CITY OF OREGON CITY
PLANNING COMMISSION
AGENDA

Commission Chambers, Libke Public Safety Facility, 1234 Linn Ave, Oregon City
Monday, April 25, 2022 at 7:00 PM

This meeting is in person hybrid via Zoom; please contact ocplanning@orcity.org for the meeting link.

CALL TO ORDER

PUBLIC COMMENT

Citizens are allowed up to 3 minutes to present information relevant to the Planning Commission but not listed as an item on the agenda. Prior to speaking, citizens shall complete a comment form and deliver it to the Chair/City Staff. The Commission does not generally engage in dialog with those making comments but may refer the issue to the City Staff. Complaints shall first be addressed at the department level prior to addressing the Commission.

PUBLIC HEARING

1. CONTINUANCE OF GLUA-21-00045 / MAS-21-00006 / VAR-22-00001 Park Place Crossing General Development Plan.

COMMUNICATIONS

ADJOURNMENT

PUBLIC COMMENT GUIDELINES

Complete a Comment Card prior to the meeting and submit it to the City Recorder. When the Mayor/Chair calls your name, proceed to the speaker table, and state your name and city of residence into the microphone. Each speaker is given three (3) minutes to speak. To assist in tracking your speaking time, refer to the timer on the table.

As a general practice, the City Commission does not engage in discussion with those making comments.

Electronic presentations are permitted but shall be delivered to the City Recorder 48 hours in advance of the meeting.

ADA NOTICE

The location is ADA accessible. Hearing devices may be requested from the City Recorder prior to the meeting. Individuals requiring other assistance must make their request known 48 hours preceding the meeting by contacting the City Recorder's Office at 503-657-0891.

Agenda Posted at City Hall, Pioneer Community Center, Library, City Website.

Video Streaming & Broadcasts: The meeting is streamed live on the Oregon City's website at www.orcity.org and available on demand following the meeting. The meeting can be viewed on Willamette Falls Television channel 28 for Oregon City area residents as a rebroadcast. Please contact WFMC at 503-650-0275 for a programming schedule.

CITY OF OREGON CITY

Staff Report

625 Center Street
Oregon City, OR 97045
503-657-0891

To: Planning Commission **Agenda Date:** 04/25/2022

From: Planner Kelly Reid

SUBJECT:

CONTINUANCE OF GLUA-21-00045 / MAS-21-00006 / VAR-22-00001 Park Place Crossing General Development Plan.

STAFF RECOMMENDATION:

Staff recommends the Planning Commission open the record, take public testimony, and continue the hearing to May 9, 2022.

EXECUTIVE SUMMARY:

The Park Place Crossing Master Plan consists of 476 residential lots planned to be provided in six residential phases on 92 acres of land. The project also includes a community park, open space, regional stormwater management facility, retail/civic, and trails components. The Park Place Crossing Master Plan area is within the northernmost portion of the larger Park Place Concept Area established in 2008 through the Park Place Concept Plan. The 92-acres was annexed into the City limits through AN-17-04.

The 92-acre site includes properties zoned Medium Density Residential (R-5), Low Density Residential (R-10), and Neighborhood Commercial (NC).

The applicant has added information to the record in the last week and granted an extension to the 120-day decision deadline to allow time for review and inclusion of the new information in the staff report. Thus, a continuance is needed to allow for staff time to review the recent information and include it in the staff report. Staff recommends opening the record to hear a brief staff summary and process explanation and to take public testimony. The record may be left open until the next hearing.

BACKGROUND:

The 92-acre subject property was annexed and assigned zoning in 2018 through AN-17-04 and ZC 17-05; this application for a General Development Plan is the next step in the development of this site. One of the conditions of approval imposed by the City on the approved annexation request was that the applicant obtain General Development Plan approval for the 92-acre area prior to any urban development on the site.

This application includes requests for the following approvals:

- **General Development Plan (GDP)**: The overall long-term approach to development through 2030 for up to 476 residential lots, including supporting parks, trails, and neighborhood commercial and civic spaces. Included in the request for GDP approval is:
    - A modification to street width standards for a limited segment of Holly Lane
    - Adjustments to the following development standards:
        - OCMC Chapter 17.08.040 and 17.10.040 Dimensional Standards, including up to 20% reduction of lot sizes, widths, depths, and setbacks
        - OCMC Chapter 17.21.090.A for garage placement and design
        - OCMC Chapter 17.08.050 and 17.10.050 Density Standards to exceed maximum density by approximately 4%

- **Variance:** Request to reduce the minimum lot size for attached single family lots to 1800 square feet.

The General Development Plan includes the following uses:

- 476 total housing units, including 126 attached dwellings and 350 detached dwellings
- Construction of a segment of Holly Lane, a planned collector street
- A future public park site of 4.4 acres
- Approximately 1.3 acres of commercial/civic space provided in two parcels
- An off-street trail system within protected natural areas

Phase 1 is anticipated to be constructed in 2023, with completion of Phases 2 through 6 accomplished by 2030. Detailed Development Plan applications for each Phase are anticipated to be submitted at a future date following approval of the General Development Plan. The provision of the OCMC 17.65, Master Plans, allow for detailed development plans to be reviewed through a Type II process following the Type III approval of a General Development Plan.

This approach allows staff, the applicant, and the public a clear road map for what is required for future detailed development plans, and clearly specifies the range of development that may be authorized and the levels of public improvements necessary to serve that development.

The applicant has added information to the record in the last week and granted an extension to the 120-day decision deadline to allow time for review and inclusion of the new information in the staff report. Thus, a continuance is needed to allow for staff time to review the recent information and include it in the staff report. Staff recommends opening the record to hear a brief staff summary and process explanation, applicant presentation, and to take public testimony. The record may be left open until the next hearing requested for May 9th. A full, detailed staff report and recommendation will be included at the continued hearing.

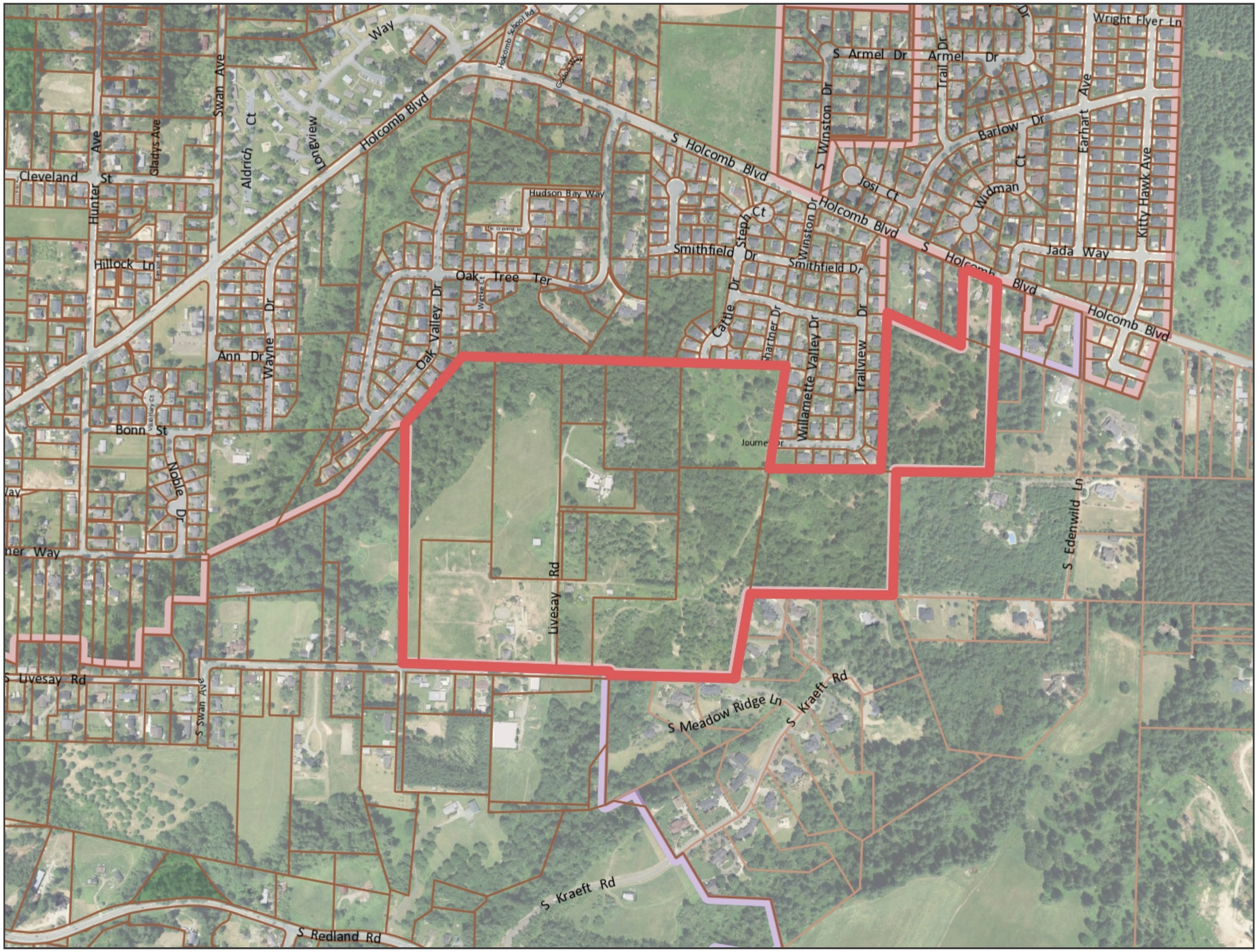
OPTIONS:

1. Open the hearing, take public testimony, and continue the hearing to a date certain of May 9, 2022
2. Open the hearing, take public testimony, and continue to hearing to another date certain

BUDGET IMPACT: N/A

Oregon City GIS Map

Item #1.

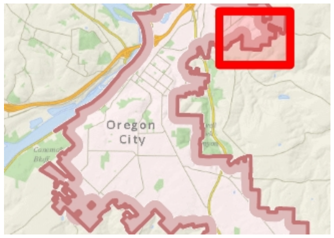


Legend

Street Names
Taxlots
Taxlots Outside UGB
City Limits
UGB
Basemap

Notes

Overview Map



0 800 1,600 Feet

1: 9,600

N

The City of Oregon City makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, surveying or navigation purposes. Notification of any errors is appreciated.

Map created 3/28/2022

City of Oregon City
PO Box 3040
625 Center St
Oregon City
OR 97045
(503) 657-0891
www.orcity.org

Public Comment Summary for GLUA 21-00045
April 18, 2022

Comment Number	Name	Summary of Comment	Staff note
1	Jed Pedersen	Owns land outside the UGB bordering the project area; concerned about stormwater impacts, safety, emergency access, and that the Concept plan maps are old. Raises questions about the accuracy of the trafffic study trip generation data and points out the the capacity of Redland and HWY 213 is inadequate.	The Concept Plan maps are from 2007 and 2008; updated existing conditions maps from the applicant have been included in the application and the information the City uses to review the development is current. Stormwater, safety, and emergency access will be discussed in the staff report. The applicant's traffic study has been reviewed by the City's consultant and found to be compelte; conditions of approval related to transportation will be included in the staff report.
2	Sharon Neisch	Concerned about numerous impacts from the development inlcuding safety, school capacity, stormwater runoff, and wildfire evacuation; multiple mentions of "Section 8" housing.	The housing types proposed by the applicant are permitted uses. Section 8 is a voucher program that can be used in any type of housing anywhere if accepted by the landlord/owner. The "Section 8" program and the related concerns brought up by this commenter will not be discussed in the staff report. Other topics will be discussed in the staff report.
3	Ken Neisch	Concerned about numerous impacts from the development inlcuding access, safety, school capacity, and stormwater runoff.	These topics will be discussed in the staff report.
4	Jackie Hammond-Williams	States that the proposal is not consistent with the Park Place Concept Plan due to lack of street connectivity with no connection of Holly Lane to Redland Road proposed. States the connections are needed for safety; mentions the wildfire evacuation constraints.	A full analysis of the proposal's relation to and consistency with the Park Place Concept Plan will be included in the staff report. Specific discussion about transportation system connectivity will be included.
5	Janice Troxler	Concerned about traffic and school capacity; mentions the wildfire evacuation constraints.	These topics will be discussed in the staff report.
6	Barbara Renken	Concerned about school capacity, traffic on Holcomb Blvd, lack of parks and sidewalks in the neighborhood. Calls for a second street access to the area before any development is approved.	These topics will be discussed in the staff report. Specific discussion about transportation system connectivity will be included.
7	Christine Kosinski	Concerns about lack of notice to property owners on Holly Lane; requests cancellation of the April 25th hearing. Concerns about landslides near Holly Lane due to additional traffic using the road, conformance with the adopted Natural Hazards Mitigation Plan, and proposed developed in hazard-prone areas. Raised numerous concerns about Holly Lane and traffic in general.	Notice was sent to all property owners within 300 feet of the site boundary, including those properties outside the city limits and Urban Growth Boundary (UGB). The hearing on the 25th will be continued due to additonal information submitted by the applicant and resulting delay in the staff report. Portions of the site are within the Geologic Hazards overlay and this will be discussed in the staff report, along with transportation and emergency access issues.

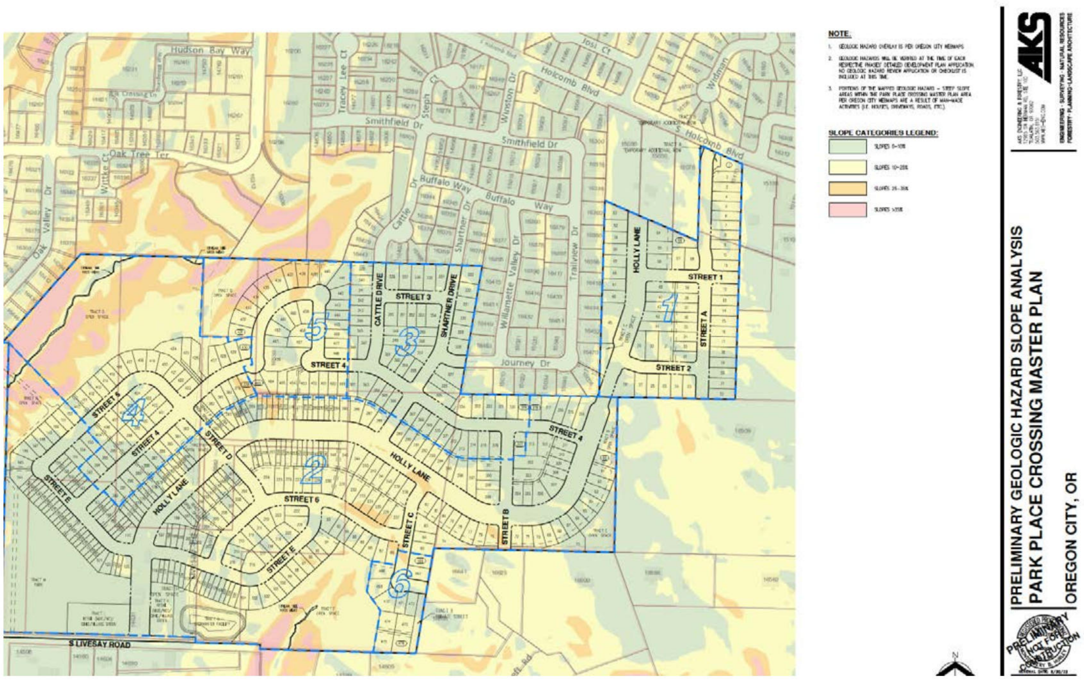
Comment Number	Name	Summary of Comment	Staff note
8	Park Place Neighborhood Association	Raises concerns about traffic on Holcomb Blvd and in the Winston Drive area due to the lack of connectivity proposed to Redland Road. Staes that the proposal does not include sufficient neighborhood amenities suchs as shopping, dining, etc that are included int he Park Place Concept Plan	These topics will be discussed in the staff report. Specific discussion about transportation system connectivity and commercially-zoned parcels will be included.
9	Hamlet of Beavercreek	Concrned about landslide risks in the proposed development area and about transportation capacity at Redland, Holcomb, and HWY 213.	These topics will be discussed in the staff report. Specific discussion about transportation system connectivity and geologic hazards will be included.
10	Clackamas County Engineering	Clackamas County has jurisdiction over Livesay Rd and Redland Rd. The comments provided information on stadnards that would be applcaible if the applciant is required to improve any segments of Livesay Road, indicating that significant imrpvements would be required along the street and at the intersection with Redland Road.	The County's comments and recommendations will be incorporated into the staff report and recommeded conditions of approval.
11	Metro	Indicated that one of the 14 subject parcels is annexed into the UGB, but not yet annexed into the Metro boundary.	The staff report will discuss this topic.
12	Oregon City Parks and Recreation	Indicated that the City Parks Department sees the need for the proposed park area and would accept the dedicated land. Requests the land be dedicated at Phase 1, and that infrastructure constructed by the developer be extended along the park frontage at the appropriate phase.	The Parks Department comments and recommendations will be incorporated into the staff report and recommeded conditions of approval.
13	Clackamas River Water (CRW)	CRW indicates that areas that cannot be served by the City with water services will be served by CRW.	Water services will be discussed in the staff report.
14	Oregon City Building Department	No conflicts	N/A
15	Oregon City Economic Development	Supports inclusion of commercial parcels in the proposal; raises concern over lack of specific development proposed for those parcels; requests measures to expedite the development of the parcels to ensure that amenities can be provided in in the neighborhood.	The Economic Development Department's comments and recommendations will be incorporated into the staff report and recommeded conditions of approval.

From: Jed Peterson
To: Planning
Subject: Notice of Planning GLUA-20-00045
Date: Thursday, March 31, 2022 5:47:47 PM

I am very concerned regarding the proposal. The maps are clearly out of date and therefore inaccurate. My property at 16586 S Edenwild Ln, Oregon City, OR 97045 is at risk with these changes due to significant storm water redirection that will negatively impact me. On one map it shows my house and my neighbors house as not existing and our properties are "Constrained Land - Open space." Clearly that inaccuracy will affect all of the projections. There needs to be a major revision on these plans to take into account changes that have occurred over the past several years. When the plans are based on this level of inaccurate information, I question the whole process.

Sincerely,
Jed Peterson
home (503) 974-9203

From: Jed Peterson
To: Kelly Reid
Subject: Topography map
Date: Saturday, April 2, 2022 6:37:59 PM
Attachments: Screen Shot 2022-04-02 at 6.31.57 PM.png



This map appears to show that a tremendous amount of runoff will be affecting my property and my immediate neighbors' property. The sparse "Tract E Open Space" will clearly not be sufficient. There needs to be major changes to the plan as submitted. I believe that Street 4, Street B and Holly Lane will need to be reworked to account for the water.

Thanks,
Jed Peterson

From: Jed Peterson
To: Kelly Reid
Subject: Re: Notice of Planning GLUA-20-00045
Date: Sunday, April 3, 2022 10:31:20 PM

This is becoming more and more troubling as I investigate this development.

https://pamplinmedia.com/pt/9-news/516813-412689-assisted-by-planners-oregon-city-developers-skirt-new-code?wallit_nosession=1

There is huge concern regarding safety, traffic, fire truck availability with limited roads. Clearly, the impacts of this development are being minimized by the developers but the real world impacts will be potentially life threatening. Inadequate planning and poor execution will be beyond costly. This mistake must not be allowed to occur.

Sincerely,
Jed Peterson

On Fri, Apr 1, 2022 at 14:38 Jed Peterson <jed.peterson.md@gmail.com> wrote:

> The Park Place Crossing Master Plan map is years out of date. The City of Oregon City Park Place Concept Plan Overlay Map is years out of date. The Existing Conditions Plan Park Place Crossing map and the Post-Developed Basin Map are not reflective of other properties that will be impacted. I am downhill from Phase 1 and potentially downhill from part of Phase 2 and see this as a tremendous potential problem. These concerns regarding stormwater are just a fraction of my concerns regarding these plans. This high density development is going to permanently change the topography of this area with the tremendous loss of trees and other wildlife. I can look at an up to date map on Google Maps and see that there will be a disruption of a long stretch of forested land. That is really disappointing. Light pollution and transportation impacts will also be quite noticeable and potentially unacceptable.
>
> Sincerely,
> Jed Peterson
>
> On Fri, Apr 1, 2022 at 12:57 PM Kelly Reid <kreid@orcity.org> wrote:
>
>> Hi Jed,
>>
>> Thank you for the email, I will add it to the record for this land use review. Are there specific maps or page numbers that you are referring to?
>>
>> Thanks,

Kelly Reid

She/her/hers

Planner

Community Development Department, City of Oregon City

695 Warner Parrott Rd, Oregon City, OR 97045

kreid@orcity.org

(503) 496-1540 Direct

(503) 722-3789 Main

Website

Interactive Maps and Apps

On-Line Submittal of Land Use Applications

The City of Oregon City continues to offer services and programs in-person and online - find facility hours of operation here.

From: Jed Peterson <jed.peterson.md@gmail.com>
Sent: Thursday, March 31, 2022 8:30 PM
To: Kelly Reid <kreid@orcity.org>
Subject: Fwd: Notice of Planning GLUA-20-00045

Re: GLUA-20-00045, MAS-21-00006, VAR-22-00001

I am very concerned regarding the proposal. The maps are clearly out of date and therefore inaccurate. My property at 16586 S Edenwild Ln, Oregon City, OR 97045 is at risk with these changes due to significant storm water redirection that will negatively impact me. On one map it shows my house and my neighbors house as not existing and our properties are "Constrained Land - Open space." Clearly that inaccuracy will affect all of the projections. There needs to be a major revision on these plans to take into account changes that have occurred over the past several years. When the plans are based on this level of inaccurate information, I question the whole process.

Sincerely,

Jed Peterson

home (503) 974-9203

--
Sent from Gmail Mobile

From: Jed Peterson
To: Kelly Reid
Subject: GLUA-21-00045 / MAS-21-00006 / VAR-22-00001
Date: Sunday, April 10, 2022 1:45:35 PM

The transportation impact study is misleading.

The data is shown to be achieved with inaccurate information. "Due to the ongoing COVID-19 viral pandemic, traffic volumes around Oregon have been depressed relative to normal conditions. A review of available traffic count data yielded 24-hour traffic counts along S Holcomb Boulevard east of S Barlow Drive from November 2, 2017, and year 2019 annual average daily traffic (AADT) along OR-213, just south of Redland Road from ODOT's Transportation Volume Tables. Given these available counts, the following methodology for data collection and volume adjustment was utilized..." A repeat detailed analysis should be performed as the collection dates were in the peak of COVID-19 when traffic was artificially low. Even analysis performed now is likely to be depressed compared with the future given that return to onsite work has been delayed for many businesses. The massaging of data throughout the report is flawed and cannot achieve the accuracy required for a project of this scope.

The executive summary notes: "that the site is projected to generate a net additional 290 morning peak hour trips, 390 evening peak hour trips, and 4,064 average weekday trips." However, the average household in the US generates approximately 9.5 trips per weekday by all modes. Being that the potential homes are in a location not ideally situated for biking or walking, the vast majority of those trips will be via car. The average US household has almost 2 cars and again given the potential location of these homes, it can be easily assumed that most of these homes will have 2 cars. Therefore, the impact on transportation appears to be deeply flawed just from basic statistical analysis.

It is also concerning that: "For the intersection of Redland Road at OR-213, the intersection is projected to operate in excess of acceptable per jurisdictional standards during the 2nd evening peak hour under 2026 buildout conditions (Phase 1) and for all succeeding analysis scenarios through year 2030. Additionally, extended queuing beyond available lane storage is expected to occur at some of the turn lanes of the two Redland Road study intersections. Although no specific mitigation is planned at either intersection..." As such, I cannot imagine a scenario where all of the phases get approved. Only phase 1 could possibly be approved as other phases would adversely affect not only existing residents but potential residents residing in phase 1 housing.

The transportation impact study also notes: "The historical traffic counts from 2019 along OR-213 were grown to reflect 2021 existing conditions by applying a 0.0118 percent per year linear growth rate over a two-year period, calculated in accordance with ODOT's Future Volumes Table." However, this does not take into account the many planned developments that will be adding to that growth. That project growth rate does not take into account the many developments that are in process or will be in process over the next several years.

The second hour analysis at the intersection of Redland Road at OR-213 is unacceptably compiled. Not even a full hour of data was collected for the analysis,"approximately 25 minutes worth of counts were collected." The complete lack of effort by the impact study to obtain accurate data is astounding. As such, more data massaging was completed that isn't based on reality but on arguably false assumptions.

Their conclusion conveniently brushes off the "2nd evening peak hour" and the fact that it will be problematic, requiring major infrastructure changes. This conclusion is clearly deceptive. How could a project of this scope proceed without those changes occuring? That should have been at the top of the conclusion. That is what we call a "rate limiting step" to the build out and should have been the initial conclusion. A more accurate conclusion would have started as, "the findings may support this project if major infrastructure changes are made at the intersection of Redland and OR-213. Without these changes, the traffic flow will fail with this development."

Thank you,
Jed Peterson

From: Sharon Neish
To: Kelly Reid
Subject: Re: GLUA-20–00045
Date: Sunday, April 3, 2022 9:46:50 PM

Really Kelly please address this at your meeting proof that there is no egress any idiot can see through this plan of yours!

https://pamplinmedia.com/pt/9-news/516813-412689-assisted-by-planners-oregon-city-developers-skirt-new-code

> On Apr 3, 2022, at 9:24 PM, Sharon Neish <sharonaneish@gmail.com> wrote:
>
> Kelli, Then I look at the crappy ugly retail plan with pictures of crappy ugly retail plazas! Really dry cleaners??? Where is urban planning??? Why dump l the section 8 in one area?? This burns me up. Why not design it like the area of Sunriver where we own another house or at least Murray Hill in Beaverton? Who came up with this plan the old fools sitting in a meeting in 2007??? That was along time ago???
> Sharon
>
>> On Apr 3, 2022, at 8:37 PM, Sharon Neish <sharonaneish@gmail.com> wrote:
>>
>> How many section 8 houses and what is the standard size lot in the Oregon city area? What is the size lot variance the icon construction is trying to obtain? Why the secrecy and why the shoddy AKS environmental plan??? I want explanations for all of this? My mother grew up in HUD housing on the east coast and I used to live near it when I was younger. It is not a pleasant experience.
>> Sharon
>>
>>> On Apr 3, 2022, at 8:24 PM, Sharon Neish <sharonaneish@gmail.com> wrote:
>>>
>>> Will HUD be inspecting this high density neighborhood? No sex offenders is usually one of the rules. Why

would metro dump 500 plus units of section 8? How much money does Oregon City gain to have higher police protection? I took a look at the icon homes behind park view manor they look like hell on earth with a high fence protecting them from what?? What are the community regulations going to be??? How would you like this mess in your neighborhood Kelly??? Why wasn't this disclosed when we bought the land????
Sharon

> On Apr 3, 2022, at 6:52 PM, Sharon Neish <sharonaneish@gmail.com> wrote:
>
> Sorry, I am blind sided since we moved into Oregon city recently and now have to deal with the tweakers and the crime rate increasing like park view manor type housing and around the Plaid pantry. Sorry I am a psych nurse and deal with it on a daily basis the huge drug crisis and homelessness. I don't trust your plan pushing the crisis into peaceful neighborhoods. Please provide facts to all new neighbors on police protection. Why are they segregating this neighborhood and offering grants???? I have little faith in being able to have security and safety with the current police force. Please provide data.
> Thanks,
> Sharon
>
>> On Apr 3, 2022, at 6:08 PM, Sharon Neish <sharonaneish@gmail.com> wrote:
>>
>> Hi Kelly,
>> I am thinking about obtaining a lawyer to review this awful plan from all perspectives. My other question is this section 8 housing low income? Why such short notice to obtain questions no one one in our

immediate neighborhood or adjoins neighborhoods knew about this shoddy cheaply built housing project. We are all up in arms about everything from water runoff, schools, traffic patterns, fire department that this will affect we realize it is lots of money involved for Oregon City in permits. Are they going to put sprinkler systems in these houses? Is the road big enough to handle emergency traffic??? The numbers of cars projected onto Holcomb look extremely low and yes you probably will have to do eminent domain to get a major artery onto Holcomb. Will you be expanding the Holcomb road for capacity for both this section 8 type housing project and the one on Serres farm???? Please explain sewer plans the 4 inch pipe does not look like it will be enough. I realize this west linn Icon builder could give a crap about this area and is out to make a buck.

Thanks,
Sharon Neish
16580 S Edenwild Lane

Begin forwarded message:

> **From:** Sharon Neish <sharonaneish@gmail.com>
>
> **Date:** April 2, 2022 at 2:42:47 AM PDT
> **To:** kreid@orcity.or
> **Cc:** Ken Neish <kenneish@gmail.com>

Subject: GLUA-20–00045

Hi Kelly,
I am in total disagreement with your metro urban pack them in master plan. I agree with affordable housing but using some builder named ICON (see other subdivisions they have produced) with cookie cutter hardiplank sided houses and 4 plexes packed in like sardines is not a solution. It looks like some crazy kind of ugly section 8 housing project from the seventies near where I grew up on the East coast and a C plus rating from the better business bureau can't be good for the people that actually buy these so called affordable homes. Please look at the reviews of this company of what the consumers have been through. The plan itself looks like hell on earth. Plus not mention all the traffic onto Holcomb that will be coming from the numerous Park Place type

‘projects’ that are in the works or under consideration. I agree with capitalism and making a buck but at what cost to the consumer for corners cut? What is this mess going to look like in 10-20 years?? No wonder why they have to put up hedges to block it from the existing neighbors, I would ask for at least a 6 foot brick/stone wall to block the view. By the way, I have never written about any other so called building project in my lifetime.

Thanks for your consideration,

Sharon Neish BSN, MS RN
16580 S Edenwild Ln.
Oregon City, OR

From: Sharon Neish
To: Kelly Reid
Cc: Ken Neish
Subject: Answer this question
Date: Tuesday, April 5, 2022 8:03:16 PM

How dishonest can you be? Commissioners' concerns about city-planning staff allegedly favoring developers over citizens recently led to an internal investigation that found city employees had not been biased. However, Terway and City Planner Kelly Reid faced disciplinary action for their failure to consult the city attorney prior to the June 2 City Commission meeting regarding when a land-use notice should be sent. Although, supposedly not biased Laura Terway tipped off Icon Construction before new building code for landslides. Mmm, have there not been other apartments buildings that developers have tried to build on landslide areas. Meanwhile, Laura has left for an area that will suit her well Happy Valley. I got to admit that suits her better her urban planning which make Levittown look good and her architectural stylings. Meanwhile old growth trees etc will be cut down by this Icon Construction for their homes devoid of any architectural value not to mention shoddy construction. See near Holcomb school.
Sharon

From: Kelly Reid
To: Kelly Reid
Subject: FW: GLUA-20–00045 comment
Date: Monday, April 4, 2022 4:15:23 PM

-----Original Message-----
From: Sharon Neish <sharonaneish@gmail.com>
Sent: Monday, April 4, 2022 1:03 PM
To: Kenneth Neish <kenneish@gmail.com>
Cc: Kelly Reid <kreid@orcity.org>
Subject: Re: GLUA-20–00045

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

One more thing for your docket. This does correlate with park place concept master plan or doesn't it? See the section about affordable housing grants. Question for icon are they receiving these grants??? Does this correlate with purposed removal of park view manor section 8 housing dates 2017 and that Oregon city has to come up with a plan to move the tenants that is acceptable to HUD so that land can also be developed. Is Icon Construction part of this solution? I know they will try to bob and weave and I understand the tax brought to the area but at what cost to all of us affected by this rash decision made in 2005 16 years ago by people who probably don't reside in the area anymore, got to admit it is one of the ugliest plans in the annuals of metro area even with the small playground and the trails.
Sharon

> On Apr 4, 2022, at 10:27 AM, Kenneth Neish <kenneish@gmail.com> wrote:
>
> Absolutely I would like all my concerns entered on the docket for a public concern.
> I see if they have proposed this project many times in the past and it has been declined because of soil instability and access issues.
> The plan also shows a number of access roads leading into private property that is not available and outside the growth boundary why?
> Going back to a year and a half ago when the chance of fire presented itself, the danger having only two access roads to this concentrated body of homes would've been detrimental and unsafe for 500 families trying to clear out in an emergency situation.
> I am also concerned that the with the development of all the new homes proposed, Holcomb grade school has no capacity to take on the additional students. Your plan also shows an abundance of subsidize homes for low income families…currently Holcomb school has a 53% need of subsidize lunches for their existing student body. Does this plan put an additional strain on the school and its resources for more subsidizing of students?
> A number of my neighbors are concerned with water runoff because they're at the base of this thing…both have wells for their water source and overflow could in turn spoil those wells.
> Your plan calls for the highest density sections other development to touch properties that are outside of the growth boundary and considered rural…why?
>
> Sincerely, Ken
>

Jackie Hammond-Williams
16303, Wayne Dr
Oregon City
OR 97045

Response to GLUA-20-00045
General Land-use Application/MAS-21-00006-Master Plan/VAR-22-00001

Dear Commissioners,
I am a 30+ year resident of Park Place. 15 years ago I was selected for the Park Place Concept Plan Committee and attended every meeting. I am deeply troubled by this proposed development.
The vision drafted for the Park Place Concept Plan was for it 'to provide a framework for growth that respects and augments the area's context, history, and natural systems. The Concept Plan emphasizes good urban design, connectivity, opportunities for place-making and cultivating community, diversity, and, above all, a way to provide for future growth in a sustainable manner'.
In fact the first key component of the Park Place Concept Plan was "the two primary north-south connections between Holcomb Boulevard and Redland Road " (Swan Avenue and Holly Lane) yet both these connectors have been removed from the current land use proposal.
During the multiple Concept Plan meetings it was stated clearly many times that the Holly Lane extension (in particular) was deemed of the utmost importance to the City of Oregon City who recognized back then the pressure of having just the single two lane Holcomb Blvd providing the main access into the neighborhood, with a narrow sharp bend at the bottom, (to this day the bend is so narrow there is not enough room for sidewalks).
15 years ago having one access road into the neighborhood was deemed a hazard for evacuation and access during an emergency, since then multiple other developments have been and continue to be built, with no new connector roads.
The Concept Plan for the biggest development yet (then referred to as the Park Place Village) provided the much needed connector roads which have now been eliminated. This leaves ALL the heavy duty development traffic, plus the future residential traffic to be carried solely by Holcomb Blvd. During the 2020 wildfire level 2 evacuation it took our family one hour to travel one mile down Holcomb Blvd.
It has been noted that the Park Place Village is now referred to as Park Place Crossing, possibly because the original concept was to create a neighborhood center in the heart of the community, with live/work development, along with retail, office, civic space and good connectivity to the rest of the city all of which has mostly been abandoned. To reduce vehicle trips on Holcomb (and Redland Rd, given the Holly Lane extension would be built) the concept of a village was planned, with enough amenities provided in place to residents to reduce trips out of the neighborhood.
I would urge you to thoroughly read through the original Concept Plan as devised with input from multiple residents of the neighborhood over many months and to drive the area noting the constraints on egress posed by Holcomb Blvd for such an enormous development.
In the interest of public safety and to maintain some kind of livability in Park Place this development should be shelved unless and until additional connector roads are built providing the already desperately needed safe connectivity to the rest of the city.

April 7, 2024

City of Oregon City Planning Commission

Re: Master Plan and Variance – Park Place Crossing Development

I have read thru the various files and see that the proposed park and trails look awesome.

Issues for me:

1. Traffic with 427 homes and a park area for games. Yes, some will go out onto Redland Rd and some out Holcomb Blvd. Holcomb Blvd already has issues with traffic from the old neighborhoods and the Kitty Hawk area. Then, the old Serres farm will soon have more homes. At least 2 cars per home for all of the proposed land use!! Both Redland and Holcomb are 2-lane roads. Once all of this traffic gets to the intersection of Abernathy, Holcomb, and Redland Rd they will also encounter traffic. Plus more in the future from the proposed land use at the “old dump” site.

   The beautiful and historic Oregon City is going away!!

2. New schools will need to be built – the residence will be paying for these!!

Please consider there will be too many homes, too many people, too much traffic. During the fires a couple of years ago when we had to evacuate it took us 2-1/2 hours to drive 5 miles to safety.

Thank you,

Janice (Jan) Troxler

OREGON CITY

Community Development – Planning

695 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LAND USE APPLICATION TRANSMITTAL – RESPONSE FORM

Date: 4/11/2022

Land Use Application File Number: GLUA-20-00045

NAME: ~~Stephen VanHaverbeke~~ Barbara Renken

AGENCY: ~~Park Place Neighborhood Association~~

EMAIL ADDRESS: ~~steve@vanhaverbeke.org~~ minflower@comcast.net

The land use application material is referred to you for your information, study and official comments. Your recommendations and suggestions will be used to guide the Planning staff when reviewing this proposal. If you wish to have your comments considered and incorporated into the staff report, please return a copy of this form to facilitate the processing of this application and to ensure prompt consideration of your recommendations.

Please check the appropriate spaces below.

	The proposal does not conflict with our interests.
X	The proposal conflicts with our interests for the reasons attached. (Please attach additional information)
	The proposal would not conflict our interests if the changes noted below or attached are addressed.

Please add any specific comments below or attach a separate document with more information.

See attachment.

CONTACT THE PLANNING DIVISION IF YOU HAVE ANY QUESTIONS ABOUT THIS APPLICATION

Comment #6

Response to GLUA-20-00045 General Land Use Application/MAS-21-00006-Master Plan/VAR-12-00001

April 8, 2022

We previously submitted a written comment on March 6, 2019 to the Oregon City Planning Commission, after studying and discussing the revisions proposed at that time, resulting from the January 2019 PPNA presentation at our meeting by Pres. Greg Stone. These comments were the result of many Park Place Neighborhood Organization Meetings, attended by the Park Place Neighborhood Committee as well as meetings with many residents in the Park Place area, who were greatly concerned about several issues with the revisions. The neighborhood residents live in several subdivisions some of which are relatively new and some which have existed for decades. There was a basic LACK OF UNDERSTANDING IN THE HUNDREDS OF PAGES IN THE NEW CODE ADOPTION DOCUMENT REQUESTS FROM THE DEVELOPERS. Attendees requested the City Staff explain it in citizen language.

Kelly Reid spoke at our February 25 General Meeting . There were many questions she was unable to answer, not because she wasn't prepared, but because NO ONE KNOWS THE OUTCOME OF THE LANDSLIDE ISSUES , INFRASTRUCTURE, FURTHER ANNEXATIONS REQUIRING ACCESS WILL RESULT IN. At that time residents were aware of a proposed **700** homes proposed or in progress in our neighborhood, all accessed by one road, **HOLCOMB BLVD**.

Other concerns are where is a second High School in this area?? A Park in 'Park Place'??? Sidewalks to be able to walk nto town??

We have lived here for 18 years and been active residents in our community and in the city. As a member of the CIC for several years, I've come to know many of you and worked with you on many projects. I had higher expectations. Some of you listen and hear the residents while some of you only hear the developers.

That is not what this is about. This is about:

RESIDENTIAL SAFETY, ACCESS TO A LOCAL PARK, TRAFFIC CONGESTION especially in a time of crisis such as fire, which we recently had the experience to live through, not easily because of lack of ability to leave the area. Some residents returned to their homes, hoping to make it safely through the events.

We feel there should be NO DEVELOPMENT OF MAJOR PROJECTS UNTIL A SECOND ACCESS TO THE AREA IS ESTABLISHED. WITHOUT A SECOND ACCESS THERE IS NO WAY TO INSURE SAFETY FOR RESIDENTS IN A TIME OF ANY FORM OF CRISIS, not to mention normal traffic times of day with only ONE EXIT.

Repectfully submitted,

Barbara Renken 15090 Oyer Drive, Oregon City 97045 **PARK PLACE NEIGHBORHOOD**

Oregon City Planning Commission
Meeting of April 25, 2022

Today's date: April 11, 2022
Time sent to City: 2:00pm

Testimony of: Christine Kosinski, Unincorporated Clackamas County, Holly Ln

Agenda File #: GLUA-21-00045/MAS-21-00006/VAR22-00001 Master Plan and Variance for Park Place Crossing Development

I ask the City to cancel the upcoming April 25th Planning Commission meeting because

1. The City has purposely not sent notice of the meeting to the homeowners on Holly Ln, outside the UGB.
2. The City is non-compliant with Statewide Land Use Goal 1 as stated below.
3. I ask the City to invite and meet with ALL homeowners on Holly Ln, whether in or out of UGB
4. I ask the City to invite DLCD to this meeting for non-compliance with Land Use Goal 1
5. I ask the City to invite LCDC to this meeting because you are non-compliant in your Comprehensive Plan.
6. I ask the City to invite Metro and ODOT because they approved dense development which goes against Land Use Goal 7 , developing in a hazardous area, and because ODOT said it was O.K. to use Holly Ln rather than to construct the Grade Separated Intersection at Hwy 213/Beavercreek, placing hundreds of people in harm's way, which also goes against Goal 7 as well as the OC NHMP with FEMA.
7. I ask the City to invite DOGAMI to see the dense development in a hazardous area with zoning codes that should not be allowed here.
8. I ask the City to invite Clackamas County as a representative to the people of Holly Ln, since Holly Ln is still a County Road. As well, the OC Natural Hazards Mitigation Plan is an Addendum to the Clackamas County NHMP.
9. I ask the City to invite FEMA to this meeting with Holly Ln homeowners regarding the City's NHMP agreement with FEMA. The people of Holly Ln have already lost a boat load of money in previous landslides, they need reassurance FEMA will continue to support them in future landslide losses.
10. I am not crazy in asking you to do this, please remember, a City united will stand, but a City divided will surely fall. Which way would you rather have it?

Because of the many complications and issues that remain **unresolved** for this Park Place Crossing Plan, **I REQUEST THAT THE CITY KEEP THE RECORDS OPEN (until completely resolved) for this land use application.** Following is information on each outstanding and unresolved issue for this land use application.

STATEWIDE LAND USE GOAL 1- Goal 1 calls for "the opportunity for **all** citizens to be involved in **all phases** of the Planning Process". It requires each City and County to have a Citizen Involvement Program that addresses...........

1. Opportunities for widespread public involvement
2. Effective two-way communication with the public
3. The ability for the public to be involved in all phases of the Planning Process
4. Making technical information easy to understand
5. Feedback mechanisms for policymakers to respond to public input, and
6. Adequate financial support for public involvement efforts

Goal 1 also calls for local governments to have a committee for Citizen Involvement (CCI) to monitor and encourage public participation planning.

Resolution is required from The Oregon City Planning Commission for discrepancies and for not meeting the State's Terms and Conditions of Goal 1. The people of Holly Ln ask you to resolve the question of why has the City never invited, mailed a notice to, or contacted any of the people of Holly Ln regarding involvement in, the Planning Process making technical information easy to understand, giving people of Holly Ln any understanding of feedback mechanisms for policymakers to respond to public input, and for taking away any and all opportunity for the people of Holly Ln to be included in widespread public involvement. **Additionally**, why were the people of Holly Ln completely left out of all phases of the Planning Process in 2013 when the City, decided on it's own, to add Holly Ln to their TSP against the will of the people. Additionally, why were the people of Holly Ln completely left out of any and all land use developments, involving Holly Ln and transportation, **even though the people of Holly Ln have been very vocal in the past, requesting the opportunity to be involved and to speak to both the Planning and City Commissions about their concerns for very heavy traffic being proposed for their street.** <u>THE PEOPLE OF HOLLY LN HAVE BEEN DENIED ALL DUE PROCESS OF THE LAW BY THE CITY OF OREGON CITY.</u>, therefore, all development affecting Holly Ln all the way back to 2004 shall be negated, shouldn't it? The City has completely wiped the people of Holly Ln off any and all invitation lists, these people have been notified of nothing, isn't that true? DLCD and LCDC need to rule on this as the City has committed a horrible crime to these homeowners who the City has completely ignored because they knew if the people were aware of the plans they had made for Holly Ln, there would have been a huge citizen uprising

Please also note that in the Applicant Narrative, the developer has met with the Park Place Neighborhood Association, but the developer never met with the people of Holly Ln regarding the transportation plan, nor the use of Holly Ln and the proposal to build a Holly Ln extension to connect to Holcomb Road.

So, Oregon City, how many ADT's per day do you now propose for Holly Ln? In 2007, just for the Park Place Plan, you gave us a figure of at least 20,000 per day. Now add traffic from the Beavercreek Road Concept Plan, in 2007 it was about 40,000-50,000 ADT's per day. The City has more than 100 streets in the City pointed directly at Holly Ln, which you know and we know is totally unsustainable, extremely unsafe and unlivable for the people currently living here. Yes, I have brought this to the attention of the City and NOTHING has been done. The City intends to literally ignore the people of Holly Ln, while they continue to development irresponsibly in building the necessary infrastructure needed to support their lofty plans.

<u>**STATEWIDE LAND USE GOAL 7**</u> – Areas Subject to Natural Hazards
Goal 7 is written to “protect people and property from natural hazards”. Local governments shall adopt comprehensive plans to reduce risk to people and property from natural hazards. Holly Ln is subject to landslides. In 1996-97 alone, two homes were complete losses and four other homes suffered serious damage. Holly Ln sits in a highly susceptible landslide area for landslides to occur in the future. The homeowners here also are unable to obtain Insurance for losses due to Landslides, in fact, there is NO insurance for losses due to landslides in the world. No insurance company in the U.S. will write coverage for landslides, so bids go out into the world, and Lloyd's of London, may in some cases, write coverage, however they **will not insure any property within ONE MILE of a previous landslide,** which means No homeowners on Holly Ln and No homeowners in Park Place can be insured due to the plethora of landslides here.

OREGON CITY'S COMPREHENSIVE PLAN – LANDSLIDES, It is stated in the Comprehensive Plan that Landslides can be triggered by heavy rains, ground shaking from earthquakes and heavy traffic, as well as development, such as cuts in road construction, and undercutting the lower edge of a slope, which can be caused by erosion along stream banks. The landslides on Holly Ln in 1996-97 occurred during a prolonged period of very heavy rains and flooding, which resulted in two homes being completely destroyed and four homes which suffered disastrous destruction. Oregon City is going against it's own Comprehensive Plan because of the many highly susceptible landslides on Holly Ln which can fail due to either heavy, vibrating traffic (as the City proposes more than 40,000 ADT's per day) or to development, such as cuts in road construction which will occur. Again, none of the homeowners on Holly Ln can obtain insurance for losses due to landslides because Lloyd's of London (the only carrier) will deny coverage if your property is within ONE MILE of a previous landslide. If Oregon City approves this amount, and more, of traffic per day down Holly Ln, then the City will be responsible for all losses due to landslides, as we have warned the City on many occasions that the homeowners on Holly Ln. will not be able to obtain landslide insurance. A similar situation arises on Trailview Dr where the City proposes to build a Holly Ln Extension(within 20-30 feet of these homes) to connect to Holcomb Rd. The homeowners here, where heavy traffic will be vibrating and shaking their homes, will suffer damages to their homes from this vibration and from development and road construction. These homeowners as well cannot obtain landslide insurance, another huge liability for the City. Again, we asked the City to work on the landslide isue more than 12 years ago.

OREGON CITY'S ADDENDUM TO THE CLACKAMAS COUNTY MULTI-JURISDICTIONAL NATURAL HAZARD MITIGATION PLAN (NHMP)

This is an agreement Oregon City signed in September of 2019 with FEMA. The plan must be renewed every five years, therefore will renew in 2024. Once the agreement is signed, the City is allowed to collect payments from FEMA for Hazard losses. The problem is that the City has failed to abide by some of the terms of this agreement, such as the following, for example see Pg. 46 of this agreement. Under heading 2018 Status/Rationale for Proposed Action Item, it is stated "The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community. Incorporating natural hazards plans into comprehensive plans, local ordinances, and land-use regulations will ensure that communities implement the proper mitigation measures for their community. Please note, that to date, the City has not integrated the natural hazard plan into it's comprehensive plan nor it's local ordinances, even though I have previously testified to the City regarding this matter and I suggested the City needed to add this plan (NHMP) to both it's Comprehensive Plan as well as being added to the Upgraded Hazard Regulations. Lastly, on this page, FEMA suggests the City use Zoning Codes to regulate development in hazard-prone areas, the City has failed to do this. Instead of applying Zoning for R8 and R10 homes, here in a landslide area, the City has gone as low as R-2. This makes the City non-compliant to it's agreement with FEMA putting the City into jeopardy of renewing the hazard plan in 2024. This would place huge liability upon the City & the people.

Now, I ask that you turn to Pg. 53 of this NHMP document that was drafted to Protect Life and Property. Please read under the heading of "ideas for implementation", where FEMA suggests the City makes certain "there are no adverse impacts on other properties" and "limit construction in known landslide areas". Again, Oregon City fails to meet this criteria. The Park Place Crossing application does NOT limit construction in known landslide areas, and yes there will be plenty of adverse impacts on other properties. Both Holly Ln and the proposed Park Place area for development are heavily affected by landslides. There have already been Adverse impacts on Oak Tree Terrace where a home has suffered drastic de-valuation of their property and NO mitigation will stop this landslide in the future. As well, the many landslides on Holly Ln, sit in a High Susceptibility area where landslides have a high chance of re-occurring and the people have NO insurance. Another example where the City has been non-compliant to this agreement.

I could go on and on giving you many more examples, but the bottom line is that the City has signed an agreement with FEMA in exchange for Hazard funds, but the City has failed to live up to it's part of the plan.

ADDITIONAL ISSUES , THAT NEED RESOLUTION FROM THE PLANNING COMMISSIONS

1. Holly Ln is a FIRE TRAP. The heavy proposed traffic makes it impossible for the homeowners to get in and out of their properties and raises huge safety issues. We are trapped by both Redland Rd and Maplelane roads.
2. The people of Holly Ln demand to know, from the City, how they will access Holly Ln
3. The people of Holly Ln demand to meet with both the City and Developer. You met with the Park Place Neighborhood, but shut out all the people on Holly. Violation of Goal 1
4. We want the name of “Holly Ln extension” changed. Leave our street alone and give the extension it's own name. We are NOT the City's FREEWAY!
5. The people of Holly Lane (in it's entirety) demand to be invited to all future meetings at the City where Holly Ln is involved in any way. A requirement of Goal 1
6. The people of Holly Ln ask to meet with the City regarding the TSP and inclusion of Holly Ln
7. Street Trees – All Sidewalks **must have rebar in them**. The City is not using Rebar thus the tree roots come up under the cement and the poor homeowners are bearing the losses. Please do this right.
8. Holly Ln has previously testified to the City regarding the fact there is NO Landslide Insurance available to homeowners living in hazardous areas, we requested the City go to the State and work on a plan where the homeowners will not bear the heavy losses of damages due to landslides. We ask the City to do this NOW, and if you don't then the City becomes liable if it cannot be responsible to live up to it's NHMP agreement with FEMA.
9. Lastly, the Alternative Mobility Targets – Why did the City do this? You are putting more and more people at risk for injury and/or fatality. During the City meetings regarding the alternative mobility targets, your consultant came straight out and stated that rear end crashes continue to rise near the intersection of Hwy 213/Beavercreek. The consultant went on to state, that unfortunately, authorizing the addition of the mobility target will **increase rear end collisions.** I am having a hard time believing the City approved this! To know that you are approving **more rear end crashes, what about the poor people**, many could be maimed for life or possibly lose their life, all because the City had to have an alternative mobility target in order to continue developing! Is this the cost of development, people's lives? I think this is shameful and I know there is a better way. Please spare the people in your decisions in the future and please approve only development that meets and/or exceeds the 19 Statewide Land Use Goals, development that is safe and livable for the people.

OREGON CITY

Community Development – Planning

695 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LAND USE APPLICATION TRANSMITTAL – RESPONSE FORM

Date: 4/11/2022

Land Use Application File Number: GLUA-20-00045

NAME: Stephen VanHaverbeke

AGENCY: Park Place Neighborhood Association

EMAIL ADDRESS: steve@vanhaverbeke.org

The land use application material is referred to you for your information, study and official comments. Your recommendations and suggestions will be used to guide the Planning staff when reviewing this proposal. If you wish to have your comments considered and incorporated into the staff report, please return a copy of this form to facilitate the processing of this application and to ensure prompt consideration of your recommendations.

Please check the appropriate spaces below.

	The proposal does not conflict with our interests.
X	The proposal conflicts with our interests for the reasons attached. (Please attach additional information)
	The proposal would not conflict our interests if the changes noted below or attached are addressed.

Please add any specific comments below or attach a separate document with more information.

See attachment

CONTACT THE PLANNING DIVISION IF YOU HAVE ANY QUESTIONS ABOUT THIS APPLICATION

Comment #8

Park Place Neighborhood Association, Oregon City, Oregon

The Neighborhood at the End of the Oregon Trail

Response to GLUA-20-00045 General Land Use Application / MAS-21-00006 – Master Plan / VAR-22-00001

The new development represented by this application will have serious impact on the livability of the Park Place area. Primarily in the subdivisions off Winston Dr, but also any homes that depend on Holcomb Blvd for driving to or from home. There are currently 1400 addresses in our neighborhood, most of which are dependent on Holcomb for getting in and out. This new development will add another 470 units (or more) all of which will connect only to Holcomb. This will seriously impact those of us who must make a left turn onto Holcomb, especially in the event of an emergency, such as the fires of September 2020. During that event, it required over an hour to drive the one mile from Winston to Redland. Any additional load on the street will make it even more problematic.

The other issue we have is that all the construction traffic will be driving on Winston to access the site. The plans call for multiple phases extending for 8 years. Again, the original development called for access from Redland Rd, but that area was not part of this annexation.

After the completion of the development, there will be another issue. All the traffic in and out of the new neighborhood and the existing subdivisions off Winston will have to drive out to Holcomb on Winston, or possibly Holly. This area will be a serious bottleneck. Again, this could have been alleviated by connecting using Holly Lane through Redland. There is an existing connection possible – Livesay Rd – but current plans indicate that it will be blocked and only accessible for emergency vehicles. I can understand that the people who live off Livesay would not be happy to have the additional traffic driving through their unincorporated area. At the time of the annexation, it was stated that 70% of the traffic from the new development would use Livesay to Redland, and that there would be required modifications to Livesay Road to allow this use.

This development purports to follow the requirements set forth in the Park Place Concept Plan – a village atmosphere with shopping, dining, coffee shops, and playgrounds. As this application only covers a quarter of the area, it does not provide for any of this. As residents of Park Place, we would want to make sure that these amenities are covered in any development being considered.

Comment #9

The Hamlet of
BEAVERCREEK
PO Box 587 • Beavercreek • Oregon • 97004

Serving the Communities of Beavercreek, Carus, Echo Dell & Fishers Corner

To Kelly Reid, Planner
City of Oregon City

RE: Land Use Transmittal for Park Place Crossing Master Plan: GLUA-20-00045 / MAS-21-00006 / VAR-22-00001

The Board of The Hamlet of Beavercreek has received and reviewed the above listed land use transmittal. We have two topics we'd like to bring forward:

- Landslides – please see the two attached DOGAMI SLIDO maps. The first, a map of historic landslides in the development area. The second, a map of landslide susceptibility. There are historic landslides in this proposed development area and a VERY high susceptibility of future landslides. These facts are denied in the application and coupled with the fact that you CANNOT purchase landslide insurance for your home, should give the City, the Applicant, the Representative and the citizens of the City pause before irresponsible development.
  The City of Oregon City signed a contract with FEMA in 2019 committing to the Natural Hazards Mitigation Plan. This contract requires the restriction of development in areas of know hazards.

- Transportation – Redland Road, Holcomb Boulevard, the intersection of both of these roads and the intersection of Redland Road and Highway 213 are all at a "failing" level; meaning unacceptable congestion. Please see page 5 of 48 item number 11 of your Lancaster Mobley Park Place Crossing Master Plan Transportation Impact Study. Two of these roads are NOT the responsibility of Oregon City, but the County of Clackamas and the State of Oregon. Adding this type of development without the planning and funding of adequate improvement is irresponsible development.

Please understand that The Hamlet of Beavercreek is not against development, only **irresponsible development** that seriously impacts the safety and quality of our citizens' lives and has no regard for "what happens after my home slides down the hill?"

We are certainly happy to provide additional information or answer questions. Thank you for this opportunity to provide input to your land use process.

Sincerely,

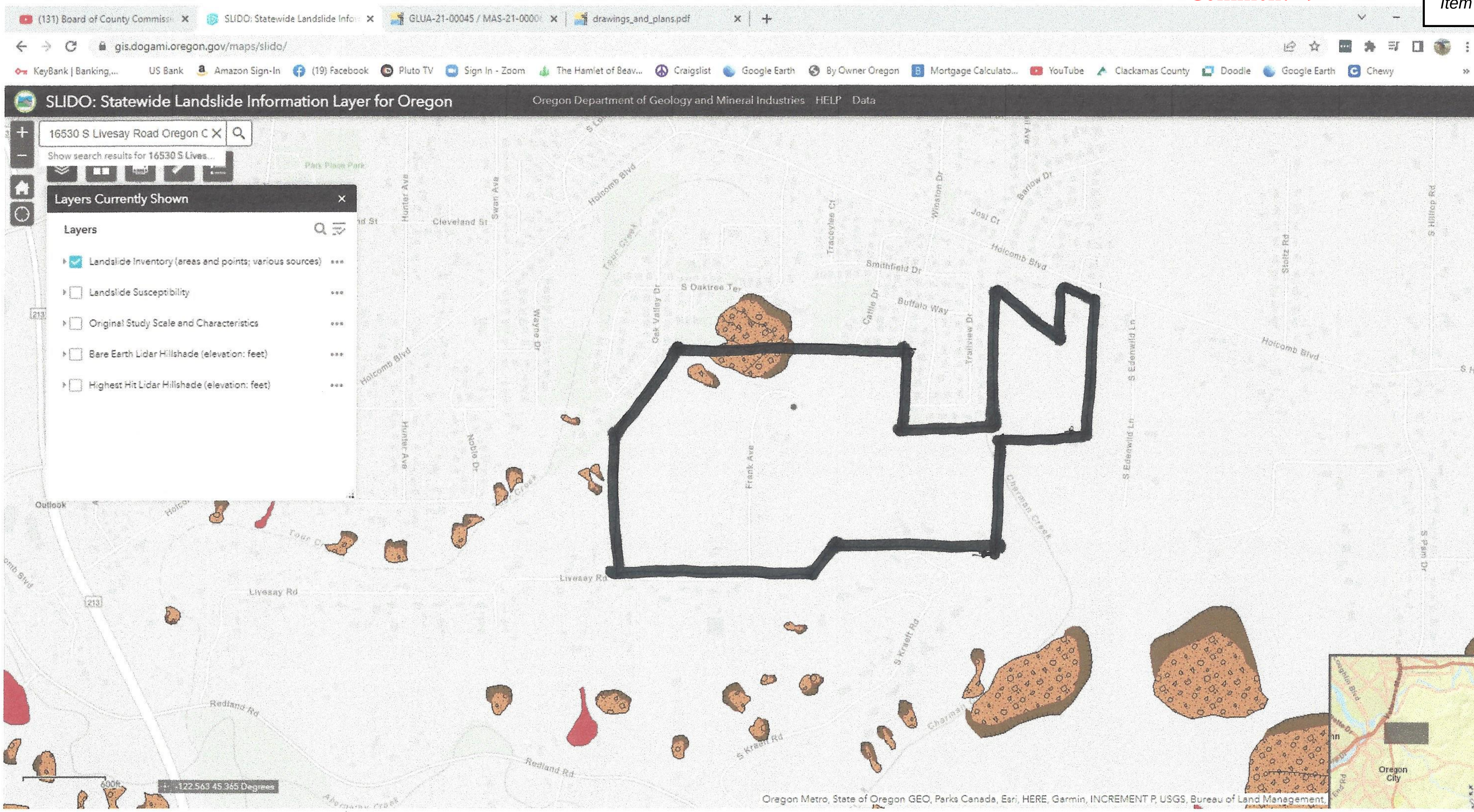
Tammy Stevens, Chair
The Hamlet of Beavercreek
503.939.3552

Enclosures

Message Phone 503–632–8370

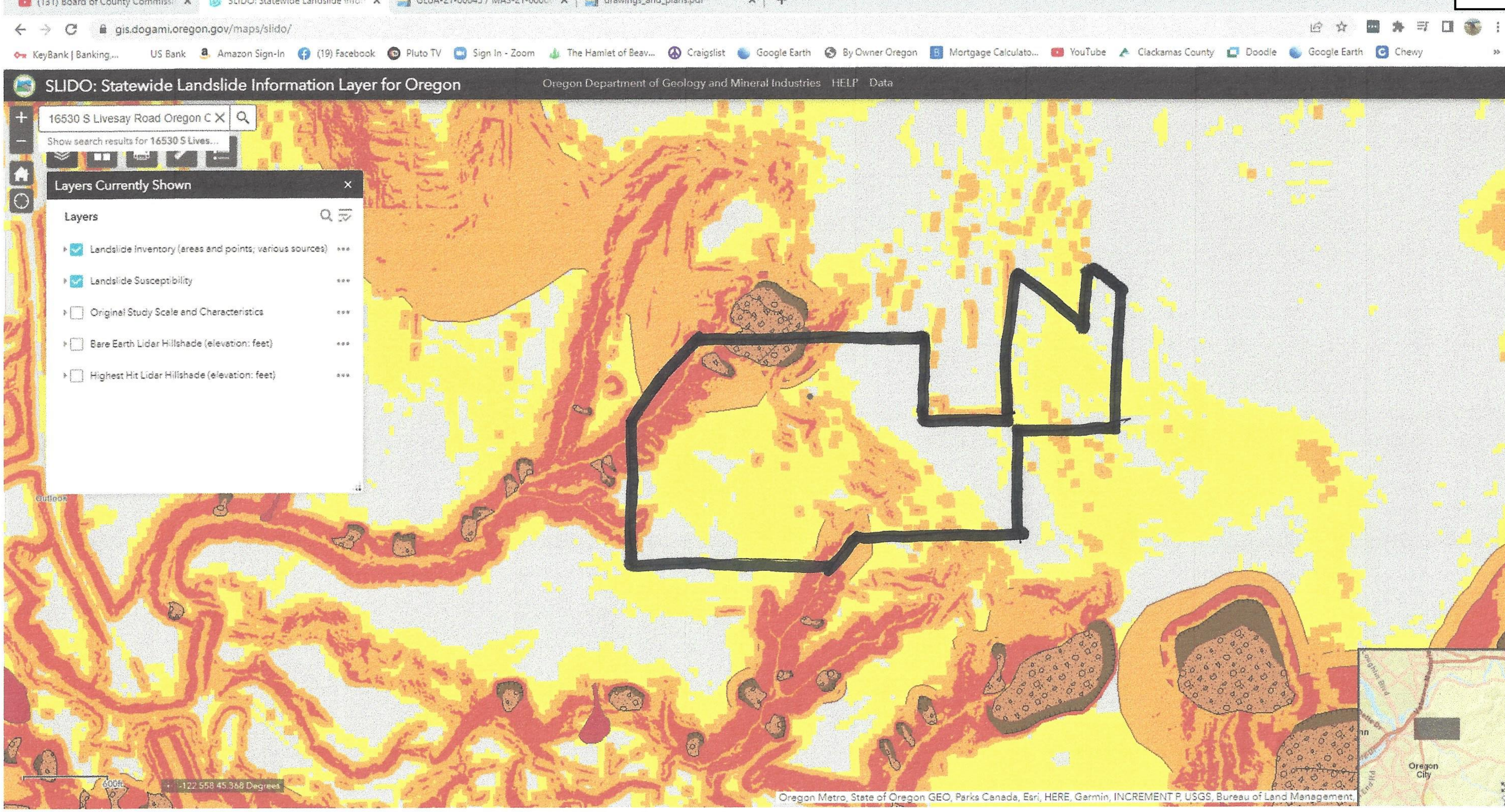
Comment #9

Item #1.



Comment #9

Item #1.



Comment #10

DAN JOHNSON
DIRECTOR

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD OREGON CITY, OR 97045

MEMORANDUM

TO: City of Oregon City, Planning Division
FROM: Kenneth Kent, Clackamas County Engineering, Senior Planner
DATE: April 15, 2022
RE: Park Place Crossing Master Plan: GLUA-20-00045 / MAS-21-00006 / VAR-22-00001

This office has the following comments pertaining to this proposal:

1. The proposed master plan provides for 477 lots, developed in six phases and is part of the larger Park Place Concept Plan. As indicated in the public notice, detailed development plans will be reviewed and approved for each phase through subsequent land use.

2. The proposed Park Place Crossing Master Plan includes frontage on S Livesay Road, which is a county collector roadway. The project site has approximately 1,095 feet of frontage on north side of the S Livesay Road right-of-way. This portion of the site include development of a future commercial uses, a community park and a water quality facility. The proposed master plan indicates that access to S Livesay from the extension of Holly Lane will be gated.

3. The Park Place Concept Plan identifies new roadways ultimately providing connectivity between S Redland Road and S Holcomb Boulevard, including a south extension of S Holly Lane. As noted in this master plan, access will be provided from S Holcomb, with gated emergency access provided to S Livesay Road at Phase 2.

4. Although, the current proposal does not include a through connection to S Livesay Road, the County has concerns about the impact to Livesay Road and its intersection with Redland Road, if full access is proposed in the future, especially if a through connection has not been completed via S Holly Lane to S Redland Road. The County has a capital improvement (CIP) project at the existing S Holly Lane/Redland Road intersection for a signal or roundabout, but appears to be based on the current configuration.

5. Even if Holly Lane is extended to S Redland, the Park Place Concept Plan does not address the S Livesay Road/S Redland Road intersection. Before access is provided to S

Comment #10

Livesay Road from the proposed master plan, additional analysis of traffic impacts to the off-site roadway and the S Livesay Road/S Redland Road intersection will require evaluation through a transportation impact study, including the possible need for a left turn lane and adequate intersection sight distance.

The adequacy of the existing width of S Livesay Road and adequacy to support traffic from the development will need to be evaluated. The current paved width of S Livesay Road is less than 20 feet, varying from 17.5 to 19 feet. The minimum width considered adequate for two-way travel is 20 feet. If access to S Livesay Road is proposed, at a minimum off-site improvements to widen the existing paved width to at least 20 feet will be required from the project site to S Redland Road. Additional improvements will be determined based on the traffic analysis.

6. Based on the scale of the proposed development, at the time of Phase 2, frontage improvements along S Livesay Road will be required. As a collector roadway, a three-lane section is recommended, with a minimum one half right-of-way width of 35 feet.

7. Prior to commencement of site work, a Development Permit will be required and must be obtained from Clackamas County Engineering for all work performed in the S Livesay Road right-of-way.

CONCLUSION

Although the County does not have land use jurisdiction over the proposed subdivision, the County does have jurisdiction over improvements along S Livesay Road. However, the following recommended conditions reflect the County's minimum standards. Where Oregon City's standards are greater, and do not otherwise conflict with the County's storm drainage standards and maintenance practices, the City's cross section may be acceptable.

If the City of Oregon City approves the request, the following conditions of approval are recommended. If the applicant is advised to or chooses to modify the proposal in terms of access location and/or design following the preparation of these comments, this office requests an opportunity to review and comment on such changes prior to a decision being made.

1. All frontage improvements in, or adjacent to Clackamas County right-of-way, shall be in compliance with *Clackamas County Roadway Standards*.

2. The applicant shall dedicate an additional approximately 15 feet of right-of-way along the entire site frontage of S Livesay Road and shall verify by survey that a 35-foot wide, one-half right-of-way width exists, or shall dedicate additional right-of-way as necessary to provide it.

3. At the time of development of Phase 2, the applicant shall dedicate an additional approximately 9 feet of right-of-way on S Leland Road and shall verify by survey that a 39-foot wide, one-half right-of-way width exists along the entire site frontage, or shall dedicate additional right-of-way as necessary to provide it.

Comment #10

4. The following improvements will be required along the entire site frontage of S Livesay Road at the time of development of Phase 2, in accordance with Clackamas County Roadway Standards:

   a. A 25-foot wide half-street improvement is required, constructed from centerline of the right-of-way. The structural section for S Livesay Road improvements shall be constructed per Clackamas County Roadway Standards Standard Drawing C100 for a collector roadway. Where widening is required, saw-cut and grind and inlay may be needed based on road condition, per Roadway Standards Section 225.5.

   b. Standard curb, or curb and gutter if curbline slope is less than one percent, and pavement with the face of the new curb located 25 feet from the centerline of the right-of-way. Centerline of the right-of-way shall be established by a registered survey.

   c. A minimum 7-foot wide unobstructed setback sidewalk shall be constructed along the frontage of the commercial sites on Tracts L and K. The remainder of the frontage a minimum 5-foot wide sidewalk shall be constructed.

   d. A 5-foot wide landscape strip, including street trees shall be constructed along the entire site frontage.

   e. Drainage facilities in conformance Tri-City regulations and Clackamas Roadway Standards, Chapter 4.

   f. For the proposed public street intersection with S Livesay Road, construct dual curb ramps, per Oregon Standard Drawings.

   g. The intersection of Holly Lane with S Livesay Road shall be limited to gated emergency vehicle access only, with the gate approve by the Clackamas Fire District.

5. If full access to S Livesay Road from the Master Plan site is proposed at any one of the proposed phases, a supplemental TIS will be required evaluating the adequacy of the off-site portion of S Livesay Road and the intersection with S Redland Road. At a minimum, a paved road width of 20 feet will be required from the project site to Redland Road, and the roadway is deemed adequate, or made adequate through improvements to support traffic from the masterplan site. Approval of a Development Permit from Clackamas County Engineering will be required for access to S Livesay Road.

Comment #11

From: Tim O"Brien
To: Kelly Reid
Subject: RE: GLUA-20-00045/MAS-21-00006
Date: Thursday, March 31, 2022 1:32:15 PM

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Kelly
Annexation to the Metro District Boundary is separate from annexation to a city boundary. Only the Metro Council can approve an annexation to the Metro District Boundary and a city annexation does not automatically include the area into the Metro Boundary if it is not already within the boundary. All of the other subject parcels were included in the original Metro District Boundary dating back to 1979, however this one parcel was not included at that time.

Tim

Tim O'Brien, AICP
Principal Regional Planner
Planning, Development & Research

Metro I oregonmetro.gov
600 NE Grand Avenue
Portland, OR 97232-2736
Please note I am working remotely
Schedule: Monday – Thursday, 8am to 5pm

From: Kelly Reid [mailto:kreid@orcity.org]
Sent: Thursday, March 31, 2022 12:10 PM
To: Tim O'Brien <Tim.O'Brien@oregonmetro.gov>
Subject: [External sender]RE: GLUA-20-00045/MAS-21-00006

CAUTION: This email originated from an **External source**. Do not open links or attachments unless you know the content is safe.

Hi Tim,

Hmm, that does not match our records – we have that parcel included in the 2018 approved annexation. I have attached documents from the final packet sent to Metro following our annexation approval. I wonder why this parcel wouldn't have been included in the Metro boundary but it was included in the city's boundary… I did not work on this project until just last year so I am not clear on the history. Let me know if I should give you a call to discuss.

Thanks,

Kelly Reid
She/her/hers
Planner
Community Development Department, City of Oregon City
695 Warner Parrott Rd, Oregon City, OR 97045
kreid@orcity.org
(503) 496-1540 Direct
(503) 722-3789 Main
Website
Interactive Maps and Apps
On-Line Submittal of Land Use Applications

The City of Oregon City continues to offer services and programs in-person and online - find facility hours of operation here.

Website: www.orcity.org
Visit us on Facebook! and Twitter

From: Tim O'Brien <Tim.O'Brien@oregonmetro.gov>
Sent: Thursday, March 31, 2022 11:23 AM
To: Kelly Reid <kreid@orcity.org>
Subject: GLUA-20-00045/MAS-21-00006

Hi Kelly
In reviewing the materials you sent for the Park Place Crossing Master Plan I realized that one of the subject parcels is not within the Metro District Boundary – see attached map with highlighted parcel. Please forward the attached annexation packet to the applicant's representative. AKS has submitted a number of Metro Boundary annexation applications and they are familiar with the process – although they can contact me with any questions.

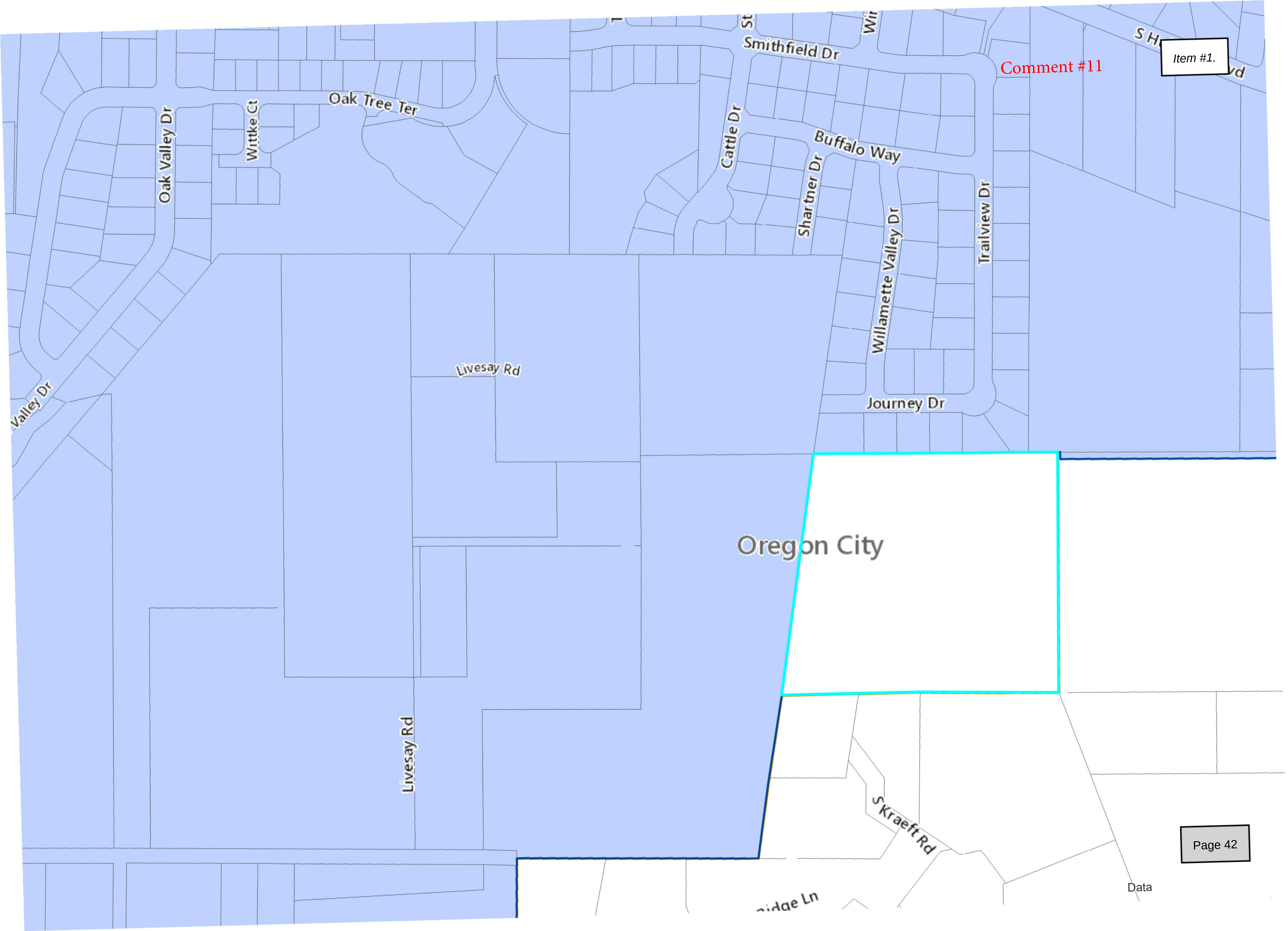
Thanks, Tim

Tim O'Brien, AICP
Principal Regional Planner
Planning, Development & Research

Comment #11

Metro I oregonmetro.gov
600 NE Grand Avenue
Portland, OR 97232-2736
Please note I am working remotely
Schedule: Monday – Thursday, 8am to 5pm

Comment #11



Smithfield Dr
Oak Tree Ter
Wittke Ct
Oak Valley Dr
Cattle Dr
Buffalo Way
Shartner Dr
Willamette Valley Dr
Trailview Dr
Journey Dr
Livesay Rd
Valley Dr
Oregon City
Livesay Rd
S Kraeft Rd
Data

Comment #12

From: Kelly Reid
To: Kelly Reid
Subject: FW: Parks comment on Park Place Crossing
Date: Friday, April 15, 2022 10:40:12 AM

From: Kendall Reid <kendallreid@orcity.org>
Sent: Friday, April 15, 2022 10:34 AM
To: Kelly Reid <kreid@orcity.org>
Cc: Aquilla Hurd-Ravich <ahurdravich@orcity.org>
Subject: RE: Parks comment on Park Place Crossing

Kelly,

Sure, here you go!

The Park Place neighborhood needs additional public park space, as determined by the adopted Parks Master Plan. The proposed 4.4-acre dedication of public park land appears to be proportional to the number of residential units in the proposal. The location of the 4.4 acres is a relatively flat part of the site that will be suitable for a park. The Parks Department would accept dedication of this land and would develop a Master Plan for the park at a future date. We would request that streets and utilities be extended to the park frontage, but we would not request that the applicant build any improvements within the park itself; the City will also utilize its own funding for the development of the park with recreational amenities. The dedication of the land should occur at Phase 1 to give the public certainty that park land will be provided within the project area if the full 92-acre development is not implemented in a timely manner.

The Parks Department would also accept a larger dedicated park space, especially given that the Park Place Concept Plan calls for an 8–10-acre park in this location. While the shadow plat map shows how additional land could be incorporated into the park in the future to create a larger park, the additional land shown is constrained by steep slopes and a stream, which would limit usable park space and would preclude various recreational uses such as athletic fields and playgrounds. It is not clear how 8 to 10 acres of open, relatively flat public park land would be fully accommodated under this plan.

Thanks,

Kendall Reid

OREGON CITY

Kendall Reid
kendallreid@orcity.org
Parks and Recreation Director
City of Oregon City
625 Center St.
Oregon City, Oregon 97045
503-496-1546 Direct phone
503-657-0891 City phone

OREGON CITY

Community Development – Planning

695 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LAND USE APPLICATION TRANSMITTAL – RESPONSE FORM

Date: 3-31-22

Land Use Application File Number: GLUA-21-00045

NAME: Betty Johnson

AGENCY: Clackamas River Water

EMAIL ADDRESS: bjohnson@crwater.com

The land use application material is referred to you for your information, study and official comments. Your recommendations and suggestions will be used to guide the Planning staff when reviewing this proposal. If you wish to have your comments considered and incorporated into the staff report, please return a copy of this form to facilitate the processing of this application and to ensure prompt consideration of your recommendations.

Please check the appropriate spaces below.

☑	The proposal does not conflict with our interests.
☐	The proposal conflicts with our interests for the reasons attached. (Please attach additional information)
☐	The proposal would not conflict our interests if the changes noted below or attached are addressed.

Please add any specific comments below or attach a separate document with more information.

CRW will be the water purveyor to those areas where the City cannot provide adequate water service per the HOPP Agreement.

CONTACT THE PLANNING DIVISION IF YOU HAVE ANY QUESTIONS ABOUT THIS APPLICATION

OREGON CITY

Community Development – Planning

695 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LAND USE APPLICATION TRANSMITTAL – RESPONSE FORM

Date: 4/5/2022

Land Use Application File Number: GLUA-20-00045/MAS-21-00006/VAR-22-00001

NAME: Chris Long

AGENCY: Oregon City

EMAIL ADDRESS: clong@orcity.org

The land use application material is referred to you for your information, study and official comments. Your recommendations and suggestions will be used to guide the Planning staff when reviewing this proposal. If you wish to have your comments considered and incorporated into the staff report, please return a copy of this form to facilitate the processing of this application and to ensure prompt consideration of your recommendations.

Please check the appropriate spaces below.

X	The proposal does not conflict with our interests.
	The proposal conflicts with our interests for the reasons attached. (Please attach additional information)
	The proposal would not conflict our interests if the changes noted below or attached are addressed.

Please add any specific comments below or attach a separate document with more information.

CONTACT THE PLANNING DIVISION IF YOU HAVE ANY QUESTIONS ABOUT THIS APPLICATION

Comment #15

Item #1.

OREGON CITY

Economic Development Department

625 Center Street | Oregon City OR 97045
Ph (503) 657-0891 | Fax (503) 657-7026

April 18, 2022

To The Oregon City Planning Commission

RE: Park Place Crossing Development

After reviewing the Park Place Crossing Master Plan, it is our understanding ICON Construction & Development, LLC intend on developing primarily a residential community that includes a community park, open space, regional stormwater management facility, retail/civic component, and trail amenities.

As you are aware, it is important to be mindful of the need to establish a balance between residential development and business tax base producing investment in the community. In the long run, it is necessary to avoid a situation where the cost of providing public services to residents overcomes the tax revenue generation capacity of for-profit enterprise. Such an imbalance can be problematic. While we recognize that homeowners pay property taxes, the tax revenue generated by private for-profit enterprise is greater and the public services required of businesses is generally less.

Hence, it is preferable that there be a for-profit business investment component realized in this planned community. In its 2022- 2027 Economic Development Strategic Plan, the Economic Development Department of Oregon City cites the need for "spec" commercial buildings within the city. The department receives calls almost monthly from business investors seeking a space that they can custom design to meet for their needs. For instance, the need to have available facilities especially designed for childcare has become more acute over the years.

The Park Place Crossing Master Plan calls for the project to be developed in six phases. In that ICON Construction & Development, LLC is not known for the development of commercial/business structures or sites, there is a concern that the proposed retail/civic portion of the development may, in actuality, not be developed by ICON. Therefore, to ensure that the planned retail/civic component becomes a reality as cited in the Parks Place Concept Plan, we support certain stipulations:

- when the residential component reaches 60% completion, the developer be required to install all necessary infrastructure to make the sites reserved for retail/civic development shovel ready for this particular purpose, and
- require ICON to offer for purchase the sites reserved for retail/civic development to the City of Oregon City on a right-of-first refusal basis for up to 12 months, permitting the purchase price to be set by appraisals of the sites ordered by the City of Oregon City.

We look forward to monitoring the development of the site as stipulated in the Parks Place Concept Plan.

Yours truly,

James N. Graham, CEcD
Economic Development Manager

OREGON CITY

Community Development – Planning

698 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LAND USE APPLICATION FORM

Type I (OCMC 17.50.030.A)
- ☐ Compatibility Review
  - ☐ Willamette River Greenway
  - ☐ Communication Facility
- ☐ Lot Line Adjustment
- ☐ Non-Conforming Use Review
- ☐ Natural Resource (NROD) Verification
- ☐ Minor Site Plan & Design Review
- ☐ Historic Review – Remodel
- ☐ Detailed Dev. Plan (DDP)

Type II (OCMC 17.50.030.B)
- ☐ Master Plan / PUD / GDP or Amendment
- ☐ Detailed Development Plan (DDP)
- ☐ Floodplain Review
- ☐ Geologic Hazard Overlay
- ☐ Minor Partition (<4 lots)
- ☐ Minor Site Plan & Design Review
- ☐ Non-Conforming Use Review
- ☐ Site Plan and Design Review / DDP
- ☐ Subdivision (4+ lots)
- ☐ Minor Variance
- ☐ Natural Resource (NROD) Review
- ☐ Public Improvement Modification
- ☐ Willamette River Greenway

Type III / IV (OCMC 17.50.030.C & D.)
- ☐ Annexation
- ☐ Code Interpretation / Similar Use
- ☑ Master Plan / PUD / GDP Amendment
- ☐ Conditional Use
- ☐ Comprehensive Plan / Legislative Amendment
- ☐ Code ☐ Map
- ☐ Detailed Development Plan DDP
- ☐ Historic Review
- ☐ Municipal Code Amendment
- ☐ Parking Adjustment
- ☑ Variance ☐ Sign Variance
- ☐ Natural Resource (NROD) Review
- ☐ Zone Change (Text/Map)
- ☐ Willamette River Greenway

ELD Process (OCMC 17.50.030.E)
- ☐ Expedited Land Division

Legislative Action (OCMC 17.50.170)
- ☐ Legislative

File Number(s): GLUA-20-00045 / MAS-21-00006	**Application Date:** 7/20/2021
Project Name: Park Place Crossing	
Proposed Land Use or Activity: Master Plan (GDP)	**# of Lots Proposed (If Applicable):** ±476
Physical Address(es) of Site: Multiple Properties, see list attached.	
Clackamas County Map and Tax Lot Number(s): 2 2E 27BC Tax Lots 1000, 2000; 2 2E 28D Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 500, 502, 3700, 3701	

Applicant(s)

Applicant(s) Signature:		
Applicant(s) Name Printed: Mark Handris, ICON Construction & Development, LLC		Date: July 12, 2021
Mailing Address: 1969 Willamette Falls Dr., Suite 260, West Linn, OR 97068		
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant.	Email: Please contact Applicant's Con.

Property Owner(s) – See reverse for more than two Owners

Property Owner #1 2 2E 28D 100, 190, 302, 400, 500, 3700

Property Owner#1 Signature		
Property Owner#1 Name Printed: Mark Handris, Manager - Hidden Falls LLC		Date: July 12, 2021
Mailing Address: 1969 Willamette Falls Dr., Suite 260, West Linn, OR 97068		
Ownership Address: 16472 & 16582 Livesay Rd, Oregon City, OR 97045 (and other Non Situs properties, see Tax Lot IDs above)		
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant	Email: Please contact Applicant's Con.

Property Owner #2 2 2E 27BC 1000, 2000; 2 2E 28D 3701

Property Owner#2 Signature		
Property Owner#2 Name Printed: Mark Handris, Manager - Redland Road LLC		Date: July 12, 2021
Mailing Address: 1969 Willamette Falls Dr., Suite 260, West Linn, OR 97068		
Ownership Address: 15110 Holcomb Blvd, Oregon City, OR 97045 (and other Non Situs properties, see Tax Lot IDs above)		
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant	Email: Please contact Applicant's Con.

Consultant

Consultant Signature		
Consultant Name Printed: AKS Engineering & Forestry, LLC - Chris Goodell, AICP, LEED AP		Date: 6/10/21
Mailing Address: 12965 SW Herman Road, Suite 100, Tualatin, OR 97062		
Phone: (503) 563-6151	Fax: (503) 563-6152	Email: ChrisG@aks-eng.com

All signatures represented must have the full legal capacity and hereby authorize the filing of this application and certify that the information and exhibits herewith are correct and indicate the parties willingness to comply with all code requirements.

Park Place Crossing Master Plan Application Additional Land Owner Signatures

Property Owner # 3	2 2E 28D 300, 301, 303	
Property Owner#3 Signature	[illegible]	
Property Owner#3 Name Printed:	George Thomas	Date: 9-15-21
Mailing Address:		
Ownership Address:	16644 Livesay Rd, Oregon City, OR 97045	
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant	Email: Please contact Applicant's Con.

Property Owner # 4	2 2E 28D 200	
Property Owner#4 Signature	[illegible]	
Property Owner#4 Name Printed:	Kirk Tolstrup	Date: Sept. 30, 2021
Mailing Address:		
Ownership Address:	16530 Livesay Rd, Oregon City, OR 97045	
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant	Email: Please contact Applicant's Con.

Property Owner #4	2 2E 28D 200	
Property Owner#4 Signature	[illegible]	
Property Owner#4 Name Printed:	MichelleTolstrup	Date: 9-30-21
Mailing Address:		
Ownership Address:	16530 Livesay Rd, Oregon City, OR 97045	
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant	Email: Please contact Applicant's Con.

Property Owner # 5	2 2E 28D 502	
Property Owner#5 Signature	[illegible]	
Property Owner#5 Name Printed:	Robert Tershel	Date: 9/30/2021
Mailing Address:		
Ownership Address:	14631 Livesay Rd, Oregon City, OR 97045	
Phone: Please contact Applicant's Con.	Fax: Please contact Applicant's Consultant	Email: Please contact Applicant's Con.

Park Place Crossing
General Development Plan/ Master Plan Application

Date: July 2021
Updated March 2022

Submitted to: City of Oregon City
Planning Division
695 Warner Parrott Road
Oregon City, Oregon 97045

Applicant: ICON Construction & Development, LLC
1969 Willamette Falls Drive, Suite 260
West Linn, Oregon 97068

AKS Job Number: 7404

AKS ENGINEERING & FORESTRY

12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

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Park Place Crossing General Development Plan/Master Plan Application

Submitted to:	City of Oregon City Planning Division 695 Warner Parrott Road Oregon City, Oregon 97045
Applicant:	ICON Construction & Development, LLC 1969 Willamette Falls Drive, Suite 260 West Linn, Oregon 97068
Property Owners:	Hidden Falls Development, LLC 1969 Willamette Falls Drive, Suite 260 West Linn, Oregon 97068 (2 2E 28D Tax Lots 100, 190, 302, 400, 500, 3700)
	Redland Road, LLC 1980 Willamette Falls Drive, Suite 200 West Linn, Oregon 97068 (2 2E 28D Tax Lot 3701 2 2E 27BC Tax Lots 1000, 2000)
	Robert Tershel 5933 SW Ralston Drive Portland, Oregon 97239 (2 2E 28D Tax Lot 502)
	George Thomas 16644 S Livesay Road Oregon City, OR 97045 (2 2E 28D Tax Lots 300, 301, 303)
	Kirk & Michelle Tolstrup 16530 S Livesay Road Oregon City, OR 97045 (2 2E 28D Tax Lot 200)
Applicant's Consultant:	AKS Engineering & Forestry, LLC 12965 SW Herman Road, Suite 100 Tualatin, OR 97062
	Contact(s): Monty Hurley, PE, PLS - Principal Chris Goodell, AICP, LEED AP – Associate

Email:	Monty@AKS-eng.com ChrisG@AKS-eng.com
Phone:	(503) 563-6151

Site Location:	North and east S Livesay Road, South of S Holcomb Road, Oregon City, Oregon
Clackamas County Assessor's Map:	Map 2 2E 28D: Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 500, 502, 3700, 3701 Map 2 2E 27BC: Tax Lots 1000, 2000
Site Size:	A Master Plan affecting ±91.7 acres
Land Use Districts:	Medium Density Residential (R-5) Low Density Residential (R-10) Neighborhood Commercial (NC)

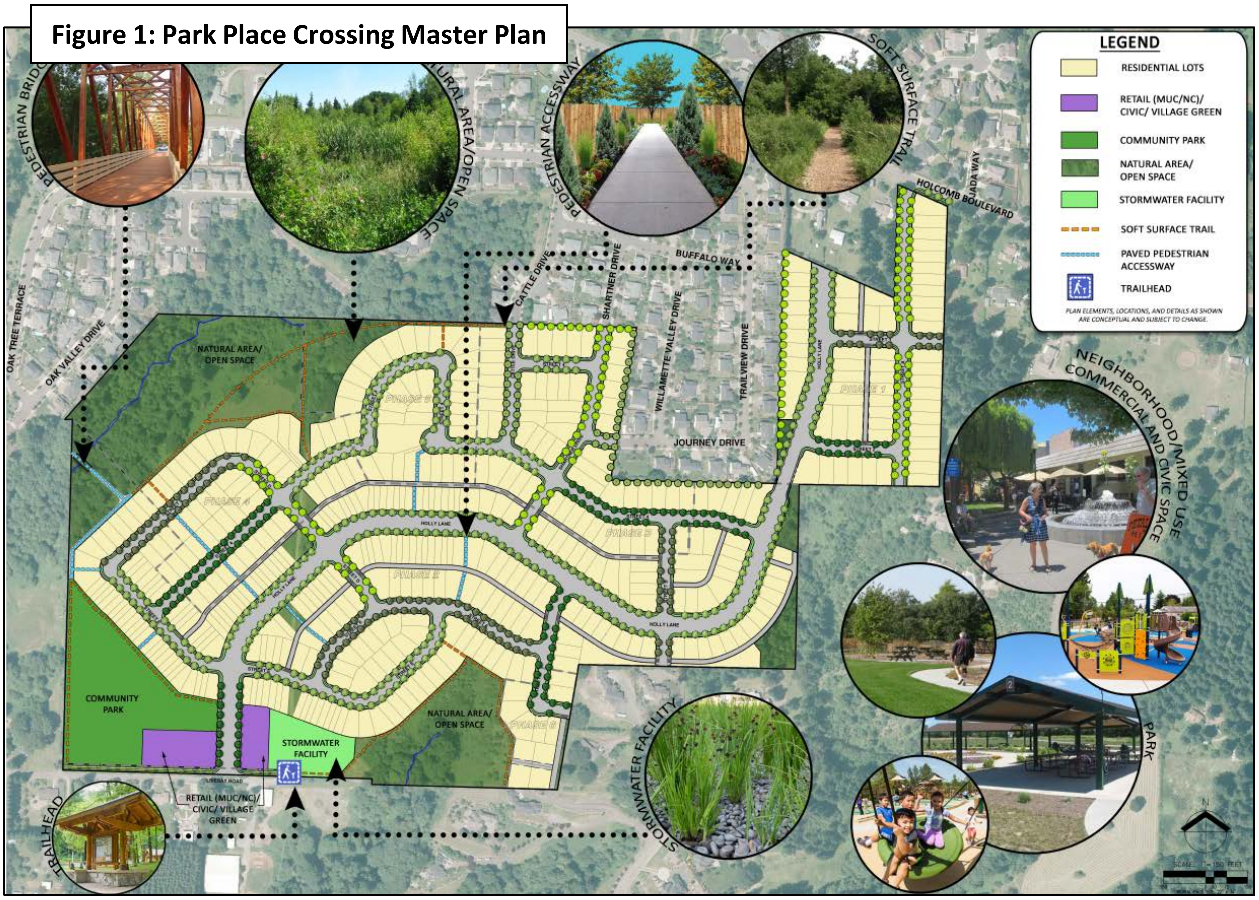
I. Executive Summary

ICON Construction & Development, LLC (Applicant) is submitting this General Development Plan application for a master-planned community within the Park Place Concept Area. The properties were annexed into the City in 2018 by City Commission approval of Ordinance 18-1007 (AN-17-0004 / ZC-17-0005). This application for a General Development Plan/Master Plan does not involve approval of physical alterations to the project site. A General Development Plan/Master Plan was required per Condition of Approval No. 4 of Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), the Park Place Annexation and Zone Change. General Development Plans require a mixture of housing types to be provided. As a result, a variance is required due to the lot size requirements of the zoning district. It is expected that upcoming code changes will remove the need for this variance with future land use applications. The application does not include an application for approval of a Detailed Development Plan (DDP), Flood Management Overlay District review, Natural Resources Overlay District review, or any construction at this time. The 20-year General Development Plan guides the project through the anticipated build-out timeframe.

The Park Place Crossing (PPC) Master Plan consists of ±476 residential lots planned to be provided in six residential phases. The project also includes a community park, open space, regional stormwater management facility, retail/civic, and trails components. The Park Place Crossing Master Plan area is within the northernmost portion of the Park Place Concept Area (PPCA) established in 2008 through the Park Place Concept Plan (PPCP).

II. Project Description

Figure 1: Park Place Crossing Master Plan



The Park Place Crossing Master Plan (PPCMP) sets up a framework consistent with the PPCP and builds on the following planned and natural elements:

- **Community Park:** The southwestern portion of the site is part of an envisioned Park Place North Village Community Park. This community park would provide ±4.4 acres for the provision of potential sport fields/courts, open lawn areas, and trails. The park will connect to natural preservation areas to the north and to other neighborhoods through its proximity to Holly Lane and S Livesay Road and pedestrian connections to adjacent on and off-street trails.

  The land reserved for the Community Park is located on one of the flattest and most suitable portions of the site for a park. It is also located near other properties which can feasibly connect to and provide additional park area needed for the Park Place Concept Area.

  Per discussions with the City, the Park Place Crossing project is expected to provide a proportional percentage of park land envisioned in the Concept Plan for its residents. Approximately 51 percent of the planned dwelling units for the Park Place Concept Area North Village are included in this master plan (±476 planned PPC units/937 total North Village units). The Community Park represents ±8 acres; therefore, Park Place Crossing would be expected to contribute ±51 percent of the needed area or ±4.0 acres. This application for General Development Plan anticipates that ±4.4 acres will be contributed for park land. Technical details for how the park land will be acquired/transferred are being coordinated with the City of Oregon City Parks Department.

- **Village Green:** A village green, with no specified size, was envisioned by the PPCP at the terminus of S Livesay Road and Holly Lane. This area is intended to anchor the intersection of Holly Lane and the future Livesay Road Main Street, providing the Park Place neighborhood with pedestrian scale lighting, street trees, and benches for the enjoyment of visitors. It is infeasible, however, to achieve the full intent of the PPCP Village Green due to the existing extension of S Livesay Road to serve existing, offsite properties to the southeast of the planned intersection between S Livesay Road and Holly Lane. Until such time those properties develop and S Livesay is vacated east of its intersection of Holly, the envisioned Village Green cannot be achieved. In the interim, Park Place Crossing will meet the amenity need that the Village Green is intended to provide by utilizing the existing terminus of S Livesay Road to serve as a trailhead for City trailways through the natural areas adjacent to the Tract G stormwater facility.

- **Mixed-Use/Neighborhood Commercial/Civic Areas:** The Park Place Concept Plan envisions retail areas to support both the North and South Villages. Within Park Place Crossing, these areas are anticipated to be needed for small-scale commercial businesses such as coffee shops, bookstores, dry cleaners, or cafés. These areas could also be used for services serving the immediate community such as local offices for medical offices, insurance brokerages, and realty companies. The Mixed-Use Commercial (MUC)/Neighborhood Commercial (NC) Area is anticipated to provide an upper-story residential component as outlined within the Oregon City Municipal Code. The location of Park Place Crossing's commercial area was determined by the conceptual location of the Livesay Road Main Street Area within the Park Place Concept Plan. The Park Place Concept Plan imagines this area to be near the intersection of Holly Lane and S Livesay Road. The Civic area was envisioned to serve as the location of a library, community center, environmental interpretive center, or post office. The proximity of the area to the Village Green, local trailhead, regional stormwater facility, and natural areas, lends to this area being created as a plaza or interpretive center.

- **Open Space Preserving Natural Areas and Drainageways:** The site is located between Tour Creek to the north and west of the site and Charman/Abernethy Creek to the south. These areas include sloped and vegetated areas associated with these drainage features. By incorporating progressive planning concepts such as flexible standards and varying lot sizes into the project design, a significant amount of land is being set aside as open space for resource protection, greater than the quantity shown and required by the Park Place Concept Plan.

  Other internal open space areas provide for active and passive recreation for residents and visitors through pedestrian pathways, open areas, seating, and other similar amenities.

- **Trails Network:** The Applicant and PPCP seek to recognize these natural resources and the opportunity to connect residents, visitors, and new and existing neighborhoods to these resources through the inclusion of an interconnected network of trails within the open space areas. These trails, including local and community trails, are consistent with the City's adopted Trails Master Plan and help provide opportunities for residents and visitors to engage in active and passive recreational pursuits, surround homes with areas of green space, and preserve habitat for native flora and fauna.

- **Interconnected Transportation Network:** Consistent with the City of Oregon City's Transportation System Plan (TSP), Park Place Crossing will be served by a comprehensive transportation network connected to Holly Lane, which serves as the Park Place Crossing community backbone. The transportation system features a new City Collector Street (Holly Lane), a grid of Local Streets, and off-street trails and pedestrian pathways. Pedestrian pathways, off-, and on-street trails include both hard and soft-surfaced linkages within Park Place Crossing and between the community and those surrounding. Many of the homes along Holly Lane are anticipated to be served by alleys to aid in circulation and minimize vehicle conflicts. Holly Lane will eventually connect to S Holcomb Road via a roundabout, with temporary connection provided by "Street A."

  Per the City's Transportation System Plan (TSP) and the attached Transportation Impact Study (TIS) (Exhibit E), the project will provide public improvements including the dedication and construction of a new Collector Street with interconnected Local Streets that, upon their extension, are able to enhance neighborhood circulation; provide needed/secondary access to the project and surrounding neighborhoods; and proportionate share payments to be directed towards future intersection improvements identified by the City's TSP. The system is designed to welcome pedestrians, bicyclists, motorists, and public/emergency services and provide safe and efficient connections to surrounding areas.

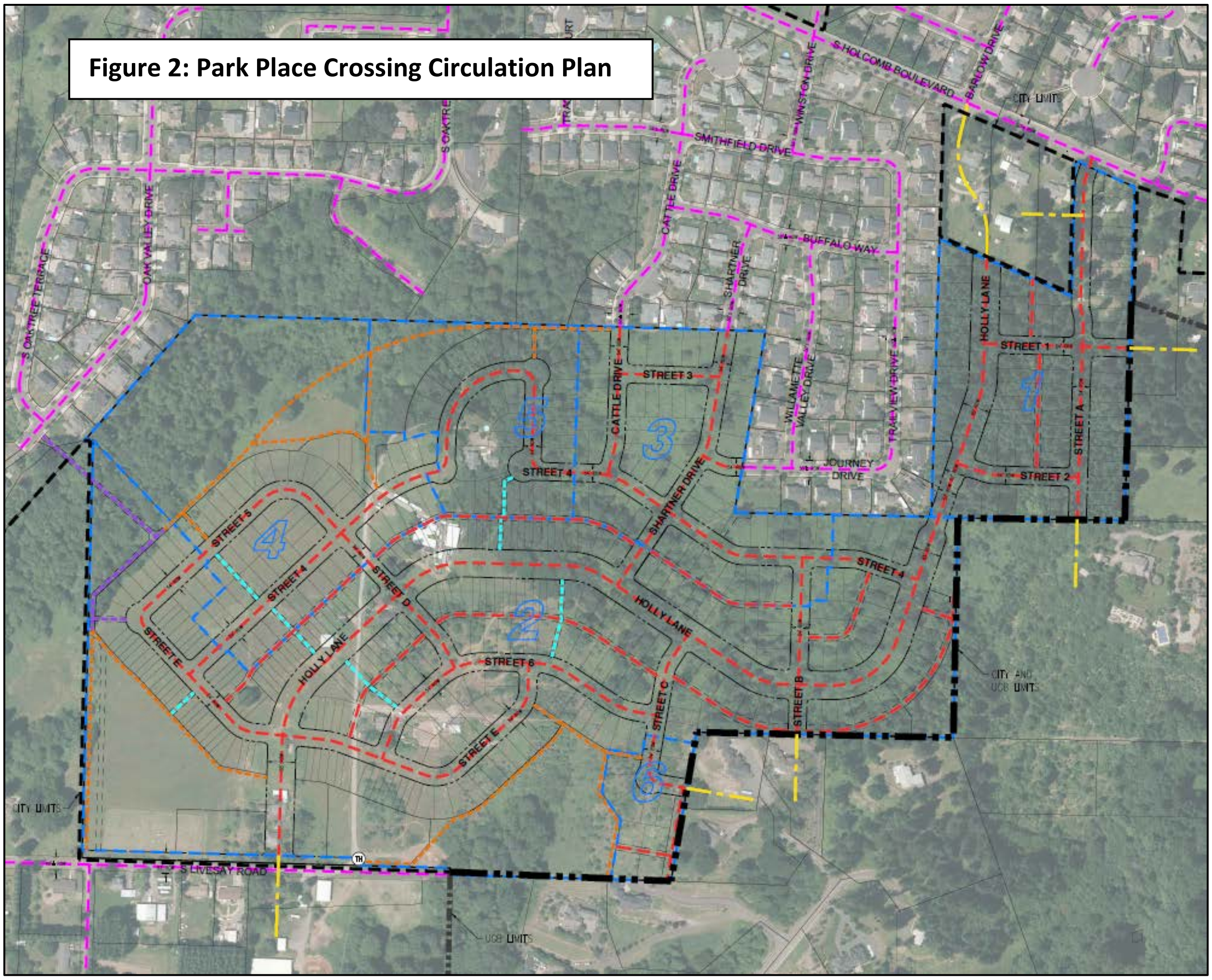


Figure 2: Park Place Crossing Circulation Plan

Regional Stormwater Management and Green Streets: The Park Place Concept Plan envisions stormwater infrastructure that mimics existing hydrology, provides innovative and green on-site stormwater treatment, and implements techniques to attenuate flow rates and provide for pollution control/reduction. Together with these features, a regional stormwater facility is planned for Park Place Crossing in order to manage stormwater.

Housing: The Park Place Crossing Master Plan area includes ±476 lots intended for future single-family homes. This represents ±51 percent (±476 GDP-planned units of the 936 intended units) of the units anticipated for the North Village by the PCCP. An additional lot may be possible following the connection of Holly Lane to S Holcomb Boulevard. A diverse range of lot sizes are planned that can accommodate a mix of home sizes and styles, as well as detached and attached housing types, appealing to a broad variety of people.

The design team worked diligently to transform constraints imposed by natural features, planned and existing infrastructure, and necessary utility facilities into attractive, public, and open-space amenities. Local and community trails along Tour and Abernethy Creeks, a community park, and other high-quality recreational opportunities for area residents and visitors and help promote active use of this area and the future commercial areas. These third place gathering areas will promote social interactions among residents and visitors and strengthen the connection residents feel with their new neighborhood.

The Park Place Concept Plans calls out quantities of parks, open spaces, residential, civic, and commercial lands within the Park Place Concept Area (PPCA). The concept plan anticipates retail sales and service areas and parks to serve residents of the PPCA. The Park Place Crossing Master Plan application aims to provide these areas within the confines of the sloped and vegetated areas interspersed throughout the site.

Approximately 4.3 additional acres, for a total of ±15.7 acres, of Park Place Crossing are planned to be reserved as open space for the conservation of sloped and vegetated areas, greater than the ±11.4 acres of open space envisioned by the Park Place Concept Plan. Space for a regional stormwater facility will be reserved as well, totaling almost two acres of area. Retail and Civic areas are generally consistent with what was originally envisioned, with opportunities for other properties south of S Livesay Road to contribute to the Livesay Road Main Street area. The planned Village Green contained within the bounds of the project site is also consistent with the area imagined with the Concept Plan.

This application for a General Development Plan, required by the City Commission as a condition of approval of the site's annexation, does not involve any physical site alterations. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. The Master Plan is consistent with the Park Place Concept Plan and Oregon City Municipal Code (OCMC). This application includes the City forms, written materials, and Preliminary Plans necessary for City staff to review and determine compliance with the applicable approval criteria. The evidence is substantial and supports the City's approval of the application.

III. Site Description/Setting

The project site within the northeast portion of Oregon City. The site is generally situated south of S Holcomb Boulevard and north of S Livesay Road between the Park Place neighborhood and the City's eastern Urban Growth Boundary (UGB). The site is currently divided into 14 properties that are expected to be part of Park Place Crossing in the future. The fourteen properties included in this application comprise a total area of ±91.7 acres.

Properties within Park Place Crossing are generally zoned Medium Density Residential (R-5), Low Density Residential (R-10), and Neighborhood Commercial (NC). The site, summarized below, contains six existing Single-Family Residences (SFR), some of which may be removed as their respective phases of the project are completed.

Table 1: Property Summary by Tax Lot

Map & Tax Lot	Current Use	Planned Use
Map 2 2E 28D		
Tax Lot 100	Vacant	Part of Phases 2, 3, and 6. Interim emergency access for Phase 1.
Tax Lot 190	Vacant	Part of Phases 1 (interim stormwater only), 2, and 3. Interim emergency access for Phase 1.
Tax Lot 200	Single-Family Residence	Phase 5. SFR may be retained as part of Phase 5.
Tax Lot 300	SFR & accessory structures	Part of Phases 2, 4, and 5. Structures to be removed as part of Phase 2.

Tax Lot 301	Vacant	Phase 2.
Tax Lot 302	Vacant	Part of Phase 2.
Tax Lot 303	Vacant	Part of Phase 5.
Tax Lot 400	SFR & accessory structures	Phases 2 and 4. Structures to be removed as part of Phase 2.
Tax Lot 500	Vacant	Part of Phases 2 and 4. Portion of future park.
Tax Lot 502	SFR & accessory structures	Part of Phases 2 and 4. Future park, civic, and retail areas. Structures to be removed as part of Phase 2.
Tax Lot 3700	SFR & accessory structures	Phase 2. Structures to be removed as part of Phase 2.
Tax Lot 3701	Vacant	Part of Phase 3. Interim emergency access for Phase 1.
Map 2 2E 27BC		
Tax Lot 1000	Vacant	Phase 1.
Tax Lot 2000	SFR & accessory structures	Phase 1. Structures to be removed as part of Phase 1.

Properties to the southeast of the site are located within the Holcomb Urban Reserve outside of the UGB. Uses within this area generally consist of rural single-family residences. Properties to the north of the project site are generally zoned Low Density Residential (LR) and are located within the Park Place Neighborhood Association. Other areas south of the site are designated Mixed Use Corridor (MUC) and Low Density Residential (LR). These areas are within the Urban Growth Boundary but currently outside of the City limits within the Park Place Concept Plan Area.

III. Applicable Review Criteria

Oregon City Municipal Code

Title 12 - STREETS, SIDEWALKS AND PUBLIC PLACES

Chapter 12.04 - STREETS, SIDEWALKS AND PUBLIC PLACES

Response: The Park Place Crossing Master Plan does not involve physical alterations to the site. The Master Plan consists of two distinct phases, a General Development Plan and a Detailed Development Plan. This application involves only a General Development Plan; therefore, the information included in this application regarding streets, sidewalks, etc. is provided at a master plan level of detail. Future applications for Detailed Development Plan and Future subdivision review will provide detailed information regarding streets, sidewalks, and public places as is customary and appropriate.

[…]

12.04.005 - Jurisdiction and management of the public rights-of-way.

A. The city has jurisdiction and exercises regulatory management over all public rights-of-way within the city under authority of the city Charter and state law by issuing separate public works right-of-way permits or permits as part of issued public infrastructure construction plans. No work in the public right-of-way shall be done without the proper permit. Some public rights-of-way within the city are regulated by the state of Oregon Department of Transportation (ODOT) or Clackamas County and as such, any work in these streets shall conform to their respective permitting requirements.

B. Public rights-of-way include, but are not limited to, streets, roads, highways, bridges, alleys, sidewalks, trails, paths, public easements and all other public ways or areas, including the subsurface under and air space over these areas.

C. The city has jurisdiction and exercises regulatory management over each public right-of-way whether the city has a fee, easement, or other legal interest in the right-of-way. The city has jurisdiction and regulatory management of each right-of-way whether the legal interest in the right-of-way was obtained by grant, dedication, prescription, reservation, condemnation, annexation, foreclosure or other means.

D. No person may occupy or encroach on a public right-of-way without the permission of the city. The city grants permission to use rights-of-way by franchises, licenses and permits.

E. The exercise of jurisdiction and regulatory management of a public right-of-way by the city is not official acceptance of the right-of-way, and does not obligate the city to maintain or repair any part of the right-of-way.

Response: Future work within public rights-of-way will be completed under an applicable public right-of-way permit. These standards are understood.

12.04.025 - Driveways.

Driveways shall be reviewed in accordance with OCMC 16.12.035. Driveway requirements may be modified through the procedures in OCMC 16.12.013.

Response: Conceptual future driveway locations have been identified within the Preliminary Plans (Exhibit A). Specific driveway locations will be determined through future processes, as described above. These standards are understood.

12.04.050 - Retaining walls—Required.

Every owner of a lot within the city, abutting upon an improved street, where the surface of the lot or tract of land is above the surface of the improved street and where the soil or earth from the lot, or tract of land is liable to, or does slide or fall into the street or upon the sidewalk, or both, shall build a retaining wall, the outer side of which shall be on the line separating the lot, or tract of land from the improved street, and the wall shall be so constructed as to prevent the soil or earth from the lot or tract of land from falling or sliding into the street or upon the sidewalk, or both, and the owner of any such property shall keep the wall in good repair.

Response: These standards are understood, and to the extent that lots abutting public rights-of-way with retaining walls are necessary, they are anticipated to meet the applicable standards.

12.04.170 - Street design—Purpose and general provisions.

All development shall be in conformance with the city's public facility master plans, public works policies, standard drawings and engineering specifications. All streets shall be reviewed and approved by the city engineer prior to construction. All streets and driveway connections to another jurisdiction's facility or right-of-way must be reviewed by the appropriate jurisdiction as a condition of the preliminary plat or site planning and when required by law or intergovernmental agreement shall be approved by the appropriate jurisdiction.

Response: The planned streets are demonstrated within the Preliminary Plans (Exhibit A) and are in conformance with the City's public facility master plans, Public Works policies, standard drawings, and engineering specifications. As noted previously, this General Development Plan (Master Plan) application does not involve physical alterations, including streets. That said, the project streets will be reviewed and approved by the City Engineer prior to construction. These standards are or will be met with future applications for Detailed Development Plan.

12.04.195 - Traffic sight obstructions.

All streets shall comply with the traffic sight obstructions in OCMC 10.32.

Response: Future streets within Park Place Crossing are anticipated to comply with the traffic sight obstruction criteria of OCMC 10.32. Therefore, this criterion is met.

12.04.270 - Standard construction specifications.

The workmanship and materials for any work performed under permits issued per this chapter shall be in accordance with the current edition of the "Oregon Standard Specifications for Construction" as prepared by the Oregon Department of Transportation (ODOT) and the Oregon Chapter of American Public Works Association (APWA) and as modified and adopted by the City in accordance with this ordinance, in effect at the time of application. The exception to this requirement is where this chapter and the Public Works Street Standard Drawings provide other design details, in which case the requirements of this chapter and the Public Works Street Standard Drawings shall control. In the case of work within ODOT or Clackamas County rights-of-way, work shall be in conformance with their respective construction standards.

Response: Future applications for Detailed Development Plan are anticipated to comply with these standards.

Chapter 12.08 - PUBLIC AND STREET TREES

12.08.010 - Purpose.

The purpose of this chapter is to:

A. Develop tree-lined streets to protect the living quality and beautify the city;

B. Establish physical separation between pedestrians and vehicular traffic;

C. Create opportunities for solar shading;

D. Improve air and water quality; and

E. Increase the community tree canopy and resource.

12.08.015 - Street tree selection, planting and maintenance requirements.

All development shall provide street trees adjacent to all street frontages. Species and locations of trees shall be selected based upon vision clearance requirements, but shall in all cases be selected from the Oregon City Street Tree List, an approved street tree list for a jurisdiction in the Metropolitan region, or be approved by a certified arborist unless otherwise approved pursuant to this section. If a setback sidewalk has already been constructed or the public works department determines that the forthcoming street design shall include a setback sidewalk, then all street trees shall be installed with a planting strip or within tree wells. If existing street design includes a curb-tight sidewalk, then all street trees shall be placed according to OCMC 12.08.035.C.

A. One street tree shall be planted for every thirty-five feet of property frontage. The tree spacing shall be evenly distributed throughout the total development frontage to meet the clearance distances required in subsection B below. The community development director may approve an alternative street tree plan, or accept fee-in-lieu of planting pursuant to OCMC 12.08.035, if site or other constraints prevent meeting the required total number of tree plantings.

B. The following clearance distances shall be maintained when planting trees:

1. Fifteen feet from streetlights;
2. Five feet from fire hydrants;
3. Twenty feet from intersections;
4. Five feet from all public utilities (i.e. sewer, storm and water lines, utility meters, etc.).

C. All street trees planted in conjunction with development shall be a minimum of two inches in caliper at six inches above the root crown and installed to city specifications. Larger caliper size trees may be approved if recommended by a certified arborist or registered landscape architect.

D. All established trees shall be pruned tight to the trunk to a height that provides adequate clearance for street cleaning equipment and ensures ADA complaint clearance for pedestrians.

E. All trees planted within the right-of-way shall be planted with root barriers at least eighteen inches in depth adjacent to the sidewalk and curb to ensure proper root growth and reduce potential damage to sidewalks, curbs and gutters.

F. All trees planted beneath powerlines shall be selected based on what is appropriate for the location. In addition, the tree species shall be approved by the associated franchise powerline utility company.

G. Tree species, spacing and selection for stormwater facilities in the public right-of-way and in storm water facilities shall conform to requirements of OCMC 13.12 and the adopted stormwater and grading design standards and be approved by the city engineer.

H. Any public or street trees planted within the natural resource overlay district shall conform to the applicable requirements of OCMC 17.49, Natural Resources Overlay District (NROD).

Response: The final number and location of street trees and the planting specifications and standards related to street trees will be based on the Detailed Development Plans for each Phase of Park Place Crossing and will be determined with future land use applications. Trees will be selected based upon what is appropriate and permitted for the location. Where needed, street trees are planned to be approved by the associated franchise powerline utility company. This application for a General Development Plan, required by the City Commission as a condition of approval of the site's annexation, does not involve any physical site alterations. Information provided as part of this application is preliminary in nature and will be refined further as part of future Detailed Development Plan applications, where changes or improvements may occur.

[…]

TITLE 16 - LAND DIVISIONS

Chapter 16.12 - MINIMUM PUBLIC IMPROVEMENTS AND DESIGN STANDARDS FOR DEVELOPMENT

[…]

16.12.010 - Purpose and general provisions.

All development shall be in conformance with the policies and design standards established by this chapter and with applicable standards in the city's public facility master plans and city design standards and specifications. In reviewing applications for development, the city engineer shall take into consideration any approved development and the remaining development potential of adjacent properties. All street, water, sanitary sewer, storm drainage and utility plans associated with any development shall be reviewed and approved by the city engineer prior to construction. All streets, driveways or storm drainage connections to another jurisdiction's facility or right-of-way shall be reviewed by the appropriate jurisdiction as a condition of the preliminary plat and when required by law or intergovernmental agreement shall be approved by the appropriate jurisdiction.

16.12.011 - Applicability.

A. Compliance with this chapter is required for all development including land divisions, site plan and design review, master plan, detailed development plan and conditional use applications and all public improvements. Minor site plan and design review applications shall not be subject to this chapter unless improvements are proposed within the right-of-way, or as otherwise provided in this chapter.

B. Compliance with this chapter is also required for new construction or additions which exceed fifty percent of the existing square footage of all 3—4 plexes, single- and two-family dwellings living space. Garages, carports, sheds, and porches may not be included in the calculation if these spaces are not living spaces. Accessory dwelling units are not subject to compliance with this chapter. All applicable 3—4 plexes, single- and two-family dwellings shall provide any necessary dedications, easements or agreements as identified in the transportation system plan and this chapter, subject to constitutional limitations. In addition, the street frontage shall be improved to include the following priorities for improvements:

1. Improve street pavement, construct curbs, gutters, sidewalks and planter strips; and

2. Plant street trees.

The cost of compliance with the standards identified in subsections 16.12.011.B.1 and 16.12.011.B.2 is calculated based on the square footage valuation from the state of Oregon Building Codes Division and limited to ten percent of the total construction costs. The value of the alterations and improvements is based on the total construction costs for a complete project rather than costs of various project component parts subject to individual building permits. The entire proposed construction project cost includes engineering and consulting fees and construction costs. It does not include permit fees, recording fees, or any work associated with drafting or recording dedications or easements.

16.12.012 - Jurisdiction and management of the public rights-of-way.

The city has jurisdiction and exercises regulatory management over all public rights-of-way as defined and outlined within Chapter 12.04 of the Oregon City Municipal Code.

16.12.013 - Modifications.

The applicant may request and the review body may consider modification of the standards in this chapter resulting from constitutional limitations restricting the city's ability to require the dedication of property or for any other reason, based upon the criteria listed below and other criteria identified in the standard to be modified. All modifications, except for adjustments approved by the city engineer for tree preservation purposes pursuant to Section 16.12.013.A, shall be processed through a Type II land use application and may require additional evidence from a transportation engineer or others to verify compliance. Compliance with the following criteria is required:

A. The modification meets the intent of the standard;

B. The modification provides safe and efficient movement of pedestrians, motor vehicles, bicyclists and freight;

C. The modification is consistent with an adopted transportation or utility plan; and

D. The modification is complementary with a surrounding street design; or, in the alternative;

E. If a modification is requested for constitutional reasons, the applicant shall demonstrate the constitutional provision or provisions to be avoided by the modification and propose a modification that complies with the state or federal constitution. The city shall be under no obligation to grant a modification in excess of that which is necessary to meet its constitutional obligations.

Response: As part of the Park Place Crossing Master Plan project, the S Holly Lane collector will be constructed through the site with future connections between S Livesay Road and S Holcomb Boulevard (note the connection to S Livesay Road as part of this Master Plan will be emergency vehicle access only). Per Oregon City Municipal Code Table 16.12.016 a collector right-of-way width is 85 feet, however within the project site where S Holly Lane crosses between tax lots 2-2E-28D-00190 and 2-2E-27BC-01000 there is not adequate room to accommodate this. Given this restriction, a reduced section is necessary to allow room for roadway construction and grading (retaining walls, daylight slopes etc.).

The modification is the minimum necessary to allow safe and efficient movement of pedestrians, motor vehicles, bicyclists, and freight while still meeting the intent of the street standards. For further information regarding this street section, please see the Preliminary Plan Sheet P-07 and P-08 (Exhibit A) and the Transportation Impact Study (Exhibit E). These criteria are met.

16.12.014 - Administrative provisions.

An applicant shall submit the following items to the city and complete the following tasks prior to proceeding with construction of proposed development plans. These items include the following:

A. Pre-design meeting;

B. Final engineering plans, stamped and signed by an Oregon licensed professional engineer;

C. Stormwater report, stamped and signed by an Oregon licensed professional engineer;

D. Geotechnical report, stamped and signed by an Oregon licensed professional engineer (if applicable);

E. Engineer's preliminary and final cost estimates (also may be known as engineer's opinion of probable construction cost);

F. Plan check and inspection fees (as set by city resolution);

G. Certificate of liability insurance for city funded public projects contracted by the city (not less than one million dollars single incident and two million dollars aggregate);

H. Preconstruction meeting notes;

I. Financial guarantee(s) per OCMC 17.50.140;

J. Applicable approvals/permits from other agencies or entities;

K. Developer/engineer agreement for public works improvements.

An applicant shall submit the following additional items to the city and complete the following tasks prior to completing construction of proposed development plans. These items include the following:

L. Project engineer's certificate of completion;

M. Stormwater operation and maintenance easement (if applicable);

N. Deed of dedication (bargain and sale deed);

O. Recorded plat and/or easements (if applicable);

P. Recorded non-remonstrance covenant agreement;

Q. Land division compliance agreement (if applicable);

R. Permanent stabilization and/or restoration of the impact from the development;

S. Fulfillment of all conditions of approval;

T. Payment of all outstanding fees;

U. Maintenance guarantee(s), per OCMC 17.50.141;

V. Indemnity agreement (if applicable);

W. Completed punchlist;

X. As-built drawings;

Details on individual items required by this subsection can be obtained by contacting public works. Many items, such as the engineer's cost estimate and plan check and inspection fee, maybe be submitted in conjunction with documentation for other infrastructure improvements that are done with the development (such as street, sanitary sewer, and water).

Response: The required tasks will be completed as applicable prior to construction. These criteria are met.

16.12.015 - Street design—Generally.

Development shall be required to provide existing or future connections to adjacent sites through the use of vehicular and pedestrian access easements where applicable. Development shall provide any necessary dedications, easements or agreements as identified in the transportation system plan, trails master plan, and/or parks and recreation master plan and this chapter, subject to constitutional limitations. The location, width and grade of street shall be considered in relation to: Existing and planned streets, topographical conditions, public convenience and safety for all modes of travel, existing and identified future transit routes and pedestrian/bicycle accessways, overlay districts, and the proposed use of land to be served by the streets. The street system shall assure an adequate traffic circulation system with intersection angles, grades, tangents and curves appropriate for the traffic to be carried considering the terrain. To the extent possible, proposed streets shall connect to all existing or approved stub streets that abut the development site. The arrangement of streets shall either:

A. Provide for the continuation or appropriate projection of existing principal streets in the surrounding area and on adjacent parcels or conform to a plan for the area approved or adopted by the city to meet a particular situation where topographical or other conditions make continuance or conformance to existing streets impractical;

Response: Streets are shown on the Preliminary Master Plan drawings as connecting to existing stub streets and providing for future access to adjacent properties where appropriate. These criteria are met.

B. Where necessary to give access to or permit a satisfactory future development of adjoining land, streets shall be extended to the boundary of the development and the resulting dead-end street (stub) may be approved with a temporary turnaround as approved by the city engineer. Notification that the street is planned for future extension shall be posted on the stub street until the street is extended and shall inform the public that the dead-end street may be extended in the future. Access control in accordance with OCMC 16.12.017 shall be required to preserve the objectives of street extensions.

Response: As described previously, this Master Plan Application does not involve physical site alterations, including street construction. The Preliminary Master Plan drawings illustrate future streets extending to the boundaries of the project site in order to permit access by future adjoining projects. That said, notification of future street extensions will be posted at the end of the stub street. Turnarounds are not required for these length of street stubs. Information provided as part of this application is preliminary in nature and will be refined further as part of future Detailed Development Plan applications, where changes or improvements may occur. Therefore, these criteria are met.

C. Adequate right-of-way and improvements to streets, pedestrian ways, bike routes and bikeways, and transit facilities shall be provided and be consistent with the city's transportation system plan. Consideration shall be given to the need for street widening and other improvements in the area of the proposed development impacted by traffic generated by the proposed development. This shall include, but not be limited to, improvements to the right-of-way, such as installation of lighting, signalization, turn lanes, median and parking strips, traffic islands, paving, curbs and gutters, sidewalks, bikeways, street drainage facilities and other facilities needed because of anticipated vehicular and pedestrian traffic generation.

Response: Adequate right-of-way and other transportation facilities consistent with Oregon City Municipal Code (OCMC) and the City's Transportation System Plan are illustrated on the Preliminary Master Plan Drawings. Other improvements are considered within the Transportation Impact Study (Exhibit E). Information provided as part of this application is preliminary in nature and will be refined further as part of future Detailed Development Plan applications, where changes or improvements may occur. These criteria are met.

16.12.016 - Street design.

All development regulated by this chapter shall provide street improvements in compliance with the standards in Table 16.12.016 depending on the street classification set forth in the transportation system plan and the comprehensive plan designation of the adjacent property, unless an alternative plan has been adopted. The table implements the adopted transportation system plan and illustrates the maximum design standards. These standards may be reduced with an alternative street design which may be approved based on the modification criteria in OCMC 16.12.013. The steps for reducing the street design are found in the transportation system plan.

Table 16.12.016

Street Design

To read the table select the road classification as identified in the transportation system plan and the comprehensive plan designation of the adjacent properties to find the maximum design standards for the road cross section. If the comprehensive plan designation for lands on either side of the street differs, the wider right-of-way standard shall apply.

Road Classification	Comprehensive Plan Designation	Right-of-Way Width	Pavement Width	Public Access	Sidewalk	Landscape Strip	Bike Lane	Street Parking	Travel Lanes	Median
Major Arterial	Mixed Use, Commercial or Public/Quasi Public	116 ft.	94 ft.	0.5 ft.	10.5 ft. sidewalk including 5 ft. x 5 ft. tree wells		6 ft.	8 ft.	(5) 12 ft. Lanes	6 ft.
	Industrial	120 ft.	88 ft.	0.5 ft.	5 ft.	10.5 ft.	6 ft.	N/A	(5) 14 ft. Lanes	6 ft.
	Residential	126 ft.	94 ft.	0.5 ft.	5 ft.	10.5 ft.	6 ft.	8 ft.	(5) 12 ft. Lanes	6 ft.
Minor Arterial	Mixed Use, Commercial or Public/Quasi Public	116 ft.	94 ft.	0.5 ft.	10.5 ft. sidewalk including 5 ft. x 5 ft. tree wells		6 ft.	8 ft.	(5) 12 ft. Lanes	6 ft.
	Industrial	118 ft.	86 ft.	0.5 ft.	5 ft.	10.5 ft.	6 ft.	7 ft.	(5) 12 ft. Lanes	N/A
	Residential	100 ft.	68 ft.	0.5 ft.	5 ft.	10.5 ft.	6 ft.	7 ft.	(3) 12 ft. Lanes	6 ft.
Collector	Mixed Use, Commercial or Public/Quasi Public	86 ft.	64 ft.	0.5 ft.	10.5 ft. sidewalk including 5 ft. x 5 ft. tree wells		6 ft.	8 ft.	(3) 12 ft. Lanes	N/A
	Industrial	88 ft.	62 ft.	0.5 ft.	5 ft.	7.5 ft.	6 ft.	7 ft.	(3) 12 ft. Lanes	N/A
	Residential	85 ft.	59 ft.	0.5 ft.	5 ft.	7.5 ft.	6 ft.	7 ft.	(3) 11 ft. Lanes	N/A
Local	Mixed Use, Commercial or Public/Quasi Public	62 ft.	40 ft.	0.5 ft.	10.5 ft. sidewalk including 5 ft. x 5 ft. tree wells		N/A	8 ft.	(2) 12 ft. Lanes	N/A
	Industrial	60 ft.	38 ft.	0.5 ft.	5 ft.	5.5 ft.	(2) 19 ft. Shared Space			N/A
	Residential	54 ft.	32 ft.	0.5 ft.	5 ft.	5.5 ft.	(2) 16 ft. Shared Space			N/A

1. Pavement width includes, bike lane, street parking, travel lanes and median.
2. Public access, sidewalks, landscape strips, bike lanes and on-street parking are required on both sides of the street in all designations. The right-of-way width and pavement widths identified above include the total street section.
3. A 0.5 foot curb is included in landscape strip or sidewalk width.
4. Travel lanes may be through lanes or turn lanes.
5. The 0.5 foot public access provides access to adjacent public improvements.

6. Alleys shall have a minimum right-of-way width of twenty feet and a minimum pavement width of sixteen feet. If alleys are provided, garage access shall be provided from the alley.

7. A raised concrete median or landscape median shall be utilized for roads identified to have access restrictions.

Response: Cross sections and other details for future streets are provided in the Preliminary Plan drawings based on the above requirements. Therefore, these criteria are met.

A. Sidewalks. The applicant shall provide for sidewalks on both sides of all public streets, on any private street if so required by the decision-maker, and in any special pedestrian way within the development. Both sidewalks and curbs are to be constructed to city standards and at widths set forth above, and according to plans and specifications provided by the city engineer. Exceptions to this requirement may be allowed in order to accommodate topography, trees or some similar site constraint. In the case of major or minor arterials, the decision-maker may approve a development without sidewalks where sidewalks are found to be dangerous or otherwise impractical to construct or are not reasonably related to the applicant's development. The decision-maker may require the applicant to provide sidewalks concurrent with the issuance of the initial building permit within the area that is the subject of the development application. Applicants for partitions may be allowed to meet this requirement by providing the city with a financial guarantee per OCMC 16.12.110.

Response: As illustrated on the Preliminary Master Plan drawings, sidewalks are planned per the above section and Table 16.12.016. Details regarding planned sidewalk widths are provided on the Preliminary Street Cross-Sections (Sheet P-07) attached as part of Exhibit A. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

B. Pedestrian and Bicycle Accessways Routes. If deemed appropriate to extend pedestrian and bicycle routes, existing or planned, the decision-maker may require the installation of separate pedestrian and bicycle facilities.

Response: This standard is understood. Pedestrian and bicycle accessways are provided in the Master Plan where appropriate. Information provided as part of this application is preliminary in nature and will be refined further as part of future Detailed Development Plan applications, where changes or improvements may occur. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

C. Street Name Signs and Traffic Control Devices. The applicant shall install street signs and traffic control devices as directed by the city engineer. Street name signs and traffic control devices shall be in conformance with all applicable city regulations and standards.

Response: As described previously, this Master Plan application does not involve physical site alterations, including street construction. That said, street name signs and traffic control devices will be installed as directed by the City Engineer and in conformance with all applicable City regulations and standards. Thus, these criteria will be met.

D. Street Lights. The applicant shall install street lights which shall be served from an underground source of supply. Street lights shall be in conformance with all city regulations.

Response: The Preliminary Master Plan drawings show the general location for future streetlights which are intended to be served with underground supply. These streetlights are anticipated to be in conformance with applicable City regulations. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. Therefore, these criteria preliminarily met and will be met by future Detailed Development Plan applications.

E. Any new street proposed with a pavement width of less than thirty-two feet shall be processed through OCMC 16.12.013 and meet minimum life safety requirements, which may include fire suppression devices as determined by the fire marshall to assure an adequate level of fire and life safety. The modified street shall have no less than a twenty-foot wide unobstructed travel lane.

Response: Residential Local Streets are planned to be 32 feet in width, per the requirements of OCMC. Adjustments below this standard are not included as part of this application. Therefore, the criteria are met.

F. All development shall include vegetated planter strips that are five feet in width or larger and located between the sidewalk and curb unless otherwise approved pursuant to this chapter. All development shall utilize the vegetated planter strip for the placement of street trees or place street trees in other acceptable locations, as prescribed by OCMC 12.08. Development proposed along a collector, minor arterial, or major arterial roads may place street trees within tree wells within a wider sidewalk in lieu of a planter strip. In addition to street trees per OCMC 12.08, vegetated planter strips shall include ground cover and/or shrubs spaced four feet apart and appropriate for the location. No invasive or nuisance plant species shall be permitted.

Response: Vegetated planter strips 5 feet in width or larger are planned for each right-of-way as indicated by the Preliminary Master Plan Drawings. Street trees, per OCMC 12.08, will be planted within the planter strips. The planters are intended to include ground cover and/or shrubs (±4 feet on-center) as appropriate for the location. Invasive and nuisance plants are not planned. Hence, these criteria are met.

G. Vehicle and pedestrian access easements may serve in lieu of streets when approved by the decision maker and only where dedication of a street is deemed impracticable.

H. Vehicular and pedestrian easements shall allow for public access and shall comply with all applicable pedestrian access requirements.

Response: Vehicle and pedestrian access easements are planned in lieu of a street within Phase 6. Because of the changes in elevation, Tract R involves a private street which will serve several lots within Phase 6. Construction of a public street is impracticable due to the required grade and available width adjacent to existing homes outside the project boundaries. This criterion is preliminarily met with this application for General Development Plan and will be met with future land use submittals for Detailed Development Plan.

16.12.017 - Street design—Access control.

A. A street which is dedicated to end at the boundary of the development or in the case of half-streets dedicated along a boundary shall have an access control granted to the city as a city controlled plat restriction for the purposes of controlling ingress and egress to the property adjacent to the end of the dedicated street. The access control restriction shall exist until such time as a public street is created, by dedication and accepted, extending the street to the adjacent property.

B. The city may grant a permit for the adjoining owner to access through the access control.

C. The plat shall contain the following access control language or similar on the face of the map at the end of each street for which access control is required: "Access Control (see plat restrictions)."

D. Said plats shall also contain the following plat restriction note(s): "Access to (name of street or tract) from adjoining tracts (name of deed document number[s]) shall be controlled by the city of Oregon City by the recording of this plat, as shown. These access controls shall be automatically terminated upon the acceptance of a public road dedication or the recording of a plat extending the street to adjacent property that would access through those access controls."

Response: A City-controlled plat restriction is planned at each street stub and half street. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

16.12.018 - Street design—Alignment.

The centerline of streets shall be:

A. Aligned with existing streets by continuation of the centerlines.

B. Offset from the centerline by no more than five feet, provided appropriate mitigation, in the judgment of the city engineer, is provided to ensure that the offset intersection will not pose a safety hazard.

C. Driveways that are at least twenty-four feet wide shall align with existing or planned streets on adjacent sites.

Response: Planned streets within the Master Plan will align through continuation of the centerline of the existing streets. Offset streets are not planned as part of this application. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

16.12.019 - Traffic sight obstructions.

All new streets shall comply with the traffic sight obstructions in Chapter 10.32.

Response: New streets are planned to comply with the traffic sight obstructions in OCMC 10.32. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

16.12.020 - Street design—Intersection angles.

Except where topography requires a lesser angle, streets shall be laid out to intersect at angles as near as possible to right angles. In no case shall the acute angles be less than eighty degrees unless there is a special intersection design. An arterial or collector street intersecting with another street shall have at least one hundred feet of tangent adjacent to the intersection unless topography requires a lesser distance. Other streets, except alleys, shall have at least fifty feet of tangent adjacent to the intersection unless topography requires a lesser distance. All street intersections shall be provided with a minimum curb return radius of twenty-five feet for local streets. Larger radii shall be required for higher street classifications as determined by the city engineer. Additional right-of-way shall be required to accommodate curb returns and sidewalks at intersections. Ordinarily, intersections should not have more than two streets at any one point.

16.12.021 - Same—Grades and curves.

Grades and center line radii shall conform to standards approved by the city engineer.

Response: The planned streets will feature adequate intersection angles, grades, and curves. Further information will be available with future Detailed Development Plan applications. Preliminary information is available within the Preliminary Plans attached as part of Exhibit A. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. This criterion is met preliminarily with this application for General Development Plan and will be met with future land use submittals for Detailed Development Plan.

16.12.022 - Same—Development abutting arterial or collector street.

Where development abuts or contains an existing or proposed arterial or collector street, the decision maker may require: Access control; screen planting or wall contained in an easement or otherwise protected by a restrictive covenant in a form acceptable to the decision maker along the rear or side property line; or such other treatment it deems necessary to adequately protect residential properties or afford separation of through and local traffic. Reverse frontage lots with suitable depth may also be considered an option for residential property that has arterial frontage. Where access for development abuts and connects for vehicular access to another jurisdiction's facility then authorization by that jurisdiction may be required.

Response: Lots abutting Arterial and Collector Streets are planned to provide limited access to said streets. Access to these lots is primarily provided by rear alleys or adjacent streets with a lesser classification. In some locations, access to the Collector Street is unavoidable because of existing homes or other constraints (i.e. topography). Final driveway locations will be determined through Detailed Development Plan applications. This criterion is preliminarily met with this application for General Development Plan and will be met with future land use submittals for Detailed Development Plan.

16.12.023 - Same—Pedestrian and bicycle safety.

Where deemed necessary to ensure public safety, reduce traffic hazards and promote the welfare of pedestrians, bicyclists and residents of the subject area, the decision maker may require that local streets be so designed as to discourage their use by nonlocal automobile traffic.

The city engineer may require that crosswalks include a large vegetated or sidewalk area which extends into the street pavement as far as practicable to provide safer pedestrian crossing opportunities. These curb extensions can increase the visibility of pedestrians and provide a shorter crosswalk distance as well as encourage motorists to drive slower. The city engineer may approve an alternative design that achieves the same standard for constrained sites.

Response: These standards are understood. The layout of Park Place Crossing discourages cut-through by nonlocal automobile traffic, and the construction of adequate facilities are planned for pedestrian and bicyclist safety. This criterion is met by this General Development Plan application and will be met by future Detailed Development Plan applications.

16.12.024 - Same—Half street.

Half streets, while generally not acceptable, may be approved where essential to the development, when in conformance with all other applicable requirements, and where it will not create a safety hazard. When approving half streets, the decision maker shall first determine that it will be practical to require the dedication of the other half of the street when the adjoining property is divided or developed. Where the decision maker approves a half street, the applicant shall construct a half street with at least twenty feet of pavement width and provide signage prohibiting street parking so as to make the half street safe until such time as the other half is constructed. Whenever a half street is adjacent to property capable of being divided or developed, the other half of the street shall be provided and improved when that adjacent property divides or develops. Access control may be required to preserve the objectives of half streets.

When the remainder of an existing half-street improvement is completed it shall include the following items: Dedication of required right-of-way, construction of the remaining portion of the street including pavement, curb and gutter, landscape strip, sidewalk, street trees, lighting and other improvements as required for that particular street. It shall also include at a minimum the pavement replacement to the centerline of the street. Any damage to the existing street shall be repaired in accordance with the city's "Pavement Cut Standards" or as approved by the city engineer.

Response: Upon improvement of Tract K and L(both Retail(MUC/NC)/Civic/Village Green tracts), as well as Tract M (Park), a half street may be provided as part of proportional upgrades to S Livesay Road. Those improvements are not planned as part of the General Development Plan. The listed improvements will be completed at a later date. Therefore, this criterion is met by this General Development Plan application and will be met by future Detailed Development Plan applications.

16.12.025 - Same—Cul-de-sacs and dead-end streets.

The city discourages the use of cul-de-sacs and permanent dead-end streets except where construction of a through street is found by the decision maker to be impracticable due to topography or some significant physical constraint such as geologic hazards, wetland, natural or historic resource areas, pre-existing dedicated open space, pre-existing development patterns, arterial access restrictions or similar situation as determined by the decision maker. This section is not intended to preclude the use of curvilinear eyebrow widening of a street where needed.

A. When permitted, access from new cul-de-sacs and permanent dead-end streets shall be limited to a maximum of twenty-five dwelling units.

B. Cul-de-sacs and permanent dead-end streets shall include pedestrian/bicycle accessways to meet minimum block width standards as prescribed in OCMC 16.12.030.

C. Cul-de-sacs shall have sufficient radius to provide adequate turn-around for emergency vehicles in accordance with fire district and city adopted street standards.

Response: Cul-de-sacs are not currently planned as part of Park Place Crossing. Further refinement and updates of the Park Place Crossing layout may occur with future land use submittals for Detailed Development Plan, at which time these criteria will be met, as applicable.

D. Permanent dead-end streets shall provide public street right-of-way/easements sufficient to provide a sufficient amount of turn-around space complete with appropriate no-parking signs or markings to accommodate waste disposal, sweepers, emergency and other long vehicles in the form of a hammerhead or other design to be approved by the decision maker.

E. In the case of dead-end stub streets that will connect to streets on adjacent sites in the future, notification that the street is planned for future extension shall be posted on the stub street until the street is extended and shall inform the public that the dead-end street may be extended in the future. A dead-end street shall include signage or barricade meeting Manual on Uniform Traffic Control Devices (MUTCD).

Response: Permanent dead-end streets are not currently planned as part of the project layout. Street stubs planned to extend to future streets on adjacent sites will be posted with a MUTCD-compliant barricade with signage indicating that the street is planned for future extension. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

16.12.026 - Same—Alleys.

Alleys with public access easements on private property shall be provided in the Park Place and South End concept plan areas for the following districts R-5, R-3.5, R-2, MUC-1, MUC-2 and NC zones unless other permanent provisions for private access to off-street parking and loading facilities are approved by the decision maker. All alleys intended to provide access for emergency vehicles shall be a minimum width of twenty feet. The corners of alley intersections shall have a radius of not less than ten feet and shall conform to standards approved by the city engineer. Access easements and maintenance agreements shall be recorded on affected properties.

Response: Alleys with access easements have been provided where appropriate within the Park Place Crossing Master Plan to provide access to off-street parking and loading facilities. The alleys are planned to be a minimum width of 20 feet, and corners of alley intersections are intended to have a radius of greater than 10 feet where required. Access easements and maintenance agreements will be recorded on the affected properties. Thus, these criteria are met preliminarily and will be met by future Detailed Development Plan applications.

16.12.027 - Same—Off-site street improvements.

During consideration of the preliminary plan for a development, the decision maker shall determine whether existing streets impacted by, adjacent to, or abutting the development meet the applicable design or dimensional requirements. Where such streets fail to meet these requirements, the decision-maker shall require the applicant to make proportional improvements sufficient to achieve conformance with minimum applicable design standards required to serve the proposed development.

Response: Where identified and required, proportional share for impacts to off-site streets will be provided for operational improvements. Additional information is available within the

Park Place Crossing Transportation Impact Study (Exhibit E). This criterion is met preliminarily and will be met by future Detailed Development Plan applications.

16.12.028 - Same—Transit.

Streets shall be designed and laid out in a manner that promotes pedestrian and bicycle circulation. The applicant shall coordinate with transit agencies where the application impacts transit streets as identified in OCMC 17.04.1310. Pedestrian/bicycle access ways shall be provided as necessary to minimize the travel distance to transit streets and stops and neighborhood activity centers. The decision maker may require provisions, including easements, for transit facilities along transit streets where a need for bus stops, bus pullouts or other transit facilities within or adjacent to the development has been identified.

Response: Streets have been designed in such a way that pedestrian and bicycle circulation is encouraged. Holly Lane is anticipated as a transit street per the Park Place Concept Plan. Accessways are provided in order to minimize the travel distance to transit streets, transit stops, and activity centers within the neighborhood. Additional information is available within the Park Place Crossing Transportation Impact Study (Exhibit E). These criteria are met.

16.12.029 - Excavations—Restoration of pavement.

Whenever any excavation shall have been made in any pavement or other street improvement on any street or alley in the city for any purpose whatsoever under the permit granted by the engineer, it shall be the duty of the person making the excavation to restore the pavement in accordance with the city of Oregon City Public Works Pavement Cut Standards in effect at the time the permit is granted. The city commission may adopt and modify the city of Oregon City Public Works Pavement Cut Standards by resolution as necessary to implement the requirements of this chapter.

Response: Cut pavement is anticipated to be restored in accordance with the City of Oregon City Public Works Pavement Cut Standards. This criterion is met.

16.12.030 - Blocks—Width.

The width of blocks shall ordinarily be sufficient to allow for two tiers of lots with depths consistent with the type of land use proposed. The length, width and shape of blocks shall take into account the need for adequate building site size, convenient motor vehicle, pedestrian, bicycle and transit access, control of traffic circulation, and limitations imposed by topography and other natural features.

All new streets shall be designed as local streets unless otherwise designated as arterials and collectors in the current adopted transportation system plan. The maximum block spacing between streets is five hundred thirty feet and the minimum block spacing between streets is one hundred fifty feet as measured between the right-of-way centerlines except in zones GI, CI, MUE, I, and WFDD where determining the appropriate street spacing will be determined by the city engineer. If the maximum block size is exceeded, pedestrian accessways shall be provided every three hundred thirty feet. The spacing standards within this section do not apply to alleys.

Response: The widths of the planned blocks within the project will generally allow for two tiers of lots with depths consistent with the land use planned. This arrangement of lots is consistent with the needs of detached and attached single-family homes. Therefore, the criteria are met with this application for General Development Plan and will be met with future applications for Detailed Development Plans.

16.12.031 - Street design—Street names.

Except for extensions of existing streets, no street name shall be used which will duplicate or be confused with the name of an existing street. Street names shall conform to the established standards in the city and shall be subject to the approval of the city.

Response: Street names have not yet been selected for this General Development Plan but are not anticipated to duplicate or cause confusion with the names of existing streets and are planned to conform to the established standards of the City. These criteria will be met with future applications for Detailed Development Plans.

16.12.032 - Public off-street pedestrian and bicycle accessways.

Pedestrian/bicycle accessways are intended to provide direct, safe and convenient connections between residential areas, retail and office areas, institutional facilities, industrial parks, transit streets, neighborhood activity centers, rights-of-way, and pedestrian/bicycle accessways which minimize out-of-direction travel, and transit-orientated developments where public street connections for automobiles, bicycles and pedestrians are unavailable. Pedestrian/bicycle accessways are appropriate in areas where public street options are unavailable, impractical or inappropriate. Pedestrian and bicycle accessways are required through private property or as right-of-way connecting development to the right-of-way at intervals not exceeding three hundred thirty feet of frontage; or where the lack of street continuity creates inconvenient or out of direction travel patterns for local pedestrian or bicycle trips.

Response: The planned pedestrian and bicycle accessways are intended to provide direct, safe, and convenient access through Park Place Crossing to connect residential areas with parks and open space. These accessways are also provided where public street connections are unavailable and impractical, or where street continuity creates inconvenient patterns. Accessways will be provided through private property as public access easements. Thus, these criteria are met by this application for General Development Plan and will be met by future Detailed Development Plan applications.

A. Entry points shall align with pedestrian crossing points along adjacent streets and with adjacent street intersections.

Response: Public off-street pedestrian and bicycle accessways are planned to align with pedestrian crossing points along adjacent streets. The alignment of these accessways and surrounding streets are available within the Preliminary Site and Phasing Plan included as part of Exhibit A. These criteria are met.

B. Accessways shall be free of horizontal obstructions and have a nine foot six inch high vertical clearance to accommodate bicyclists. To safely accommodate both pedestrians and bicycles, accessway right-of-way widths shall be as follows:

1. Accessways shall have a fifteen-foot wide right-of-way with a seven-foot wide paved surface with a minimum four-foot planter strip on either side.

2. If an accessway also provides secondary fire access, the right-of-way width shall be at least twenty-four feet wide with a sixteen-foot paved surface between four-foot planter strips on either side.

Response: Accessways have been planned to be free of horizontal obstructions to the specified height and provide at least 7 feet of paved surface within a 15-foot-wide right-of-way or easement. The General Development Plan Preliminary Plans (Exhibit A) demonstrate accessways meeting the above criteria, as applicable. These criteria will be met by future Detailed Development Plan applications.

C. Accessways shall be direct with at least one end point of the accessway always visible from any point along the accessway. On-street parking shall be prohibited within fifteen feet of the intersection of the accessway with public streets to preserve safe sight distance and promote safety.

Response: Accessways within Park Place Crossing have been planned with at least one end of the accessway visible from any point along the accessway. On-street parking is planned to be prohibited within 15 feet of the intersection of the accessway and public streets in order to preserve sight distance and promote safety. The General Development Plan Preliminary Plans (Exhibit A) demonstrate accessways meeting the above criterion. These criteria will be met by future Detailed Development Plan applications.

D. To enhance pedestrian and bicycle safety, accessways shall be lighted with pedestrian-scale lighting. Accessway lighting shall be to a minimum level of one-half-foot-candles, a one and one-half foot-candle average, and a maximum to minimum ratio of seven-to-one and shall be oriented not to shine upon adjacent properties. Street lighting shall be provided at both entrances.

E. Accessways shall comply with Americans with Disabilities Act (ADA).

F. The planter strips on either side of the accessway shall be landscaped along adjacent property by installation of the following:

1. Either an evergreen hedge screen of thirty to forty-two inches high or shrubs spaced no more than four feet apart on average;

2. Ground cover covering one hundred percent of the exposed ground. No bark mulch shall be allowed except under the canopy of shrubs and within two feet of the base of trees;

3. A two-inch minimum caliper tree for every thirty-five feet along the accessway. Trees may be planted on either side of the accessway, provided they are spaced no more than thirty-five feet apart; and4.In satisfying the requirements of this section, evergreen plant materials that grow over forty-two inches in height shall be avoided. All plant materials shall be selected from the Oregon City Native Plant List.

G. Accessways shall be designed to prohibit unauthorized motorized traffic. Curbs and removable, lockable bollards are suggested mechanisms to achieve this.

H. Accessway surfaces shall be paved with all-weather materials as approved by the city. Pervious materials are encouraged. Accessway surfaces shall be designed to drain stormwater runoff to the side or sides of the accessway. Minimum cross slope shall be two percent.

I. In parks, greenways or other natural resource areas, accessways may be approved with a five-foot wide gravel path with wooden, brick or concrete edgings.

J. The decision maker may approve an alternative accessway design due to existing site constraints through the modification process set forth in OCMC 16.12.013.

K. **Ownership, liability and maintenance of accessways. To ensure that all pedestrian/bicycle accessways will be adequately maintained over time, the city engineer shall require one of the following:**

1. **Dedicate the accessways to the public as public right-of-way prior to the final approval of the development; or**

2. **The developer incorporates the accessway into a recorded easement or tract that specifically requires the property owner and future property owners to provide for the ownership, liability and maintenance of the accessway.**

Response: Accessways have been planned to meet the above standards; however, their review is not part of this General Development Plan application. A conceptual standard detail has been provided for accessways within Exhibit A, and their planned location has been demonstrated within the Conceptual Offsite Development & Neighborhood Circulation Plan (Sheet P-16). Further review of accessways and their design will occur with land use applications for Detailed Development Plan.

16.12.033 - Mobility standards.

Development shall demonstrate compliance with intersection mobility standards. When evaluating the performance of the transportation system, the city of Oregon City requires all intersections, except for the facilities identified in subsection E below, to be maintained at or below the following mobility standards during the two-hour peak operating conditions. The first hour has the highest weekday traffic volumes and the second hour is the next highest hour before or after the first hour. Except as provided otherwise below, this may require the installation of mobility improvements as set forth in the transportation system plan (TSP) or as otherwise identified by the city engineer.

A. **For intersections within the regional center, the following mobility standards apply:**

1. **During the first hour, a maximum v/c ratio of 1.10 shall be maintained. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.**

2. **During the second hour, a maximum v/c ratio of 0.99 shall be maintained at signalized intersections. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.**

3. **Intersections located on the regional center boundary shall be considered within the regional center.**

B. **For intersections outside of the regional center but designated on the arterial and throughway network, as defined in the regional transportation plan, the following mobility standards apply:**

1. **During the first hour, a maximum v/c ratio of 0.99 shall be maintained. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.**

2. **During the second hour, a maximum v/c ratio of 0.99 shall be maintained at signalized intersections. For signalized intersections,**

this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.

C. **For intersections outside the boundaries of the regional center and not designated on the arterial and throughway network, as defined in the regional transportation plan, the following mobility standards apply:**

1. **For signalized intersections:**

a. **During the first hour, LOS "D" or better will be required for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of the critical movements.**

b. **During the second hour, LOS "D" or better will be required for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of the critical movements.**

2. **For unsignalized intersections outside of the boundaries of the regional center:**

a. **For unsignalized intersections, during the peak hour, all movements serving more than twenty vehicles shall be maintained at LOS "E" or better. LOS "F" will be tolerated at movements serving no more than twenty vehicles during the peak hour.**

[…]

E. **Until the city adopts new performance measures that identify alternative mobility targets, the city shall exempt proposed development that is permitted, either conditionally, outright, or through detailed development master plan approval, from compliance with the above-referenced mobility standards for the following state-owned facilities:**

I-205/OR 99E Interchange.

State intersections located within or on the regional center boundaries.

1. **In the case of conceptual development approval for a master plan that impacts the above references intersections:**

a. **The form of mitigation will be determined at the time of the detailed development plan review for subsequent phases utilizing the code in place at the time the detailed development plan is submitted; and**

b. **Only those trips approved by a detailed development plan review are vested.**

2. **Development which does not comply with the mobility standards for the intersections identified in OCMC 16.12.033 shall provide for the improvements identified in the transportation system plan (TSP) in an effort to improve intersection mobility as necessary to offset the impact caused by development. Where required by other provisions of the code, the applicant shall provide a traffic impact study that includes an assessment of the development's impact on the intersections identified in this exemption and shall construct the intersection improvements listed in the TSP or required by the code.**

<u>**Response:**</u> Intersection mobility has been analyzed as part of the Transportation Impact Study (Exhibit E). For further details, please see Exhibit E. These criteria are met.

16.12.035 - Driveways.

A. All new development and redevelopment shall meet the minimum driveway spacing standards identified in Table 16.12.035.A.

Table 16.12.035.A Minimum Driveway Spacing Standards		
Street Functional Classification	Minimum Driveway Spacing Standards	Distance
Major Arterial Streets	Minimum distance from a street corner to a driveway for all uses other than detached single- and two-family dwellings	175 feet
Minor Arterial Streets	Minimum distance from a street corner to a driveway for all uses other than detached single- and two-family dwellings	175 feet
Collector Streets	Minimum distance from a street corner to a driveway for all uses other than detached single- and two-family dwellings	100 feet
Local Streets	Minimum distance from a street corner to a driveway for all uses other than detached single- and two-family dwellings	25 feet

The distance from a street corner to a driveway is measured along the right-of-way from the edge of the intersection (on the same side of the road) right-of-way to the nearest portion of the driveway and the distance between driveways is measured at the nearest portions of the driveway at the right-of-way.

Response: Driveway spacing is planned to meet the applicable requirements for minimum distance between a driveway and a street corner for Collector and Local Streets according to Table 16.12.035.A. Final driveway locations will be determined through Detailed Development Plan applications. This criterion is met with this application for General Development Plan and will be met with future land use submittals for Detailed Development Plans.

[…]

C. One driveway may be allowed per frontage, unless otherwise restricted. In no case shall more than two driveways be allowed for any single-family attached or detached residential property, duplex, 3—4 plex, or property developed with an ADU or internal conversion with multiple frontages, unless otherwise approved by the city engineer.

D. When a property fronts multiple roads, access shall be provided from the road with the lowest classification in the transportation system plan whenever possible to minimize points of access to arterials and collectors. At the discretion of the city engineer, properties fronting a collector or arterial road may be allowed a second driveway, for the creation of a circulation pattern that eliminates reverse maneuvers for vehicles exiting a property if applied for and granted through procedures in OCMC 16.12.013. All lots proposed with a driveway and lot orientation on a collector or minor arterial shall combine driveways into one joint access per two or more lots unless the city engineer determines that:

1. No driveway access may be allowed since the driveway(s) would cause a significant traffic safety hazard; or
2. Allowing a single driveway access per lot will not cause a significant traffic safety hazard.

Response: A single driveway is planned per lot. On corner lots, access is anticipated from the street with the lower classification in order to minimize points of access. A majority of lots fronting Holly Lane, a Collector Street, will have alley access where possible in order to provide safe access without backing movements onto a higher traffic roadway. Conceptual driveway locations have been designated on the Preliminary Site and Phasing Plan (Sheet P-08) within Exhibit A. Final driveway locations will be determined through Detailed Development Plan applications. This criterion is met preliminarily with this application for General Development Plan and will be met with future land use submittals for Detailed Development Plan.

E. All driveway approaches shall be limited to the dimensions identified in Table 16.12.035.D.

Table 16.12.035.D Driveway Approach Size Standards			
Property Use	Minimum Driveway Approach Width		Maximum Driveway Approach Width
Single-Family Attached	10 feet		12 feet
Single-Family Detached in R-5 & R-3.5	10 feet		12 feet
Single-Family Detached in R-10, R-8, & R-6	12 feet		24 feet
Duplexes	12 feet		24 feet
3—4 plexes	12 feet		24 feet
Multi-Family	18 feet		30 feet
Commercial, Industrial, Office, Institutional, Mixed Use, and/or Nonresidential	One-Way 12 feet	Two-Way 20 feet	40 feet

Driveway widths shall match the width of the driveway approach where the driveway meets sidewalk or property line but may be widened onsite (for example between the property line and the entrance to a garage). Groups of more than four parking spaces shall be so located and served by driveways so that their use will not require backing movements or other maneuvering within a street right-of-way other than an alley.

Response: Driveway widths are anticipated to meet the requirements of Table 16.12.035.D. Driveway widths at the sidewalk and property line are anticipated to match the width of the approach. Final driveway locations will be determined through Detailed Development Plan applications. This criterion is preliminarily met with this application for General Development Plan and will be met with future land use submittals for Detailed Development Plan.

F. The city engineer reserves the right to require a reduction in the number and size of driveway approaches as far as practicable for any of the following purposes:

1. To provide adequate space for on-street parking;

2. To facilitate street tree planting requirements;

3. To assure pedestrian and vehicular safety by limiting vehicular access points; and

4. To assure that adequate sight distance requirements are met.

a. Where the decision maker determines any of these situations exist or may occur due to the approval of a proposed development for non-residential uses or attached or multi-

family housing, a shared driveway shall be required and limited to twenty-four feet in width adjacent to the sidewalk or property line.

Response: These standards are understood. Driveway spacing has been designed to provide on-street parking, street trees, pedestrian and vehicular safety, and sight distance to the greatest degree practicable. Further review of driveways and their design will occur with land use applications for Detailed Development Plan.

G. For all driveways, the following standards apply:

1. Each new or redeveloped curb cut shall have an approved concrete approach or asphalted street connection where there is no concrete curb and a minimum hard surface for at least ten feet back into the property as measured from the current edge of sidewalk or street pavement to provide for controlling gravel tracking onto the public street. The hard surface may be concrete, asphalt, or other surface approved by the city engineer.

2. Any driveway approach built within public right-of-way shall be built and permitted per city requirements as approved by the city engineer.

3. No driveway with a slope of greater than fifteen percent shall be permitted without approval of the city engineer.

Response: Planned driveways will have concrete approaches and asphalted street connections. Hard surfacing is planned for the depth of each driveway as measured from the edge of the sidewalk or street pavement to control gravel tracking onto the public street. Driveway approaches within the public right-of-way are planned to be built and permitted per City requirements. Driveways with a slope greater than 15 percent, if needed, will be submitted to the City Engineer for approval. Further review of driveways and their design will occur with land use applications for Detailed Development Plan.

H. Exceptions. The city engineer reserves the right to waive these standards or not allow driveway access, if the driveway(s) would cause a significant traffic safety hazard. Narrower driveway widths may be considered where field conditions preclude use of recommended widths. When larger vehicles and trucks will be the predominant users of a particular driveway, turning templates may be utilized to develop a driveway width that can safely and expeditiously accommodate the prevalent type of ingress and egress traffic.

Response: These standards are understood.

16.12.065 - Building site—Grading.

Grading of building sites shall conform to the state of Oregon Structural Specialty Code, Title 18, any approved grading plan and any approved residential lot grading plan in accordance with the requirements of OCMC 13.12, 15.48, 16.12 and the public works stormwater and grading design standards, and the erosion control requirements of OCMC 17.47.

Response: Grading of building sites is planned to conform with Oregon Structural Specialty Code, Title 18, the approved grading plan, and approved residential lot grading plans, when applicable. Grading is also planned to be performed in accordance with the requirements OCMC 13.12, 16.12, 17.47, and the public works stormwater and grading design standards. These criteria will be met with future land use applications for Detailed Development Plans.

16.12.085 - Easements.

The following shall govern the location, improvement and layout of easements:

A. Utilities. Utility easements shall be required where necessary as determined by the city engineer. Insofar as practicable, easements shall be continuous and aligned from block-to-block within the development and with adjoining subdivisions or partitions. Specific utility easements for water, sanitary or storm drainage shall be provided based on approved final engineering plans.

B. Unusual Facilities. Easements for unusual facilities such as high voltage electric transmission lines, drainage channels and stormwater detention facilities shall be adequately sized for their intended purpose, including any necessary maintenance roads. These easements shall be shown to scale on the preliminary and final plats or maps. If the easement is for drainage channels, stormwater detention facilities or related purposes, the easement shall comply with the requirements of the public works stormwater and grading design standards.

C. Watercourses. Where a development is traversed or bounded by a watercourse, drainageway, channel or stream, a stormwater easement or drainage right-of-way shall be provided which conforms substantially to the line of such watercourse, drainageway, channel or stream and is of a sufficient width to allow construction, maintenance and control for the purpose as required by the responsible agency. For those subdivisions or partitions which are bounded by a stream of established recreational value, setbacks or easements may be required to prevent impacts to the water resource or to accommodate pedestrian or bicycle paths.

D. Access. When easements are used to provide vehicular access to lots within a development, the construction standards, but not necessarily width standards, for the easement shall meet city specifications. The minimum width of the easement shall be twenty feet. The easements shall be improved and recorded by the applicant and inspected by the city engineer. Access easements may also provide for utility placement.

E. Resource Protection. Easements or other protective measures may also be required as the community development director deems necessary to ensure compliance with applicable review criteria protecting any unusual significant natural feature or features of historic significance.

<u>Response:</u> These items are not provided as part of this General Development Plan application. Appropriate easements for utilities, unusual facilities, watercourses, access, and natural resources will be provided with Detailed Development Plan and on the final subdivision plat applications. Therefore, these criteria will be met with future Detailed Development Plans.

16.12.090 - Minimum improvements—Procedures.

In addition to other requirements, improvements installed by the applicant either as a requirement of these or other regulations, or at the applicant's option, shall conform to the requirements of this title and be designed to city specifications and standards as set out in the city's facility master plan and public works stormwater and grading design standards. The improvements shall be installed in accordance with the following procedure:

A. Improvement work shall not commence until construction plans have been reviewed and approved by the city engineer and to the extent that improvements are located in county or state right-of-way, they shall be approved by the responsible authority. To the extent necessary for evaluation of the proposal, the plans may be required before approval of the preliminary plat of a subdivision or partition. Expenses incurred thereby shall be borne by the applicant and paid for prior to final plan review.

Response: These standards are understood. Preliminary Plans are attached as part of this application for review. The appropriate construction plan materials will be provided to the City for review and approval prior to work commencing. This criterion will be met with future applications for Detailed Development Plans.

B. Improvements shall be constructed under the inspection and approval of the city engineer. Expenses incurred thereby shall be borne by the applicant and paid prior to final approval. Where required by the city engineer or other city decision-maker, the applicant's project engineer also shall inspect construction.

Response: Improvements are anticipated to be constructed under the inspection and approval of the City Engineer. Inspections are also anticipated to be performed by the Applicant's Project Engineer. These criteria will be met during construction.

C. Erosion control or resource protection facilities or measures are required to be installed in accordance with the requirements of OCMC 17.47, 17.49 and the public works erosion and sediment control standards.

Response: Erosion control and resource protection facility and measure requirements of OCMC 17.47 and OCMC 17.49 will be reviewed as part of future applications for Detailed Development Plan. Therefore, this criterion is met.

D. Underground utilities, waterlines, sanitary sewers and storm drains installed in streets shall be constructed prior to the surfacing of the streets. Stubs for service connections for underground utilities, such as, storm, water and sanitary sewer shall be placed beyond the ten-foot wide franchise utility easement within private property.

Response: Underground utilities, water lines, sanitary sewers, and storm drains installed within street rights-of-way are anticipated to be constructed prior to surfacing of the streets. Stubs for service connections for underground utilities are planned to be placed beyond the 10-foot-wide franchise utility easement adjacent to street rights-of-way. This criterion will be met with future applications for Detailed Development Plans.

E. As-built construction plans and digital copies of as-built drawings shall be filed with the city engineer upon completion of the improvements.

Response: As-built construction plans are anticipated to be filed with the City Engineer upon completion of the improvements. This criterion will be met upon completion of construction.

F. The city engineer may regulate the hours of construction and access routes for construction equipment to minimize impacts on adjoining residences or neighborhoods.

Response: This standard is understood.

16.12.095 - Same—Public facilities and services.

The following minimum improvements shall be required of all applicants for a development, unless the decision-maker determines that any such improvement is not proportional to the impact imposed on the city's public systems and facilities:

A. **Transportation System. Applicants and all subsequent lot owners shall be responsible for improving the city's planned level of service on all public streets, including alleys within the development and those portions of public streets adjacent to but only partially within development. Applicants are responsible for designing and providing adequate vehicular, bicycle and pedestrian access to their developments and for accommodating future access to neighboring undeveloped properties that are suitably zoned for future development. Storm drainage facilities shall be installed and connected to off-site natural or man-made drainageways. Upon completion of the street improvement survey, the applicant shall reestablish and protect monuments of the type required by ORS 92.060 in monument boxes with covers at every public street intersection and all points or curvature and points of tangency of their center line, and at such other points as directed by the city engineer.**

Response: Public streets with sidewalks are planned to provide connectivity with adjacent development, circulation throughout the project, and access to all future homes. As shown on the Preliminary Site and Phasing Plan, frontage improvements are included along S Holcomb Boulevard. This project will result in the creation of new, fully improved streets and the continuation and improvement of three existing streets. The project will also provide the opportunity for orderly and connected development of adjacent properties. Stormwater facilities will be installed and connected as required. Monument boxes at street centerline intersections and other required locations will be installed and/or protected. Therefore, these criteria are met, will be met with applications for Detailed Development Plans, or will be met upon completion of construction, as applicable.

B. **Stormwater Drainage System. Applicants shall design and install drainage facilities within a development and shall connect the development's drainage system to the appropriate downstream storm drainage system as a minimum requirement for providing services to the applicant's development. The applicant shall obtain county or state approval when appropriate. Applicants are responsible for extending the appropriate storm drainage system to the development site and for providing for the connection of upgradient properties to that system. The applicant shall design the drainage facilities in accordance with city drainage master plan requirements, OCMC 13.12 and the public works stormwater and grading design standards.**

Response: As shown in the Preliminary Plans and discussed in the Preliminary Stormwater Report (Exhibit F), within Phase 1, on-site stormwater will be collected and conveyed to a temporary stormwater facility. Upon construction of Phase 2, stormwater will be managed within the regional facility in Tract G and then conveyed to the creek within Tract F. The temporary pond for Phase 1 will then be converted to Lots 314-318 as part of Phase 2. Detailed Development Plans and other land use applications have not been submitted for review at this time and will be submitted at a later date. Further refined details will be available with future applications for Detailed Development Plans. Therefore, these criteria are met, will be met with applications for Detailed Development Plans, or will be met upon completion of construction, as applicable.

C. **Sanitary Sewer System. The applicant shall design and install a sanitary sewer system to serve all lots or parcels within a development in accordance with the city's sanitary sewer design standards, and shall connect those lots or parcels to the city's sanitary sewer system, except where connection is** required to the county sanitary sewer system as approved by the county. Applicants are responsible for extending the city's sanitary sewer system to the development site and through the applicant's property to allow for the future connection of neighboring undeveloped properties that are suitably zoned for future development. The applicant shall obtain all required permits and approvals from all affected jurisdictions prior to final approval and prior to commencement of construction. Design shall be approved by the city engineer before construction begins.

Response: Sanitary sewer infrastructure within Park Place Crossing is planned to be served through a connection to S Holcomb Boulevard until such time the connection ultimate connection south to Redland Road can be made through the extension of Holly Lane onto off-site properties not under the control of this Master Plan. An initial interim connection will be made with Phase 1 to existing sewer at the intersection of Trail View Drive and Journey Drive. A final interim sewer connection will be made with Phase 2 of Park Place Crossing, rerouting the sewer from Phase 1 to an existing sewer in Oak Valley Drive across Tour Creek via a pedestrian bridge. Sanitary sewer systems within Local Streets are planned to serve all lots within the project area in accordance with the Sanitary Sewer Master Plan and the Park Place Concept Plan. The Sanitary Sewer Capacity Study (Exhibit J) identifies the portions of Park Place Crossing that can be served via this method until connections to sanitary sewer systems south of Park Place Crossing can be completed at a later date. The planned Phase 6 pump station was designed in accordance with the City of Oregon City's Sewage Pump Station and Force Main Design Standards. Detailed Development Plans and other land use applications have not been submitted for review at this time and will be submitted at a later date. Further refined details will be available with future applications for Detailed Development Plans. Therefore, these criteria are met, will be met with applications for Detailed Development Plans, or will be met upon completion of construction, as applicable.

D. Water System. The applicant shall design and install a water system to serve all lots or parcels within a development in accordance with the city public works water system design standards, and shall connect those lots or parcels to the city's water system. Applicants are responsible for extending the city's water system to the development site and through the applicant's property to allow for the future connection of neighboring undeveloped properties that are suitably zoned for future development.

Response: Per the January 2021 update of the 2012 Water Distribution System Master Plan, Holly Lane will be the location of a 12-inch water transmission line connecting the 16-inch Barlow Crest Transmission to the Park Place Concept Area and areas south of S Livesay Road. An additional 12-inch transmission line will connect Cattle Drive and Holly Lane. The water infrastructure shown on the Preliminary Plans is planned to serve the project in conformance with the Park Place Concept Plan and the City's Water Capital Improvements Projects Master Plan. Water systems within Local Streets are planned to serve all lots within the project area in accordance with the City's public works water system design standards. The water supply is anticipated to be in conformance with the requirements of Clackamas Fire District No. 1, with fire hydrants located as required. Detailed Development Plans and other land use applications have not been submitted for review at this time and will be submitted at a later date. Further refined details will be available with future applications for Detailed Development Plans. Therefore, these criteria are met, will be met with applications for Detailed Development Plans, or will be met upon completion of construction, as applicable.

E. Street Trees. Refer to OCMC 12.08, Street Trees.

Response: Conceptual street trees are shown within the Preliminary Plans; however, the provisions of OCMC 12.08 will be addressed with future Detailed Development Plan applications. To the extent that it applies, this criterion is met.

F. Bench Marks. At least one bench mark shall be located within the subdivision boundaries using datum plane specified by the city engineer.

Response: The final plat will reference a benchmark utilizing the datum plane specified by the City Engineer, if required. This criterion will be met.

G. Other Utilities. The applicant shall make all necessary arrangements with utility companies or other affected parties for the installation of underground lines and facilities. Existing and new electrical lines and other wires, including but not limited to communication, street lighting and cable television, shall be placed underground.

Response: All appropriate easements will be provided to public and private utility providers. Arrangements will be made with utility providers for the installation of these facilities. Therefore, this criterion is met.

H. Oversizing of Facilities. All facilities and improvements shall be designed to city standards as set out in the city's facility master plan, public works design standards, or other city ordinances or regulations. Compliance with facility design standards shall be addressed during final engineering. A development may be required to modify or replace existing offsite systems if necessary to provide adequate public facilities. The city may require oversizing of facilities to meet standards in the city's facility master plan or to allow for orderly and efficient development. Where oversizing is required, the applicant may request reimbursement from the city for oversizing based on the city's reimbursement policy and funds available, or provide for recovery of costs from intervening properties as they develop.

Response: Appropriately sized public facilities will be provided throughout the project to serve future homes. Where oversizing of facilities is required because of the facility's importance to an adopted master plan, the Applicant will receive reimbursement from the City or from intervening properties as they develop. All public improvements will be designed by a registered professional engineer and reviewed and approved by City engineering staff. This application for a General Development Plan complies with the criteria and future Detailed Development Plans are anticipated to meet the criteria.

I. Erosion Control Plan—Mitigation. The applicant shall be responsible for complying with all applicable provisions of OCMC 17.47 with regard to erosion control.

Response: Erosion control will be addressed with future Detailed Development Plan applications. As described previously, this Master Plan application does not involve physical site alterations, including those which would create erosion conditions on the project site. Therefore, the criteria will met at the time of Detailed Development Plans, to be submitted at a future date.

16.12.100 - Same—Road standards and requirements.

A. The creation of a public street and the resultant separate land parcels shall be in conformance with requirements for subdivisions or partitions and the applicable street design standards of this chapter. However, the decision-maker may approve the creation of a public street to be established by deed without full compliance with the regulations applicable to subdivisions or partitions where any of the following conditions exist:

1. The establishment of the public street is initiated by the city commission and is declared essential for the purpose of general traffic circulation and the partitioning of land is an incidental effect rather than the primary objective of the street;

2. The tract in which the street is to be dedicated is within an isolated ownership either not over one acre or of such size and characteristics as to make it impossible to develop building sites for more than three dwelling units.

B. For any public street created pursuant to subsection A of this section, a copy of a preliminary plan and the proposed deed shall be submitted to the community development director and city engineer at least ten days prior to any public hearing scheduled for the matter. The plan, deed and any additional information the applicant may submit shall be reviewed by the decision-maker and, if not in conflict with the standards of Title 16 and Title 17, may be approved with appropriate conditions.

16.12.105 - Same—Timing requirements.

A. Prior to applying for final plat approval, the applicant shall either complete construction of all public improvements required as part of the preliminary plat approval or guarantee the construction of those improvements. Whichever option the applicant elects shall be in accordance with OCMC 17.50.140.

B. Construction. The applicant shall construct the public improvements according to approved final engineering plans and all applicable requirements of this code, and under the supervision of the city engineer. Under this option, the improvement shall be complete and accepted by the city engineer prior to final plat approval.

16.12.110 - Public improvements—Financial guarantees.

A. To ensure construction of required public improvements, the applicant shall provide the city with a performance guarantee in accordance with OCMC 17.50.140.

B. After satisfactory completion of required public improvements and facilities, all public improvements not constructed by the city, shall be maintained and under warranty provided by the property owner or developer constructing the facilities until the city accepts the improvements at the end of the warranty period as prescribed in OCMC 17.50.141.

Response: These standards are understood and will be reviewed for compliance with applications for Detailed Development Plans to be submitted at a later date. Therefore, the criteria applicable at this time are met.

Title 17 – ZONING

Chapter 17.50 - ADMINISTRATION AND PROCEDURES

17.50.010 - Purpose.

This chapter provides the procedures by which Oregon City reviews and decides upon applications for all permits relating to the use of land authorized by ORS 92, 197 and 227. These permits include all form of land divisions, land use, limited land use and expedited land division and legislative enactments and amendments to the Oregon City Comprehensive Plan and Titles 16 and 17 of this code. Pursuant to ORS 227.175, any applicant may elect to consolidate applications for two or more related permits needed for a single development project. Any grading activity associated with development shall be subject to preliminary review as part of the review process for the underlying development. It is the express policy of the city of Oregon City that development review not be segmented into discrete parts in a manner that precludes a comprehensive review of the entire development and its cumulative impacts.

17.50.030 - Summary of the city's decision-making processes.

The following decision-making processes chart shall control the city's review of the indicated permits:

Table 17.50.030
Permit Approval Process

Permit Type	I	II	III	IV	Expedited Land Division
Master plan/planned unit development—General development plan			X		
Master plan/planned unit development—General development plan amendment	X	X	X		
Detailed development plan 1	X	X	X		
Geologic hazards		X			
Variance		X	X		
Natural resource overlay district exemption	X				
Natural resource overlay district review		X	X		

1 If any provision or element of the master plan/planned unit development requires a deferred Type III procedure, the detailed development plan shall be processed through a Type III procedure.

Response: The appropriate permit application for a General Development Plan/Master Plan has been submitted to the City. Detailed Development Plans and other land use applications have not been submitted for review at this time and will be submitted at a later date. The applicable criteria are met.

A. Type I decisions do not require interpretation or the exercise of policy or legal judgment in evaluating approval criteria. Because no discretion is involved, Type I decisions do not qualify as a land use, or limited land use, decision. The decision-making process requires no notice to any party other than the applicant. The community development director's decision is final and not appealable by any party through the normal city land use process.

B. Type II decisions involve the exercise of limited interpretation and discretion in evaluating approval criteria, similar to the limited land use decision-making process under state law. Applications evaluated through this process are assumed to be allowable in the underlying zone, and the inquiry typically focuses on what form the use will take or how it will look. Notice of application and an invitation to comment is mailed to the applicant, recognized active neighborhood association(s) and property owners within three hundred feet. The community development director accepts comments for a minimum of fourteen days and renders a decision. The community development director's decision is appealable to the city commission, by any party who submitted comments in writing before the expiration of the comment period. Review by the city commission shall be on the record pursuant to OCMC 17.50.190 under ORS 197.195(5). The city commission

decision is the city's final decision and is subject to review by the land use board of appeals (LUBA) within twenty-one days of when it becomes final.

C. Type III decisions involve the greatest amount of discretion and evaluation of subjective approval standards, yet are not required to be heard by the city commission, except upon appeal. In the event that any decision is not classified, it shall be treated as a Type III decision. The process for these land use decisions is controlled by ORS 197.763. Notice of the application and the planning commission or the historic review board hearing is published and mailed to the applicant, recognized neighborhood association(s) and property owners within three hundred feet. Notice shall be issued at least twenty days pre-hearing, and the staff report shall be available at least seven days pre-hearing. At the evidentiary hearing held before the planning commission or the historic review board, all issues are addressed. The decision of the planning commission or historic review board is appealable to the city commission, on the record pursuant to OCMC 17.50.190. The city commission decision on appeal from is the city's final decision and is subject to review by LUBA within twenty-one days of when it becomes final, unless otherwise provided by state law.

D. Type IV decisions include only quasi-judicial plan amendments and zone changes. These applications involve the greatest amount of discretion and evaluation of subjective approval standards and shall be heard by the city commission for final action. The process for these land use decisions is controlled by ORS 197.763. Notice of the application and planning commission hearing is published and mailed to the applicant, recognized neighborhood association(s) and property owners within three hundred feet. Notice shall be issued at least twenty days pre-hearing, and the staff report shall be available at least seven days pre-hearing. At the evidentiary hearing held before the planning commission, all issues are addressed. If the planning commission denies the application, any party with standing (i.e., anyone who appeared before the planning commission either in person or in writing within the comment period) may appeal the planning commission denial to the city commission. If the planning commission denies the application and no appeal has been received within fourteen days of the issuance of the final decision, then the action of the planning commission becomes the final decision of the city. If the planning commission votes to approve the application, that decision is forwarded as a recommendation to the city commission for final consideration. In either case, any review by the city commission is on the record and only issues raised before the planning commission may be raised before the city commission. The city commission decision is the city's final decision and is subject to review by LUBA within twenty-one days of when it becomes final.

E. The expedited land division (ELD) process is set forth in ORS 197.360 to 197.380. To qualify for this type of process, the development shall meet the basic criteria in ORS 197.360(1)(a) or (b). While the decision-making process is controlled by state law, the approval criteria are found in this code. The community development director has twenty-one days within which to determine whether an application is complete. Once deemed complete, the community development director has sixty-three days within which to issue a decision. Notice of application and opportunity to comment is mailed to the applicant, recognized neighborhood association and property owners within one hundred feet of the subject site. The community development director will accept written comments on the application for fourteen days and then issues a decision. State law prohibits a hearing. Any party who submitted comments may call for an appeal of the community development director's decision before a hearings referee. The referee need not hold a hearing; the only requirement is that the determination be based on the evidentiary record

established by the community development director and that the process be "fair." The referee applies the city's approval standards, and has forty-two days within which to issue a decision on the appeal. The referee is charged with the general objective to identify means by which the application can satisfy the applicable requirements without reducing density. The referee's decision is appealable only to the court of appeals pursuant to ORS 197.375(8) and 36.355(1).

F. Decisions, completeness reviews, appeals, and notices in this chapter shall be calculated according to OCMC 1.04.070 and shall be based on calendar days, not business days.

17.50.040 - Development review in overlay districts and for erosion control.

For any development subject to regulation of geologic hazards overlay district under OCMC 17.44; natural resource overlay district under OCMC 17.49; Willamette River Greenway Overlay District under OCMC 17.48; historic overlay district under OCMC 17.40, and erosion and sediment control under OCMC 17.47, compliance with the requirements of these chapters shall be reviewed as part of the review process required for the underlying development for the site.

Response: These standards are understood, and the applicable sections of code are addressed within this narrative and the applicable criteria are met.

17.50.050 - Pre-application conference.

A. Pre-application Conference. Prior to a Type II—IV or legislative application, excluding historic review, being deemed complete, the applicant shall schedule and attend a pre-application conference with city staff to discuss the proposal, unless waived by the community development director. The purpose of the pre-application conference is to provide an opportunity for staff to provide the applicant with information on the likely impacts, limitations, requirements, approval standards, fees and other information that may affect the proposal.

1. To schedule a pre-application conference, the applicant shall contact the planning division, submit the required materials, and pay the appropriate conference fee.

2. At a minimum, an applicant should submit a short narrative describing the proposal and a proposed site plan, drawn to a scale acceptable to the city, which identifies the proposed land uses, traffic circulation, and public rights-of-way and all other required plans.

3. The planning division shall provide the applicant(s) with the identity and contact persons for all affected neighborhood associations as well as a written summary of the pre-application conference.

Response: A pre-application conference was held with City staff on May 5, 2021, prior to submittal of this application. Therefore, these criteria are met.

B. A pre-application conference shall be valid for a period of six months from the date it is held. If no application is filed within six months of the conference or meeting, the applicant shall schedule and attend another conference before the city will accept a permit application. The community development director may waive the pre-application requirement if, in the director's opinion, the development has not changed significantly and the applicable municipal code or standards have not been significantly amended. In no case shall a pre-application conference be valid for more than one year.

Response: An application was first submitted on July 20, 2021, less than six months from the date the pre-application conference was held. This criterion is met.

C. Notwithstanding any representations by city staff at a pre-application conference, staff is not authorized to waive any requirements of this code, and any omission or failure by staff to recite to an applicant all relevant applicable land use requirements shall not constitute a waiver by the city of any standard or requirement.

Response: This standard is understood.

17.50.055 - Neighborhood association meeting.

Neighborhood Association Meeting. The purpose of the meeting with the recognized neighborhood association is to inform the affected neighborhood association about the proposed development and to receive the preliminary responses and suggestions from the neighborhood association and the member residents.

A. Applicants applying for annexations, zone change, comprehensive plan amendments, conditional use, planning commission variances, subdivision, or site plan and design review (excluding minor site plan and design review), general development master plans or detailed development plans applications shall schedule and attend a meeting with the city-recognized neighborhood association in whose territory the application is proposed no earlier than one year prior to the date of application. Although not required for other projects than those identified above, a meeting with the neighborhood association is highly recommended.

Response: The Park Place Crossing project was required by annexation decision Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005) to submit a master plan application for the area annexed. The applicant held a meeting with the Park Place Neighborhood Association on May 17, 2021. This criterion is met.

B. The applicant shall request via email or regular mail a request to meet with the neighborhood association chair where the proposed development is located. The notice shall describe the proposed project. A copy of this notice shall also be provided to the chair of the citizen involvement committee.

Response: Notice and a request to meet with the Neighborhood Association were provided to the Neighborhood Association Chair and the Chair of the Citizen Involvement Committee. These materials are included as Exhibit H. This criterion is met.

C. A meeting shall be scheduled within thirty days of the date that the notice is sent. A meeting may be scheduled later than thirty days if by mutual agreement of the applicant and the neighborhood association. If the neighborhood association does not want to, or cannot meet within thirty days, the applicant shall host a meeting inviting the neighborhood association, citizen involvement committee, and all property owners within three hundred feet to attend. This meeting shall not begin before six p.m. on a weekday or may be held on a weekend and shall occur within the neighborhood association boundaries or at a city facility.

Response: A request was emailed to the Park Place Neighborhood Association on May 4, 2021. The meeting was held on May 17, 2021, within thirty days of the date that the notice was sent. These criteria are met.

D. If the neighborhood association is not currently recognized by the city, is inactive, or does not exist, the applicant shall request a meeting with the citizen involvement committee.

Response: The applicant participated in a Park Place Neighborhood Association meeting, held on May 17, 2021, to discuss the project. The Park Place Neighborhood Association is an active, City-recognized association. This standard does not apply.

E. To show compliance with this section, the applicant shall submit a copy of the email or mail notice to the neighborhood association and CIC chair, a sign-in sheet of meeting attendees, and a summary of issues discussed at the meeting. If the applicant held a separately noticed meeting, the applicant shall submit a copy of the meeting flyer, postcard or other correspondence used, and a summary of issues discussed at the meeting and submittal of these materials shall be required for a complete application.

Response: The required materials listed above have been included as part of Exhibit H. This criterion is met.

17.50.060 - Application requirements.

A permit application may only be initiated by the record property owner or contract purchaser, the city commission or planning commission. If there is more than one record owner, then the city will not complete a Type II—IV application without signed authorization from all record owners. All permit applications shall be submitted on the form provided by the city, along with the appropriate fee and all necessary supporting documentation and information, sufficient to demonstrate compliance with all applicable approval criteria. The applicant has the burden of demonstrating, with evidence, that all applicable approval criteria are, or can be, met.

Response: The application has been submitted on the appropriate forms provided by the City with appropriate fees and necessary supporting documentation and information. Signatures of owners of record are included as applicable, with special regard given to the provisions of Section 17.65.020.A for Master Plans/General Development Plans involving land "that is not currently under the applicant's control, but which eventually may be controlled by the applicant during the duration of the master plan." Where applicable, property owner signatures for areas of the Master Plan/General Development Plan have been included. Conceptual project plans have been provided to show that these areas can be built in compliance with the Master Plan/General Development Plan. This criterion is met.

17.50.070 - Completeness review and one hundred twenty-day rule.

A. Upon submission, the community development director shall date stamp the application form and verify that all of the appropriate application review fee(s) have been submitted. Upon receipt of all review fees and an application form, the community development director will then review the application and all information submitted with it and evaluate whether the application is complete enough to process. Within thirty days of receipt of the application and all applicable review fees, the community development director shall complete this initial review and issue to the applicant a written statement indicating whether the application is complete enough to process, and if not, what information shall be submitted to make the application complete.

Response: These standards are understood.

B. The applicant has one hundred eighty days from the date the application was made to submit the missing information or the application shall be rejected and the unused portion of the application fee returned to the applicant. If the applicant submits the requested information within the one hundred eighty-day period, the community development director shall again verify whether the application, as augmented, is complete. Each such review and verification shall follow the procedure in subsection A of this section.

The application will be deemed complete for the purpose of this section upon receipt by the community development director of:

1. All the missing information;
2. Some of the missing information and written notice from the applicant that no other information will be provided; or
3. Written notice from the applicant that none of the missing information will be provided.

Response: These standards are understood. Additional information is provided for the purpose of allowing the application to be appropriately reviewed. The updated application is accompanied by a memorandum discussing the completeness letter received and the items requested. These criteria are met.

C. Once the community development director determines the application is complete enough to process, or the applicant refuses to submit any more information, the city shall declare the application complete. Pursuant to ORS 227.178, the city will reach a final decision on an application within one hundred twenty calendar days from the date that the application is determined to be or deemed complete unless the applicant agrees to suspend the one hundred twenty-calendar-day timeline or unless state law provides otherwise. The one hundred twenty-day period, however, does not apply in the following situations:

1. Any hearing continuance or other process delay requested by the applicant shall be deemed an extension or waiver, as appropriate, of the one hundred twenty-day period.
2. Any delay in the decision-making process necessitated because the applicant provided an incomplete set of mailing labels for the record property owners within three hundred feet of the subject property shall extend the one hundred twenty-day period for the amount of time required to correct the notice defect.
3. The one hundred twenty-day period does not apply to any application for a permit that is not wholly within the city's authority and control.
4. The one hundred twenty-day period does not apply to any application for an amendment to the city's comprehensive plan or land use regulations nor to any application for a permit, the approval of which depends upon a plan amendment.

Response: These standards are understood and will be followed as applicable.

D. A one hundred day-period applies in place of the one hundred twenty-day period for affordable housing projects where:

1. The project includes five or more residential units, including assisted living facilities or group homes;
2. At least fifty percent of the residential units will be sold or rented to households with incomes equal to or less than sixty percent of the

median family income for Clackamas County or for the state, whichever is greater; and

3. Development is subject to a covenant restricting the owner and successive owner from selling or renting any of the affordable units as housing that is not affordable for a period of sixty years from the date of the certificate of occupancy.

Response: These standards are understood, but not applicable to the project.

E. The one hundred twenty-day period specified in OCMC 17.50.070.C or D may be extended for a specified period of time at the written request of the applicant. The total of all extensions may not exceed two hundred forty-five calendar days.

Response: These standards are understood, but not applicable at this time.

F. The approval standards that control the city's review and decision on a complete application are those which were in effect on the date the application was first submitted.

Response: The applicable standards are those which were in place on the date that the application was first submitted, July 20, 2021.

17.50.080 - Complete application—Required information.

Unless stated elsewhere in OCMC 16 or 17, a complete application includes all the materials listed in this subsection. The community development director may waive the submission of any of these materials if not deemed to be applicable to the specific review sought. Likewise, within thirty days of when the application is first submitted, the community development director may require additional information, beyond that listed in this subsection or elsewhere in Titles 12, 14, 15, 16, or 17, such as a traffic study or other report prepared by an appropriate expert. In any event, the applicant is responsible for the completeness and accuracy of the application and all of the supporting documentation, and the city will not deem the application complete until all information required by the community development director is submitted. At a minimum, the applicant shall submit the following:

A. One copy of a completed application form that includes the following information:

1. An accurate address and tax map and location of all properties that are the subject of the application;

Response: Address, Assessor’s Map, as well as general locational information has been provided for the subject properties. This criterion is met.

2. Name, address, telephone number and authorization signature of all record property owners or contract owners, and the name, address and telephone number of the applicant, if different from the property owner(s);

Response: The applicable property and contract owner information has been provided for the project. This criterion is met.

B. A complete list of the permit approvals sought by the applicant;

Response: A complete list of the permit approvals sought is included as part of the application; therefore, this criterion is met.

C. A complete and detailed narrative description of the proposed development;

Response: A complete and detailed narrative description of the project has been included as part of the application; therefore, this criterion is met.

D. A discussion of the approval criteria for all permits required for approval of the development proposal that explains how the criteria are or can be met or are not applicable, and any other information indicated by staff at the pre-application conference as being required;

Response: The approval criteria for the applicable permits sought as part of this project at this time have been included with a discussion of each. Therefore, this criterion is met.

E. One copy of all architectural drawings and site plans shall be submitted for Type II—IV applications. One paper copy of all application materials shall be submitted for Type I applications;

Response: An appropriate number of copies was submitted for this Type III land use application. This criterion is met.

F. For all Type II—IV applications, the following is required:

1. An electronic copy of all materials.

Response: An electronic copy of the application materials have been provided to the City. This criterion is met.

2. Mailing labels or associated fee for notice to all parties entitled under OCMC 17.50.090 to receive mailed notice of the application. The applicant shall use the names and addresses of property owners within the notice area indicated on the most recent property tax rolls.

Response: Updated mailing labels were provided to the City as part of the application materials. This criterion is met.

3. Documentation indicating there are no liens favoring the city on the subject site.

Response: Documentation demonstrating that there are no liens favoring the City on the subject site have been provided as part of the application materials. This criterion is met.

4. A receipt from the county assessor's office indicating that all taxes for the lot or parcels involved are paid in full for the preceding tax year.

Response: County tax payment information has been provided as part of the application materials. This criterion is met.

5. A current preliminary title report or trio for the subject property(ies);

Response: A current preliminary title report for the subject properties has been provided. This criterion is met.

G. All required application fees;

Response: The applicable required application fees have been provided for the application. This criterion is met.

H. Annexation agreements, traffic or technical studies (if applicable);

Response: Responses addressing the Conditions of Approval from the annexation of the site Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), a Transportation Impact Study (Exhibit

E), Preliminary Stormwater Report (Exhibit F), Natural Resources Overlay District Memorandum (Exhibit G), and Sanitary Sewer Capacity Study (Exhibit J) are provided for review. This criterion is met.

I. Additional documentation, as needed and identified by the community development director.

Response: The required applicable information, fees, narrative, and applications for a General Development Plan/Master Plan approval have been provided. This criterion is met.

17.50.090 - Public notices.

17.50.100 - Notice posting requirements.

17.50.110 - Assignment of decision-makers.

17.50.120 - Quasi-judicial hearing process.

17.50.130 - Conditions of approval and notice of decision.

17.50.140 - Financial guarantees.

17.50.141 - Public improvements—Warranty.

17.50.150 - Covenant with the city.

17.50.240 - Conformity of permits.

17.50.280 - Transfer of approval rights.

17.50.290 - Fees.

Response: The standards of the above sections are understood and omitted for brevity. The criteria applicable to this General Development Plan application have been met.

Chapter 17.60 – VARIANCES

17.60.010 - Authority.

According to procedures set forth in OCMC 17.60.030, the planning commission or the community development director may authorize variances from the requirements of this title. In granting a variance, the planning commission or community development director may attach conditions to protect the best interests of the surrounding property or neighborhood and otherwise achieve the purposes of this title. No variances shall be granted to allow the use of property for a purpose not authorized within the zone in which the proposed use would be located.

Response: A General Development Plan/Master Plan was required per Condition of Approval No. 4 of Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), the Park Place Annexation and Zone Change. Oregon City Municipal Code 17.65.050.C.9 of the General Development Plan code requires that a mix of residential uses be provided for General Development Plan applications, with no single use exceeding 75 percent of the total. The Preliminary Plans provide a mix of attached and detached single-family residential units to meet the criterion. In doing so, the need for a lot size variance to accommodate appropriately sized attached housing was identified.

A variance is necessary due to the lot width requirements and lot area requirements. Staff plans to adjust the lot size and dimensional requirements for single-family attached (townhome) housing in the near future to meet House Bill 2001 standards. At such time, the townhome lot minimum will be 1,500 square feet per the Oregon Administrative Rule.

Because this change is scheduled to be made to the Oregon City Municipal Code prior to June 2022, future Detailed Development Plan applications are anticipated to meet the requirements of OCMC upon their submittal. Therefore, granting the variance makes sense and will allow for residential lots that do not exceed the standard to be in place in the near future; however, since those requirements are not yet codified, this variance is needed at this time.

The need is explained in depth as part of the narrative responses below. The variance application allows a use required by a City Condition of Approval and authorized within the zone in which the use is located. This criterion is met.

17.60.020 - Variances—Procedures.

A. A request for a variance shall be initiated by a property owner or authorized agent by filing an application with the city recorder. The application shall be accompanied by a site plan, drawn to scale, showing the dimensions and arrangement of the proposed development. When relevant to the request, building plans may also be required. The application shall note the zoning requirement and the extent of the variance requested. Procedures shall thereafter be held under Chapter 17.50. In addition, the procedures set forth in subsection D of this section shall apply when applicable.

Response: This variance application is submitted by the property owner for Park Place Crossing. The application is accompanied by a scaled site plan. The Applicant notes the zoning requirement and the extent of the variance application and the procedures of Chapter 17.50 are addressed within this narrative. This criterion is met.

B. A nonrefundable filing fee, as listed in OCMC 17.50.080, shall accompany the application for a variance to defray the costs.

Response: This variance application is accompanied by the appropriate filing fee. This criterion is met.

C. Before the planning commission may act on a variance, it shall hold a public hearing thereon following procedures as established in Chapter 17.50. A variance shall address the criteria identified in OCMC 17.60.030, Variances—Grounds.

D. Minor variances, as defined in subsection E of this section, shall be processed as a Type II decision, shall be reviewed pursuant to the requirements in OCMC 17.50.030.B, and shall address the criteria identified in OCMC 17.60.030, Variance—Grounds.

Response: These standards are understood and the applicable criteria are met by this application.

E. For the purposes of this section, minor variances shall be defined as follows:

1. Variances to setback and yard requirements to allow additions to existing buildings so that the additions follow existing building lines;

2. Variances to width, depth and frontage requirements of up to twenty percent;

3. Variances to residential yard/setback requirements of up to twenty-five percent;

4. Variances to nonresidential yard/setback requirements of up to ten percent;

5. Variances to lot area requirements of up to five percent;

6. Variance to lot coverage requirements of up to twenty-five percent;

7. Variances to the minimum required parking stalls of up to five percent; and

8. Variances to the floor area requirements and minimum required building height in the mixed-use districts.

9. Variances to design and/or architectural standards for single-family dwellings, duplexes, single-family attached dwellings, internal conversions, accessory dwelling units, and 3—4 plexes in OCMC 17.14, 17.16, 17.20, 17.21, and 17.22.

Response: As part of the completeness review, the need for a variance was identified in order to meet the needs of the General Development Plan section of the Oregon City Municipal Code. The General Development Plan was required as Condition of Approval No. 4 of the annexation approval of the Park Place Crossing area.

Until the City of Oregon City adopts housing regulations to meet the requirements of House Bill 2001, the minimum townhome lot area and dimensions required by current code do not allow for common-sense construction of attached single-family residences required to meet the General Development Plan requirements for variation of housing types. Future code standards are expected to allow lots with dimensions and areas currently planned.

A variance to the lot width and lot area requirements is necessary. Staff plans to adjust the lot requirements for single-family attached (townhome) housing in the near future to meet House Bill 2001 standards. At such time, the townhome lot minimum will be 1,500 square feet per the Oregon Administrative Rule.

The lots, as adjusted (20 percent reduction to dimensional standards) through the Master Plan process, meet the lot width (25 feet × 0.80 = 20 feet) requirements of the zone. Twenty-foot lot widths are typical of attached single-family housing projects. However, the lot sizes would not meet the single-family attached standards for the R-5 zone (3,500 square feet × 0.80 = 2,800 square feet); the lots planned would range from 1,800 square feet for those interior lots to 2,500 square feet for end units and single-family attached corner lots. The R5 dimensional standards do not support typical attached housing townhome product types because of the combination of required lot widths and areas. The resulting lots, if the standard is met, would be excessively long. Lots would be required to be 140 feet deep to meet the 2,500 square foot lot size requirement, an illogical requirement for attached housing.

A variance is needed to allow for single-family attached lots, required by the Master Plan, that meet the adjusted width standards with reasonable lot lengths. As attached homes need no interior side setbacks due to their construction, a reduction in the width of these lots allows the lot area to be reasonably accommodated by a lot which meets the minimum lot depth within the R-5 zone (70 feet). Lots for single-family attached homes are also not reasonably possible due to the topographic constraints, need for alleys, and additional constraints present within Park Place Crossing. While a variance is needed for the General Development Plan application in order to meet the standards currently in place, future Detailed Development Plan applications are anticipated to meet the anticipated requirements of the updated OCMC. Granting this variance allows Park Place Crossing to provide common-sense construction of housing.

17.60.030 - Variance—Grounds.

A variance may be granted only in the event that all of the following conditions exist:

A. That the variance from the requirements is not likely to cause substantial damage to adjacent properties by reducing light, air, safe access or other desirable or necessary qualities otherwise protected by this title;

Response: The variance allows for attached residential lots, required by the General Development Plan criteria and which meet other dimensional and design aspects of Oregon City Municipal Code, to meet a common-sense lot area standard. The lot area change will not substantially or adversely affect the neighboring properties from accessing light, air, safe access, or any other desirable or necessary qualities stated within the OCMC. The variance allows single-family attached lots to meet a standard that is likely to be put into place to address state requirements. This criterion is met.

B. That the request is the minimum variance that would alleviate the hardship;

Response: The variance to single-family attached residential lot standards required by the Master Plan is the minimum needed to alleviate the hardship. Single-family detached residential lots will not be affected by the variance, and the reduced standard will not apply to detached lots. The minimum lot requirement of 2,800 square feet per lot (per the adjusted standard established by the General Development Plan) does not make sense when applied to shared-wall fee simple townhomes and other attached residential structures.

City staff is planning to reduce the minimum standard to 1,500 square feet as part of the future House Bill 2001 housing code update in the near future (likely prior to June 2022). Therefore, granting the variance makes sense and will allow for residential lots that do not exceed the standard anticipated to be created in the near future. This criterion is met.

C. Granting the variance will equal or exceed the purpose of the regulation to be modified.

Response: Single-family attached residential homes or "Missing Middle" housing, have been identified as an important housing type to provide as part of a City's needed housing. The variance allows attached residences, required by the General Development Plan, to be constructed to a reasonable standard expected to be allowed in the near future. Without a variance to these standards, lots for single-family attached homes are not reasonably possible due to the topographic constraints, need for alleys, and additional constraints present within Park Place Crossing. With the variance, these homes can be feasibly constructed without making unreasonably long lots (140 feet long at 20 feet in width). The adjustment allows for Park Place Crossing to provide the necessary permitted density and other standards and not create unnecessary unusable space. This criterion is met.

D. Any impacts resulting from the adjustment are mitigated;

Response: There are no anticipated impacts resulting from the adjustment. Lot setback requirements are not planned for adjustment, creating lots which do not appear crowded from the street or from adjacent homes. This criterion is met.

E. **No practical alternatives have been identified which would accomplish the same purpose and not require a variance; and**

Response: There are no known practical alternatives to meet the minimum lot area requirements of the OCMC without creating lots that are ±50 feet deeper than currently planned. Meeting the lot area requirements without a variance would either create an excessively deep home or unused space at either the front or rear of the lots. These alternatives take away from the aesthetic quality of the neighborhood, create unnecessarily lengthy yards, taking away from area which could otherwise be used for homes, or create larger homes than necessary, which increases their costs. Without a variance to these standards, lots for single-family attached homes are not reasonably possible due to the topographic constraints, need for alleys, and additional constraints present within Park Place Crossing. No practical alternative to a variance in minimum lot area requirements exists; therefore, this criterion is met.

F. **The variance conforms to the comprehensive plan and the intent of the ordinance being varied.**

Response: As addressed within narrative responses to the Comprehensive Plan Goals and Policies, the variance and other adjustments planned conform to the plan and the intent of the ordinance being varied. The intent of the lot area standard is not to create excessively large lots, and future code updates are anticipated to reduce the standard to a reasonable quantity. This criterion is met.

Chapter 17.65 - MASTER PLANS AND PLANNED UNIT DEVELOPMENTS

17.65.010 - Purpose and intent.

It is the intent of this chapter to foster the growth of major institutions, phased residential, commercial or mixed-use development, and other large-scale development, while identifying and mitigating the impacts of such growth on surrounding properties and public infrastructure. The city recognizes the valuable housing options, services and/or employment opportunities that these developments bring to Oregon City residents. The master plan or planned unit development process is intended to facilitate an efficient and flexible review process for major developments, support innovative and creative land development, and to provide long-term assurance to plan for and execute developments in a phased manner. To facilitate this, the master plan process is structured to allow an applicant to address larger development issues, such as adequacy of infrastructure and transportation capacity, and reserve capacity of the infrastructure and transportation system before expenditure of final design costs. The master plan or planned unit development process is further intended to promote efficiency in land development, maintenance, street systems and utility networks while providing site layouts that integrate usable and attractive open spaces, site circulation, and the general wellbeing of site users. For the purposes of this chapter planned unit developments are considered the same as master plans.

17.65.020 - What is included in a master plan or planned unit development.

A. **A master plan or planned unit development is a two-step process that includes a general development plan and a detailed development plan. A general development plan incorporates the entire area where development is planned**

for up to the next twenty years from the date of final approval, including the identification of one or more development phases. The general development plan may encompass land that is not currently under the applicant's control, but which eventually may be controlled by the applicant during the duration of the master plan. The plan shall have no effect for lands not currently controlled by the applicant. "Controlled" shall be defined as leased or owned by the applicant. A detailed development plan is the phase or phases of the general development plan that are proposed for development within two years.

Response: Per Condition of Approval No. 4 of Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005) for the Park Place Annexation and Zone Change, a General Development Plan (Master Plan) was required for the ±92 acres of property. The application for the General Development Plan includes land not currently under the “control” of the Applicant (2 2E 28D Tax Lots 200, 300, 301, 303, and 502). Signatures for the General Development Plan land use application have been obtained from owners of property within the master plan area; however, verification and survey of ground conditions has not taken place at this time and will occur prior to an application for Detailed Development Plan.

A Detailed Development Plan is not included as part of this application. The master plan applies to the area of the application over the duration of the 20-year planning period and over several phases of the project. This criterion is met.

B. A master plan or planned unit development identifies the current and proposed uses of the development, proposed project boundaries, and proposed public and private infrastructure needed to serve the development. If approved, the general development plan may be used to allow existing legal non-conforming uses. If conditions of approval from a previous land use decision have not been completed, they shall be modified through the general development plan or completed with new development.

Response: The project site currently serves residential uses, the planned use of the property will also be primarily residential, but at densities appropriate for the City of Oregon City zoning assigned to the properties through the annexation process. Project boundaries and the planned project infrastructure are shown on the Preliminary Plans attached as Exhibit A. This land use application is submitted to satisfy Condition of Approval 4 from the property’s annexation, Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005). Therefore, these criteria are met.

C. A master plan or planned unit development identifies future development impacts, thresholds for mitigation and mitigation improvements and implementation schedules. A threshold for mitigation is the point that determines when or where a mitigation improvement will be required. Examples of "thresholds" include vehicle trips, square feet of mpervious surface area, water usage measured in gallons per minute, construction of a building within a general development plan and construction of a building within a certain distance of a residential lot.

Mitigation improvements are necessary when a threshold for mitigation is reached. Examples include road dedication, intersection improvement, road widening, construction of a stormwater or water quality facility, installation of vegetative buffering and wetland restoration or enhancement.

Response: Approval of the Master Plan in and of itself does not permit physical alterations of the site. That said, this General Development Plan illustrates features that would be necessary in the future with a potential Detailed Development Plan or subdivision application. Relevant information is included within these application materials and the Park Place Crossing Transportation Impact Study (Exhibit E). These criteria are satisfied.

17.65.030 - Applicability of the master plan or planned unit development regulations.

A. Required for Large Institutional Uses. If the boundaries of an institutional development exceed ten acres in size, the proposed development shall be master planned using the regulations of this chapter. No land use review other than a Type I or II Minor Site Plan and Design Review shall be issued for any institutional development in excess of ten acres in total acreage unless it is accompanied by or preceded by a master plan approval under this chapter. This requirement does not apply to modifications to existing institutional developments unless the modification results in a cumulative square footage increase of over ten thousand total building square feet in an existing institutional development over ten acres.

B. When Required as Part of Previous Land Use Review. The master plan or planned unit development regulations may be used to fulfill a condition of approval from a previous land use decision-requiring master planning for a development.

C. When identified in the Oregon City Comprehensive Plan. The master plan regulations are required for all properties identified for master planning in the land use section of the Oregon City Comprehensive Plan.

D. Voluntarily. An applicant may voluntarily submit a master plan or planned unit development as part of a land use review, including for residential projects.

Response: A Master Plan, or General Development Plan, was required as part of Condition of Approval No. 4 of Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), part of a previous land use review. A Master Plan has been submitted as part of these applications. Therefore, the applicable criteria are met.

17.65.040 - Procedure.

A. Preapplication Review. Prior to filing for either general development plan or detailed development plan approval, the applicant shall file a pre-application conference pursuant to OCMC 17.50.030.

Response: Pre-application conferences were held on April 7, 2020, and May 5, 2021. Therefore, this criterion is met.

B. General Development Plan. An application for a general development plan describing the long-term buildout of the site shall be reviewed through a Type III procedure. An applicant shall have an approved general development plan before any detailed development plan may be approved, unless both are approved or amended concurrently. Amendments to an approved general development plan shall be reviewed under a Type III procedure pursuant to OCMC 17.65.080.

Response: This application includes a General Development Plan (GDP) for Park Place Crossing meeting the requirements of OCMC 17.65.050. Therefore, this criterion is met.

C. Detailed Development Plan. An application for a detailed development plan, is processed through a Type II procedure, as long as it is in conformance with

the approved general development plan. Amendments to an approved detailed development plan shall be processed pursuant to OCMC 17.65.080. Once a development has an approved detailed development plan, OCMC 17.62, Site Plan and Design Review is not required.

Response: This application does not include a Detailed Development Plan at this time. Future applications for Detailed Development Plans are planned for each phase of the project outlined through the submitted General Development Plan. The criterion is expected to be met by these future applications.

D. Concurrent Review. An applicant may concurrently apply for a general development plan and a detailed development plan. Such a concurrent application is reviewed through the highest procedure that applies to any element of the combined application.

Response: This application does not include a Detailed Development Plan at this time and therefore does not require a concurrent review. This criterion does not apply.

E. Relationship to Other Reviews. It is the express policy of the city that development review not be segmented into discrete parts in a manner that precludes a comprehensive review of the entire development and its cumulative impacts.

Response: This standard is understood.

F. Duration of General Development Plan. A general development plan shall involve a planning period of up to twenty years. An approved general development plan shall remain in effect until development allowed by the plan has been completed through the detailed development plan process, the plan is amended or superseded, or the plan expires under its stated expiration date either as stated in the approved master plan or planned unit development application or decision of approval.

Response: These standards are understood.

17.65.050 - General development plan.

A. Existing Conditions Submittal Requirements.

1. Narrative Statement. An applicant shall submit a narrative statement that describes the following:

a. Current uses of and development on the site;

Response: The property consists of multiple individual tax lots/ownerships, some of which have been improved with home sites. These properties were annexed into Oregon City in 2017 (Ordinance 18-1007). A narrative statement describing the current uses on the site has been included with this application. This criterion is met.

[…]

c. A vicinity map showing the location of the general development plan boundary relative to the larger community, along with affected major transportation routes, transit, and parking facilities. At least one copy of the vicinity map shall be eight and one-half inches by eleven inches in size, and black and white reproducible;

Response: A vicinity map is included within the Preliminary Plans (Exhibit A) to illustrate the General Development Plan boundary relative to the larger community, affected major transportation routes, transit, and parking facilities, as applicable. This criterion is met.

d. **Land uses that surround the development site. This may also reference submitted maps, diagrams or photographs;**

Response: Portions of the subject site are adjacent to single-family residential uses. Other surrounding uses include areas unsuitable for residential uses because of the proximity of slopes and drainageway areas. Land use materials submitted as part of the Preliminary Plans (Exhibit A) include maps, diagrams, and photographs. This criterion is met.

e. **Previous land use approvals within the general development plan boundary and related conditions of approval, if applicable;**

Response: Several related conditions of approval were created through File No. AN 17-0004/ZC 17-0005, the General Development Plan is a result of and consistent with those conditions reviewed later within this narrative. Other relevant documents include the Park Place Concept Plan adopted by the City in 2008. This criterion is met.

f. **Existing utilization of the site;**

Response: The subject site is largely currently vacant or underdeveloped with single-family homes with rural densities. Portions of the site are the location of steep slopes and/or natural resources such as riparian areas. Further details are available within this narrative (Section III. Site Description) and as part of Exhibit A – Preliminary Plans. This criterion is met.

g. **Site description, including the following items. May also reference submitted maps, diagrams or photographs:**

i. **Physical characteristics;**

ii. **Ownership patterns;**

iii. **Building inventory;**

iv. **Vehicle/bicycle parking;**

v. **Landscaping/usable open space;**

vi. **FAR/lot coverage;**

vii. **Natural resources that appear on the city's adopted Goal 5 inventory;**

viii. **Cultural/historic resources that appear on the city's adopted Goal 5 inventory;**

ix. **Location of existing trees six inches in diameter or greater when measured four feet above the ground. The location of single trees shall be shown. Trees within groves may be clustered together rather than shown individually; and**

x. **Geologic hazards pursuant to OCMC 17.44.**

Response: The applicable site characteristics listed above are illustrated within the Preliminary Plans and other attachments to this narrative. Goal 5 resources, such as Tour and Abernethy

Creeks, are depicted on the Preliminary Plans. Existing trees over six inches in diameter or groves of clustered trees are depicted within the Existing Conditions Plan. Geologic hazards pursuant to OCMC 17.44 are also depicted within the Preliminary Plans. Further details are available within this narrative (Section III. Site Description) and as part of Exhibit A – Preliminary Plans. This criterion is met.

h. Existing transportation analysis, including the following items. May also reference submitted maps, diagrams or photographs.

i. Existing transportation facilities, including highways, local streets and street classifications, and pedestrian and bicycle access points and ways;

ii. Transit routes, facilities and availability;

iii. Alternative modes utilization, including shuttle buses and carpool programs; and

iv. Baseline parking demand and supply study (may be appended to application or waived if not applicable).

Response: A Transportation Impact Study for the project was prepared by Lancaster Mobley (Exhibit E). The Transportation Impact Study meets the City standards for traffic studies and addresses the requirements listed above. This criterion is met.

i. Infrastructure facilities and capacity, including the following items:

i. Water;

ii. Sanitary sewer;

iii. Stormwater management; and

iv. Easements.

Response: Plans illustrating the project infrastructure facilities, phasing, and capacity at a Master Plan level have been prepared and are attached as Exhibit A. Sanitary Sewer has been studied by the City and an appropriate solution determined per the Sanitary Sewer Capacity Study (Exhibit J). A Preliminary Stormwater Report, prepared by AKS Engineering & Forestry, LLC, is also attached as Exhibit F. Descriptions of the conceptual General Development Plan infrastructure is provided later within this narrative and as part of Exhibit A. Future applications for Detailed Development Plans will meet the criteria by further refining the needed infrastructure facilities and capacity. This criterion is met and will be met with future applications for Detailed Development Plans.

2. Maps and Plans.

a. Existing conditions site plan. Drawn at a minimum scale of one-inch equals one hundred feet (one inch equals one hundred feet) that shows the following items. At least one copy shall be eight and one-half inches x eleven inches in size, and black and white reproducible.

i. Date, north point, and scale of drawing.

ii. Identification of the drawing as an existing conditions site plan.

iii. Proposed development boundary.

iv. All parking, circulation, loading and service areas, including locations of all carpool, vanpool and bicycle parking spaces as required in Chapter 52 of this title.

v. Contour lines at two-foot contour intervals for grades zero to ten percent, and five-foot intervals for grades over ten percent.

b. A site plan or plans, to scale, for the general development plan site and surrounding properties containing the required information identified in OCMC 17.62.040.b, Vicinity map. Depicting the location of the site sufficient to define its location, including identification of nearest cross streets. At least one copy of the vicinity map shall be eight and one-half inches by eleven inches in size, and black and white reproducible.

c. Aerial photo. Depicting the subject site and property within two hundred fifty feet of the proposed development boundaries. At least one copy of the aerial photo shall be eight and one-half inches by eleven in size, and black and white reproducible.

Response: These requested materials are attached as part of the Preliminary Plans (Exhibit A), as applicable. Therefore, these criteria are met.

B. Proposed Development Submittal Requirements.

1. Narrative statement. An applicant shall submit a narrative statement that describes the following:

a. The proposed duration of the general development plan.

Response: The Park Place Crossing Master Plan is planned to be effective for the subject site for 20 years; however, the Applicant anticipates that the full build-out of Park Place Crossing could occur sooner, potentially within approximately 8 to 9 years of approval. This criterion is met.

b. The proposed development boundary. May also reference submitted maps or diagrams.

Response: The project boundaries are illustrated within the Preliminary Plans. This criterion is satisfied.

c. A description, approximate location, and timing of each proposed phase of development, and a statement specifying the phase or phases for which approval is sought under the current application. May also reference submitted maps or diagrams.

Response: Park Place Crossing is anticipated to occur in chronological order according to the numbering of the phase. Each phase requires a separate Detailed Development Plan and associated materials. Phases are anticipated to occur as outlined within the following table.

Table 2: Park Place Crossing Anticipated Phasing

Phase	Dwelling Units / Anticipated Uses	Open Space (acres)	Amenities
1	±59 single-family detached homes	±0.14	Open Space and street connections to areas of future development
2	±133 single-family detached homes ±126 single-family attached homes Civic area Retail area Regional stormwater facility	±6.52	Park, civic space, retail area, trails & connection to existing neighborhoods, pedestrian pathways, Open Space Tracts
3	±59 single-family detached homes	±0.00	Street connections to existing neighborhoods
4	±53 single-family detached homes	±7.58	Pedestrian pathways, trails, Open Space
5	±35 single-family detached homes	±1.49	Pedestrian pathways, trails, Open Space
6	±11 single-family detached homes	±0.00	Trail connections & street connections to future UGB expansion area

Phase 1 is anticipated to be constructed in 2023, with completion of Phases 2 through 6 accomplished by 2030. Detailed Development Plan applications are anticipated to be submitted at a future date following approval of the General Development Plan. Descriptions and approximate locations of each phase are included as part of Sheet P-08 within the Preliminary Plans (Exhibit A). This criterion is met.

d. An explanation of how the proposed development is consistent with the purposes of Section 17.65, the applicable zone district or districts, and any applicable overlay district.

Response: An explanation of how this master plan is consistent with the purposes of this section and applicable zoning districts is included within this narrative. This criterion is met.

e. A statement describing the impacts of the proposed development on inventoried Goal 5 natural, historic or cultural resources within the development boundary or within two hundred fifty feet of the proposed development boundary.

Response: Natural resources within 250 feet of the Master Plan boundary are shown in the Preliminary Plans (Exhibit A). Historic and cultural resources have not been found to have been inventoried on the property. Further details will be shown with future applications for Detailed Development Plan. This criterion is met.

f. An analysis of the impacts of the proposed development on the surrounding community and neighborhood, including:

i. **Transportation impacts as prescribed in subsection g below;**

Response: A Transportation Impact Study which contains analysis of the impacts of the planned project on the surrounding community and neighborhood is included as Exhibit E. The impacts described in subsection 17.65.50.B.1.g are addressed below. Park Place Crossing will be contributing to transportation system infrastructure improvements and public projects through the payment of Systems Development Charges and construction of Holly Lane and associated improvements. This criterion is met.

ii. **Internal parking and circulation impacts and connectivity to sites adjacent to the development boundary and public right-of-ways within two hundred fifty feet of the development boundary;**

Response: Circulation to and from the residential project is anticipated according to the scenarios envisioned within the Transportation Impact Study. Parking is planned via off-street parking provided by single-family residences. Surrounding existing development and rights-of-way within 250 feet of the Master Plan boundary are shown within the Preliminary Plans. This criterion is met.

iii. **Public facilities impacts (sanitary sewer, water and stormwater management) both within the development boundary and on city-wide systems; including a phasing plan for all on-site and off-site public improvements, including but not limited to transportation, schools, parks, open space, trails, sewer, water and stormwater, with an analysis of the capacity and improvements required as a result of fully implementing the plan. This analysis shall reference any adopted parks and recreation, public facilities plans and concept plans and identify specific funding mechanisms to address the adequacy of public facilities.**

Response: A General Development Plan/Master Plan was required per Condition of Approval No. 4 of Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), the Park Place Annexation and Zone Change. Preliminary information regarding public facilities impacts is provided as part of this General Development Plan application. Approval of the Master Plan/General Development Plan will not authorize physical alterations of the site or new use of the property. Further refined information will be provided with future Detailed Development Plan applications.

Sanitary Sewer:

Sanitary Sewer for Phase 1 is available through an interim connection through Map 2 2E 28AD Tax Lot 314 to existing sewer within Trail View Drive. Sanitary Sewer for Phases 2 through 6 is available through an interim connection to the existing sanitary sewer system within Oak Valley Drive. This sanitary sewer system ultimately connects to existing sewer within S Holcomb Boulevard. The interim connection will serve Park Place Crossing until the annexation and improvement of properties to the southwest is completed. A sanitary sewer service is planned to extend through Park Place Crossing where it will connect to a new service line near S Livesay Road that will eventually connect to an upgraded Tri-City Sewer District trunk line within Redland Road. Sanitary sewer for Phase 6 may require the use of a pump station, which will meet the City's standards. Sanitary sewer sizing is expected to align with those shown within the Park Place Concept Plan.

Details about the planned sanitary sewer utilities can be found on Sheets P-09 through P-15 of the Preliminary Plans, attached as Exhibit A. A Sanitary Sewer Capacity Study is attached as Exhibit J.

Applications for Detailed Development Plan with additional details, including further refinements or improvements, will be submitted prior to each Phase of Park Place Crossing. Adequate sanitary sewer service can be provided to Park Place Crossing. Therefore, this criterion is met.

Water Service:

Water service to the site has been deemed sufficient by the City and Clackamas River Water. According to comments from Development Services in the May 5, 2021, pre-application conference notes, there is an existing 16-inch City of Oregon City ductile iron water line within S Holcomb Boulevard. Other services include 8-inch ductile iron water lines within Cattle and Shartner Drives and a 4-inch water line within S Livesay Road. The northeastern portion of the site is within the Clackamas River Water district.

The Park Place Concept Plan calls for a 10-inch connection to S Holcomb Boulevard, through the Park Place – Intermediate Area leading to S Livesay Road, the Park Place – Livesay Road Area.

Details about the planned water utilities can be found on Sheets P-09 through P-15 of the Preliminary Plans, attached as Exhibit A.

Applications for Detailed Development Plan with additional details, including further refinements or improvements, will be submitted prior to each Phase of Park Place Crossing. Adequate water service can be provided to Park Place Crossing. The improvements shown are consistent with the approved concept plan for Park Place and the Water Master Plan. This criterion is met.

Stormwater:

Stormwater facilities have been planned to be phased, with Phase 1 featuring a temporary stormwater facility which will be converted to residential lots with completion of a permanent regional facility within Phase 2. Green street facilities as outlined within the Preliminary Stormwater Report, are planned within rights-of-way where required, logical, and feasible.

Details about the planned stormwater facilities can be found on Sheets P-09 through P-15 of the Preliminary Plans, attached as Exhibit A, and within the Preliminary Stormwater Report, attached as Exhibit F.

Applications for Detailed Development Plan with additional details, including further refinements or improvements, will be submitted prior to each Phase of Park Place

Crossing. Adequate storm sewer and stormwater drainage can be provided to Park Place Crossing. This criterion is met.

Transportation:

Site access will ultimately be provided through a new street, Holly Lane, connecting to S Holcomb Boulevard. Interim site access to S Holcomb Boulevard will be provided by Street A. As Holly Lane is adequately connected to S Holcomb Boulevard, the Street A area may be converted to a future residential lot. Please see the Transportation Impact Study (Exhibit E) and Preliminary Plans (Exhibit A) for further details.

As shown on the Preliminary Plans, interior Local Streets within the project are anticipated to meet the Local residential street classification cross section and include a 54-foot-wide right-of-way, 16-foot-wide shared travel lanes, 5-foot-wide planter strips, 5-foot wide-sidewalks, and 0.5-foot-wide public access strips.

The Transportation Impact Study (TIS) is included as Exhibit E with the application. Appropriate street improvements, which connect to existing transportation facilities, are planned for the project, as illustrated on the Preliminary Plans. The TIS found that the existing streets in conjunction with those planned are adequate to accommodate the additional amount of traffic that will be generated by this project. In addition, Transportation Systems Development Charges will be paid for each new home prior to issuance of a building permit. These fees will fund future City and County public works street improvement projects. Please see the Transportation Impact Study (Exhibit E) for additional information.

The planned transportation facilities are adequate to provide service to Park Place Crossing and future portions of the Park Place Concept Area. Further refined details will be provided with future applications for Detailed Development Plans. This standard is met.

Emergency Services:

Clackamas County Fire District No. 1 will provide fire services. Property taxes will be paid by future property owners to fund fire protection services, ensuring funding for fire protection services.

The City of Oregon City Police Department will provide police services. Property taxes will be paid by future property owners to fund police protection services, ensuring funding for police protection services.

An interim emergency access will be created with Phase 1 to connect to an existing street stub at Shartner Drive (shown on Sheet P-08). The access will follow the future alignment of Shartner Drive and Street 4 through Phases 2 and 3 to provide emergency access to Phase 1. Holly Lane will feature removable barriers to provide emergency access to/from S Livesay Road until Holly Lane can be extended or S Livesay Road can be upgraded upon completion of Park, Civic, and MUC/NC tract improvements.

There is adequate capacity for public services for Park Place Crossing. Further refined details will be provided with future applications for Detailed Development Plans. Therefore, this criterion is met.

Public Parks:

Per the Park Place Concept Plan, a park is provided at the southwest corner of the subject site. Park lands are planned to be provided to the City of Oregon City with Phase 2 of Park Place Crossing (approximately 2024/2025 planned construction date). It is expected that timing will allow inclusion of the park facility within an update of the City's Parks Capital Improvement Projects list. The details of park construction and SDC-creditable projects are anticipated to be determined at a later date.

Trail connections are being provided through planned open space tracts street and sidewalk connections on Local and Collector Streets as part of their applicable Phase of Park Place Crossing. Additional coordination, including design and Park System Development Charges (SDCs) for the future park will be determined, assessed, and paid at the time building permits are issued. This will ensure funding for parks based on need identified in City plans and on a timeline reflecting City priorities.

Parks, trails, and recreation facilities adequate to serve residents of Park Place Crossing and surrounding areas can be provided. Further refined details will be provided with future applications for Detailed Development Plans. This criterion is met.

Schools:

The project site is served by Oregon City Public Schools, including Redland Elementary School, Holcomb Elementary School, Tumwata Middle School (formerly Ogden Middle School), and Oregon City High School. Comments related to the project from Wes Rogers, Oregon City Public Schools Director of Operations, were received on March 13, 2017, as part of the Park Place Annexation, Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005).

Completion of Park Place Crossing is expected in ±2030. It is anticipated that Phase 1 could be constructed beginning in ±2023, completion of Phase 2 is expected in ±2026, Phase 3 in ±2029, and completion of Phases 4 through 6 beginning in ±2030. The School District stated that its timeline to provide additional school capacity was 5 to 10 years from 2017. The completion timeline is consistent with the School District's ability to provide additional school capacity.

Planned land uses within the Park Place Crossing project have been the subject of a significant public planning process (Park Place Concept Plan, annexation, etc.) The General Development Plan (GDP) is consistent with these uses. The predominantly residential use in the Park Place Crossing GDP is single-family detached homes; therefore, the plan is consistent with the established neighborhoods surrounding the project. Transportation system infrastructure improvements are included, and parks and open spaces are planned to be created for the use of the public. This criterion is met.

iv. Neighborhood livability impacts;

Response: The Master Plan provides for potential transportation improvements included within the City's Transportation System Plan. During the project team's neighborhood meeting with the Park Place Neighborhood Association, comments regarding traffic were provided. The Master Plan envisions connections south from Holcomb Boulevard. Specifically, Park Place Crossing will ultimately allow a connection to S Livesay Road upon completion of Park, Civic, and MUC/NC tracts, and lead to eventual connection to S Redland Road. The Park Place Crossing project improves connectivity throughout the area and is important to the long-term relief of pressure created by traffic on Holcomb Boulevard.

The Park Place Crossing project abuts existing homes and neighborhoods only in a few areas. The Master Plan accommodates these areas by providing lots meeting the zoning standards, vegetative screening, and open spaces adjacent to some existing homes and neighborhoods. Where existing homes abut planned lots, those lots have been designed to be larger to provide a transition in density. This criterion is met.

v. Natural, cultural and historical resource impacts within the development boundary and within two hundred fifty feet of the development boundary.

Response: The General Development Plan depicted within the Preliminary Plans (Exhibit A) demonstrates that impacts to known natural resources are planned to be avoided to the greatest extent practicable. Cultural and historical resources are not mapped or known on the site. If encountered during construction, cultural and historic resources are planned to be dealt with in the manner prescribed by Oregon City Municipal Code and other applicable state and federal laws. This criterion is met.

g. A summary statement describing the anticipated transportation impacts of the proposed development. This summary shall include a general description of the impact of the entire development on the local street and road network, and shall specify the maximum projected average daily trips, projected AM and PM peak hour traffic and the maximum parking demand associated with build-out each phase of the master plan or planned unit development.

Response: Transportation system related topics are summarized within the Transportation Impact Study (TIS) Executive Summary (Exhibit E). The TIS contains information regarding the master plan and the local street and road network. The anticipated future average daily trips and projected AM and PM peak hour traffic is described for each phase of the master plan. This criterion is met.

h. In addition to the summary statement of anticipated transportation impacts, an applicant shall provide a traffic impact study as specified by city requirements. The transportation impact study shall either:

i. Address the impacts of the development of the site consistent with all phases of the general development plan; or

ii. Address the impacts of specific phases if the city engineer determines that the traffic impacts of the

full development can be adequately evaluated without specifically addressing subsequent phases.

Response: A Transportation Impact Study is provided as Exhibit E which meets the City's standards and describes the project phasing of the planned street network. Where applicable, the study addresses all or specific phases. These requirements are met.

i. If an applicant chooses to pursue option h.1., the applicant may choose among three options for implementing required transportation capacity and safety improvements:

i. The general development plan may include a phasing plan for the proposed interior circulation system and for all on-site and off-site transportation capacity and safety improvements required on the existing street system as a result of fully implementing the plan. If this option is selected, the transportation phasing plan shall be binding on the applicant.

Response: The submitted General Development Plan includes a phasing plan for interior circulation and trip generation for determining on-site and off-site capacity and improvements required with final implementation/completion of the Master Plan. Therefore, this criterion is met.

ii. The applicant may choose to immediately implement all required transportation safety and capacity improvements associated with the fully executed general development plan. If this option is selected, no further transportation improvements will be required from the applicant. However, if a general development plan is later amended in a manner so as to cause the projected average daily trips, the projected a.m. or p.m. peak hour trips, or the peak parking demand of the development to increase over original projections, an additional transportation impact report shall be required to be submitted during the detailed development plan review process for all future phases of the development project and additional improvements may be required.

iii. The applicant may defer implementation of any and all capacity and safety improvements required for any phase until that phase of the development reaches the detailed development plan stage. If this option is selected, the applicant shall submit a table linking required transportation improvements to vehicle trip thresholds for each development phase.

Response: A Transportation Impact Study was required as part the submittal for annexation of the property. Off-site transportation system infrastructure improvements, comparison to the annexation TIS, and planned phasing is discussed in the attached Transportation Impact Study (Exhibit E).

Transportation improvements and resulting proportional shares were determined as part of the annexation of the property. An updated Transportation Impact Study is included as part of this application for a General Development Plan for Park Place Crossing. Transportation improvements per vehicle trip thresholds for each phase of the Master Plan are included as part of the Transportation Impact Study (Exhibit E). These criteria are met.

j. **For residential and mixed-use projects:**

i. **Proposed minimum lot area, width, frontage and yard requirements.**

Response: The lot areas, widths, frontage, and yard requirements are planned to meet the requirements of the R-5 zoning district with allowed adjustments to the listed standards of up to twenty percent as allowed by the master plan process. These are addressed further later within this narrative. A variance for attached residential lots is necessary and is discussed previously within this narrative.

ii. **Proposed project density in number of units per acre.**

Response: A density of ±9.1 units per net acre is anticipated to fit the planned densities of the zone and the Park Place Concept Plan with an allowed adjustment to the listed standards of less than 10 percent and the transfer of density from NROD conservation areas. This criterion is met.

Table 3: NROD Density Transfer

Area Category	Acreage
Net Developable Area	±47.7
NROD Conservation Tract Areas	±14.3
NROD Density Transfer (1/3 of NROD area)	±4.8
Total Developable Area for Density Calculations	±52.5

Table 4: Allowed Density by Zone

Zoning	Net Acreage	Percentage of Total Acres	Units per Net Acre (Minimum)	Units per Net Acre (Maximum)
Low Density Residential (R-10)	±2.8	5.8%	3.5	4.4
Medium Density Residential (R-5) (Detached)	±36.7	76.9%	7.0	8.7
Medium Density Residential (R-5) (Attached)	±6.9	14.5%	7.0	12.4
Geologic Hazard Areas (Slopes >25%)	±1.3	2.7%	-	2.0

Table 5: Planned Density Calculations

Calculated Minimum Density	±47.7 acres	±6.7 units per acre
Calculated Maximum Density	±47.7 acres	±8.8 units per acre
Calculated Area with NROD Transfer	±52.5 acres	-
Maximum Density with 10% GDP Increase	±52.5 acres	±9.7 units per acre
Planned Density	±52.5 acres	±9.1 units per acre

2. **Maps and Diagrams. The applicant shall submit, in the form of scaled maps or diagrams, as appropriate, the following information:**

a. **A preliminary site circulation plan showing the approximate location of proposed vehicular, bicycle, and pedestrian access points and circulation patterns, parking and loading areas or, in the alternative, proposed criteria for the location of such facilities to be determined during detailed development plan review.**

Response: A Conceptual Offsite Development & Neighborhood Circulation Plan showing the location of vehicular, bicycle, pedestrian access points and circulation patterns within Park Place Crossing is included within the Preliminary Plans (Exhibit A). This criterion is met.

b. **The approximate location of all proposed streets, alleys, other public ways, sidewalks, bicycle and pedestrian access ways and other bicycle and pedestrian ways, transit streets and facilities, neighborhood activity centers and easements on and within two hundred fifty feet of the site. The map shall identify existing subdivisions and development and un-subdivided or unpartitioned land ownerships adjacent to the proposed development site and show how existing streets, alleys, sidewalks, bike routes, pedestrian/bicycle access ways and utilities within two hundred fifty feet may be extended to and/or through the proposed development.**

Response: The approximate location of all planned streets, alleys, sidewalks, bicycle and pedestrian access ways, and easements on and within 250 feet of the site have been illustrated at a Master Plan level on the Preliminary Plans (Exhibit A), as applicable. The map identifies existing subdivisions, unpartitioned land ownerships adjacent to the project site and shows how existing streets may be extended to serve future subdivisions in the area. Therefore, these criteria are met.

c. **The approximate location of all public facilities to serve the proposed development, including water, sanitary sewer, stormwater management facilities.**

Response: The approximate location of all public facilities included with the Master Plan, including water, sanitary sewer, and stormwater management, have been illustrated on the Preliminary Plans (Exhibit A). Further refined details will be provided with future applications for Detailed Development Plans. This criterion is met.

d. **The approximate location, footprint and building square footage of buildings within of each phase of proposed development, and/or proposed lot patterns for each phase of future development.**

Response: Lot patterns and layouts for each future phase of the Master Plan have been provided. The approximate location, footprint, and building area within each phase is anticipated to be determined at a later date. This criterion is met.

e. **The approximate locations of proposed parks, playgrounds or other outdoor play areas; outdoor common areas and usable open spaces; and natural, historic and cultural resource areas or features proposed for preservation. This information shall include identification of areas proposed to be dedicated or otherwise preserved for public use and those open areas to be maintained and controlled by the owners of the property and their successors in interest for private use.**

Response: The location of planned parks, outdoor common areas, usable open spaces, and natural resources have been indicated on the Preliminary Plans (Exhibit A). Of these areas, those to be provided or preserved for public use and those to be maintained and controlled by the owners of the property for private use by the residents of Park Place Crossing are anticipated to be designated through coordination with the City of Oregon City Parks Department. These criteria are met.

C. **Approval Criteria for a General Development Plan. The planning commission may approve an application for general development plan only upon finding that the following approval criteria are met:**

1. **The proposed general development plan is consistent with the purposes of OCMC 17.65.**

Response: The General Development Plan is consistent with the purpose statement and applicable requirements of OCMC 17.65. The Park Place Crossing GDP provides valuable housing options within a phased residential Master Plan. The master plan facilitates the efficiency and flexible use of the project site to provide infrastructure, transportation systems, and utility networks while providing site layouts that include useable open space, site circulation, and general wellbeing. This criterion is met.

2. **Development shall demonstrate compliance with OCMC 12.04 16.12, 17.62, if applicable, and 16.08, if applicable.**

Response: The General Development Plan meets the applicable criteria.

- OCMC 12.04: This section generally addresses the public works requirements for streets, sidewalks, and public places. Park Place Crossing is anticipated to meet these requirements with the consideration of adjustment. Further review of specific requirements is anticipated to be reviewed at the time of Detailed Development Plans as customary and appropriate. The specific applicable criteria of OCMC 12.04 are addressed previously within this narrative.
- OCMC 16.08: This section outlines the standards for land divisions. Master plans are outlined as an applicable process for land division and this application meets the requirements for preliminary plat, frontage, building sites, minimum density, et cetera. Flag and through lots are necessary due to natural topographic site constraints and adjacent existing dwellings. The planned flag lots meet the accessway and dimensional requirements of this code section. The criteria of OCMC 16.08 are not

applicable at this time and will be addressed through a future Detailed Development Plan/subdivision application.

- OCMC 16.12: OCMC 16.12 defines the minimum public improvement standards for the Detailed Development Plan application. Streets within Park Place Crossing, with the exception of a confined area which requires the narrowing of a cross section, meet the dimensional and design standards of this section. The specific applicable criteria of OCMC 16.12 are addressed within a previous section of this narrative. These criteria will be met through a future Detailed Development Plan application.
- OCMC 17.62: This section is not applicable at this time, as design review is not required as part of this General Development Plan application. If necessary, the criteria of OCMC 17.62 will be addressed through a future land use application.

These criteria are met.

3. Public services for transportation, water supply, police, fire, sanitary waste disposal, storm-water disposal, and any other needed public services and facilities including schools and parks for proposed residential uses, are capable of serving the proposed development, or will be made capable by the time each phase of the development is completed.

Response: Physical alterations to the project site are not included with this application for the Park Place Crossing Master Plan/General Development Plan. Site improvements will be addressed with future applications for Detailed Development Plans. Applicable public services for transportation, water supply, police, fire, sanitary waste disposal, stormwater disposal, and other needed public services and facilities, including parks and schools are capable of serving the planned residential project. Further refined details will be provided with future applications for Detailed Development Plans.

Water: Within the project area, water is provided by the City and Clackamas River Water (CRW) (above 450 feet elevation). Service has been deemed sufficient by the City and CRW. These providers have an Intergovernmental Agreement (IGA) to provide these services. Water supply systems are shown on the Preliminary Plans (Exhibit A). The water infrastructure shown as part of the Park Place Crossing Master Plan is consistent with the Park Place Concept Plan and the City's Water Capital Improvement Projects Master Plan, including the January 2021 Water Distribution System Master Plan Amendment. The improvements shown are consistent with the approved concept plan for Park Place and the Water Master Plan. Further details will be submitted with future Detailed Development Plan applications. This criterion is met.

Sanitary Sewer: Sanitary service for the project area will be provided by the Tri-City Sewer District. Annexation to the sewer district is required in the future prior to subdividing the land. A sanitary sewer modeling analysis has been completed and submitted to the City for review. The project area is planned to be served by several phases of sewer, illustrated on the Preliminary Plans (Exhibit A). Sanitary sewer is planned to be routed across Tour Creek adjacent to Oak Valley Drive until such time that gravity sewer becomes available as a permanent option through the improvement of abutting properties to the south and east. Due to grade issues in the southeast corner of the site (Phase 6), sanitary sewer will require pumping to gravity systems within an adjacent Phase of Park Place Crossing. The improvements shown are consistent with the approved concept plan and Sanitary Sewer Master Plan. Further details will be submitted with future Detailed Development Plan applications. This criterion is met.

Stormwater: The planned improvements are consistent with the Park Place Concept Plan and the City's Stormwater and Grading Design Standards. Stormwater facilities for the overall project are shown within the Preliminary Plans (Exhibit A). Temporary stormwater facilities for Phase 1 will be decommissioned and routed to regional facilities as part of Phase 2. This area will then be reclaimed for residential lots. Further analysis of the site's stormwater needs, and the prescribed management facilities are included within the Preliminary Stormwater Report (Exhibit F). Phase 6 stormwater, due to the aforementioned grading issues, are not planned to be routed to the regional facility. Phase 6 stormwater is anticipated to be treated and managed within private stormwater planters and directed to the natural area. The planned stormwater management methods and facilities are appropriate and consistent with City requirements. Further details will be submitted with future Detailed Development Plan applications. This criterion is met.

Transportation/Streets: Streets, as illustrated within the Preliminary Plans, are designed to serve the project site and connect it to the surrounding street network. Holly Lane, a planned Collector Street, will ultimately serve as the main thoroughfare through the project site and the "North Village" outlined within the Park Place Concept Plan. Holly Lane is anticipated to connect S Holcomb Boulevard with S Livesay Road within the project site and the portions of the Park Place Concept Area beyond. The planned streets comply with those envisioned within the Park Place Concept Plan and City standards. Further details will be submitted with future Detailed Development Plan applications. This criterion is met.

Parks: Per the Park Place Concept Plan, a park is provided at the southwest corner of the subject site. Approximately 4.4 acres of public park have been anticipated to be provided to the City. Future expansion of the park, as needed to fulfill the Park Place Concept Plan's envisioned final 8–10-acre requirement for the community park and as shown within Exhibit N, is possible through provision by neighboring properties. Park lands are planned to be provided to the City of Oregon City with Phase 2 of Park Place Crossing (approximately 2024/2025 planned construction date). It is expected that timing will allow inclusion of the park facility within an update of the City's Parks Capital Improvement Projects list. The details of park construction and SDC-creditable projects are anticipated to be determined at a later date. Coordination is needed with the Parks Department in order to amend the City's Parks Master Plan/Capital Improvement Projects list and outline the process and details for the transfer of ownership as part of Phase 2.

Trail connections are being provided through planned open space tracts street and sidewalk connections on Local and Collector Streets as part of their applicable Phase of Park Place Crossing. Additional coordination, including design and Park System Development Charges (SDCs) for the future park will be determined, assessed, and paid at the time building permits are issued. This will ensure funding for parks based on need identified in City plans and on a timeline reflecting City priorities.

Private Utilities: Electric, Gas, and other telecommunications utilities are planned to be routed and arranged as needed and appropriate within right-of-way and adjacent Public Utility Easements (PUEs). The provision of these services is anticipated to be consistent with City requirements. Further details will be submitted with future Detailed Development Plan applications. This criterion is met.

Emergency Services: Police service to the project site will be provided by the Oregon City Police Department (OCPD). OCPD previously submitted a response to Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005) indicating that the resources to serve this area were available.

Park Place Crossing is within Clackamas Fire District #1, which provides fire protection for Oregon City and surrounding areas. Clackamas Fire District #1 provided pre-application conference comments requesting further information about the project, which have been provided within the Preliminary Plans (Exhibit A).

Emergency Medical Services for the area are provided by Clackamas Fire District #1 and American Medical Response (AMR) through contract with Clackamas County.

Emergency services to the planned project are satisfactory and consistent with applicable requirements. Temporary emergency access will be available to Phase 1 from Shartner Drive, as depicted within Sheet P-08 (Exhibit A). Temporary emergency access to Park Place Crossing will be available via the Holly Lane/S Livesay Road connection. At each of these locations, during their appropriate phases, removable barriers will allow emergency traffic to travel to and through Park Place Crossing. Further details will be submitted with future Detailed Development Plan applications. This criterion is met.

Schools: The project site is served by the Oregon City School District. The School District provided comments for the annexation and zone assignment applications for this property. In those comments, the School District voiced no major concerns regarding school capacity or serving the new homes as build-out of the project aligned with the School District's stated timeline to provide additional school capacity and several other methods of providing or shifting capacity are available. This criterion is met.

All applicable public facilities and services to serve the project site have been or will be made available per the adopted public facilities plans; however, since this application is for a Master Plan and does not involve any physical alterations to the site, further details will be submitted with future Detailed Development Plan applications. These criteria are met.

4. **The proposed general development plan protects any inventoried Goal 5 natural, historic or cultural resources within the proposed development boundary consistent with the provisions of applicable overlay districts.**

Response: The General Development Plan included as part of this application lays the foundations for the protection of inventoried Goal 5 natural resources such as those within the Natural

Resources Overlay District (NROD). These areas are preserved within open space areas on the outskirts of the site and are addressed within the NROD Memorandum (Exhibit G) prepared as part of this application for General Development Plan. Future Detailed Development Plans will provide further details regarding these areas. Historic or cultural resources are not known to be present within the site boundaries. Physical alterations are not planned with this application for General Development Plan. Further details will be submitted with future Detailed Development Plan applications. These criteria are met.

5. **The proposed general development plan, including development standards and impact mitigation thresholds and improvements, adequately mitigates identified impacts from each phase of development. For needed housing, as defined in ORS 197.303(1), the development standards and mitigation thresholds shall contain clear and objective standards.**

Response: Phasing of the General Development Plans allows for the orderly provision of transportation facilities and utilities to new areas and eventual connection as planned within the City's Transportation System Plan and Utility Master Plans. Further details are available within the Transportation Impact Study (Exhibit E) and will be submitted with future Detailed Development Plan applications. This criterion is met.

6. **The proposed general development plan is consistent with the Oregon City Comprehensive Plan.**

Response: The General Development Plan is consistent with the Park Place Annexation and Zone Change conditions of approval Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), the Park Place Concept Plan, the Oregon City Comprehensive Plan, and applicable zoning requirements. Further details will be submitted with future Detailed Development Plan applications. These criteria are met.

7. **The proposed general development plan is consistent with the underlying zoning district(s) and any applicable overlay zone or concept plans.**

Response: With adjustments, as outlined below, the General Development Plan is consistent with applicable underlying zoning district regulations and the Park Place Concept Plan. These criteria are met.

8. **For projects with a residential use component, the proposed general development plan includes common open space for the recreational needs of the development's residents.**

   a. **Required open space shall be located either on-site or off-site within one-quarter mile of the development.**

Response: Open space areas are located on-site and within one-quarter mile of the project and are located consistent with the Park Place Concept Plan. This criterion is met.

   b. **Minimum required open space shall be one hundred square feet per residential unit in the development.**

Response: Park Place Crossing plans ±476 residential units (with one additional future unit possible in the future), this equates to ±47,700 square feet of open space. Over ±496,500 square feet are provided via open space tracts, public park, and dedicated civic space. Therefore, these criteria are met.

c. **The open space area may be in private ownership or proposed for public dedication, at the city's discretion whether to accept.**

Response: Approximately 4.4 acres of public park have been anticipated to be provided to the City. Coordination is needed with the Parks Department in order to amend the City's Parks Master Plan/Capital Improvement Projects list and outline the process and details for the transfer of ownership as part of Phase 2. Approximately 11.4 acres of private open space with public access easements for trails have been planned as well. Per the annexation approval for the project site, Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005), the area was required to incorporate park and trail areas generally consistent with the Park Place Concept Plan and Trails Master Plan. These areas have been incorporated into the General Development Plans where applicable and appropriate and therefore, these criteria are met.

d. **The open space shall be developed with a unified design to provide for a mix of passive and active uses. Passive uses include, but are not limited to sitting benches, picnicking, reading, bird watching and natural areas. Active uses include, but are not limited to playgrounds, sports fields and courts, running and walking areas.**

Response: Open space areas within the Master Plan provide both passive and active areas. These areas connect to regional and local trails and provide walking and running trails through natural areas, benches for sitting, opportunities for birdwatching, et cetera. The Applicant plans to provide parkland consistent with the Park Place Concept Plan for the future purpose of providing other active uses such as playgrounds and sports fields within areas that are appropriately improved for those types of uses. The areas include a unified design to provide a variety of functions within the Park Place Crossing project. These criteria are met.

e. **Land area to be used for the open space area that is required in this section shall not include required setback areas, required landscaping, streets, rights-of-way, driveways, or parking spaces.**

Response: Land designated as open space has not been included if it was required for a setback area, required landscaping, street, right-of-way, driveway, or parking. Open spaces, however, are located within areas designated as setback for steep slopes and natural resources. This designation helps to provide these areas protection from encroachment. The intent of this criterion is met.

f. **Unless dedicated to the public, the applicant shall also provide an irrevocable legal mechanism for the maintenance of the open space and any related landscaping and facilities. The applicant shall submit, for city review and approval, all proposed deed restrictions or other legal instruments used to reserve open space and maintenance of open space and any related landscaping and facilities.**

Response: Areas that are acceptable for public use are anticipated to be provided to the City. Other open spaces are planned to be included under irrevocable legal mechanisms for landscaping and maintenance in the future at the appropriate time. Therefore, these criteria are met.

9. **For projects with a residential use component, the proposed general development plan includes a mix of residential uses such that no single residential use exceeds seventy-five percent of the total proposed units. The mix of residential uses shall provide variety of dwelling types and sizes that are integrated throughout the site, rather than isolated from one another, with smooth transitions between residential types including appropriate setbacks, landscaping or screening as necessary, while maintaining street and pedestrian connectivity between all residential uses. Tenancy (i.e. ownership versus rental) shall not be a consideration in determination of the mix of residential use. For the purposes of this section, residential uses include single-family detached, single-family attached, duplex, 3—4 plex, and multi-family.**

Response: As a requirement of providing a Master Plan/General Development Plan, Park Place Crossing includes a mix of residential uses – single-family detached and single-family attached. Of the planned ±476 residential units, ±126 single-family attached units, or ±26.5% of the total units, are planned. No single residential use is planned to exceed 75% of the total units; therefore, this criterion is met.

17.65.070 - Adjustments to development standards.

A. **Purpose. In order to implement the purpose of the city's master plan or planned unit development process, which is to foster the growth of major institutions, major residential, commercial or mixed-use development, and other large-scale development, while identifying and mitigating their impacts on surrounding properties and public infrastructure, an applicant may request one or more adjustments to the applicable development regulations as part of the master planning or planned unit development process, and are not required to go through the variance process pursuant to OCMC Chapter 17.60.**

B. **Procedure. Requests for adjustments shall be processed concurrently with a general development plan. An adjustment request at the detailed development plan review shall cause the detailed development plan to be reviewed as a Type III application.**

Response: In order to properly protect sloped areas and natural resources that exist within the master plan area, adjustments to certain standards are necessary to accommodate residential uses and densities provided for in the Park Place Concept Plan.

C. **Regulations That May be Adjusted. Adjustments may be allowed for the following items:**

1. **Dimensional standards of the underlying zone of up to twenty percent, except the perimeter of the development shall meet the underlying zone's setbacks when adjacent to residentially zoned property.**

Response: Following underlying zoning by its exact zoning map boundaries would create areas within master plan that did not transition well between housing types within the project as well as new and existing housing. Because the residential developable (net) areas of the site, per Table 4, amount to 5.8 percent R-10 zoning and 91.4 percent R-5 zoning, Low-Density Residential zoning is considered for the overall density requirements, but not dimensional standards. Master planned communities typically provide their own dimensional standards where the underlying zoning would not fit the current conditions or the future plans for the site.

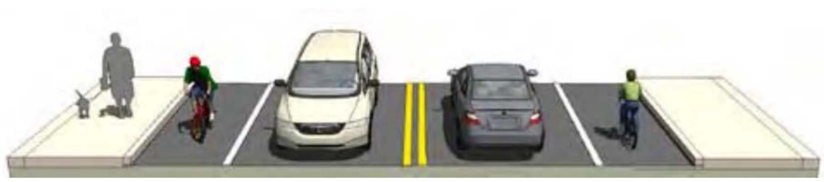
Adjustments to the dimensional standards of the underlying zone include reduction in minimum lot size from the underlying requirement of the R-5 zone: 5,000 square feet. A portion of the project lots, except for those along the perimeter of the site, are planned to be slightly smaller than required by the R-5 zone. Specific lot sizes, including those requiring adjustment, are anticipated to be determined as part of future Detailed Development Plans for Park Place Crossing.

Lots along the perimeter of the site have been planned to meet the underlying zone's setbacks where adjacent to residentially zoned properties not planned as part of the Park Place Crossing Master Plan. As Detailed Development Plans are submitted and plans for Park Place Crossing become more refined, adjustments to the underlying setback requirements may be required. This criterion for adjustment is met.

2. Site plan and design standards.

Response: Consistent with the Park Place Concept Plan, the Park Place Crossing Master Plan includes a Collector Street extending generally from the northeast portion of the site to the southern portion of the site. There is one small area, however, where the street alignment traverses a geometrically and topographically constrained area (generally between Map 2 2E 28AD Tax Lot 314 and Map 2 2E 27C Tax Lot 400).

A modified street section for this short segment of roadway would benefit the project and surrounding area because it would require reduced alterations to site topography. The modified street section is discussed in greater detail in the Transportation Impact Study, but such a cross section is discussed within and consistent with the Park Place Concept Plan (Figure 3-D pictured below) within this immediate cross section of Holly Lane. This criterion for adjustment is met.



Figures 3-C and 3-D. Narrow Minor Arterial 2-Lane Cross Section and Collector 2-Lane Cross Section

3. Residential design standards.

Response: The Park Place Concept Plan envisions a Collector Street, Holly Lane, residences with rear-load garages abutting in order to minimize the number of driveways and help ensure a safe pedestrian space. The planned General Development Plan/Master Plan provides alleys for lots along Holly Lane, where feasible, to prevent backing movements onto the Collector Street. Other areas of the project abut existing homes and sensitive areas.

Alleys, rear-load, and side-load garages and homes would not be beneficial in these locations.

Similarly, because of the increased site constraints (steep slopes, and natural resources areas) along the project perimeters, blocks with alleys along Local Streets are burdensome and do not work with the constrained layout. The layout abuts several areas with pre-existing homes and the establishment of alleys behind these homes would disturb established residents and patterns of development.

OCMC 17.21.090.A requires that garages be detached, side entry, or rear entry. The Park Place Crossing Master Plan works best with no limitations on garage type or entry, therefore, an adjustment is required, as provided for by OCMC 17.65.070.C.

A mixture of front-entry, attached, side entry, and rear entry, appropriate for the site, is beneficial to the Park Place Crossing neighborhood. The variety of designs allows for site constraints to be best resolved, less paving to be provided, safe accesses to be decided, and appropriate home designs determined to fit the project. Where attached front entry garages are provided, the minimum garage door width required is 16-feet, with a 20-foot width driveway.

Because an exemption is possible due to the topographic and pre-existing lot concerns, this exemption is sought as part of the Park Place Crossing General Development Plan for home sites which require it. Increased garage setbacks, pedestrian accessways, and pedestrian friendly streets with sidewalks and planter strips are planned in order to lessen the impact of these front entry attached garages, as provided in many similar neighborhoods. Garages and their orientation will be determined at submittal of Detailed Development Plans. This criterion for adjustment is met.

4. Increase in allowed maximum residential density of up to ten percent.

Response: Due to greater steep slope and drainageway areas requiring preservation than originally accounted for as part of the Park Place Concept Plan, ±15.7 acres as part of the Park Place Crossing Master Plan versus ±11.4 acres accounted for as part of the PPCP, greater density is required to meet the intent of the Park Place Concept Plan.

As shown in Table 2, Park Place Crossing offers a developable area of ±47.7 acres, resulting in a density of 9.1 dwelling units per net acre. This is an increase over the maximum residential density allowed within the combined underlying zoning districts of fewer than four percent, less than the ten percent maximum (with the NROD Density Transfer) adjustment permitted. This criterion for adjustment is met.

5. Standards for land division approval.

Response: This application for the Park Place Crossing Master Plan/General Development Plan does not include any land divisions or physical alterations to the project site, which will be addressed with future applications. Adjustments to the standards of land division approval may be required with future Detailed Development Plan applications. This criterion for adjustment is met.

6. Additional uses allowed with residential projects, or residential component of projects:

a. Notwithstanding the use provisions of the underlying zones, neighborhood commercial uses as defined in Chapter 17.24.020, including restaurants and eating and drinking establishments without a drive-through, retail trade, and services, are permitted on up to ten percent of the net developable area. The neighborhood commercial uses shall be planned and constructed so as to support and be compatible with the entire development and shall not alter the character of the surrounding area so as to substantially preclude, impair or limit the use of surrounding properties for the primary uses listed in the underlying district.

b. Public or private parks and playgrounds, community buildings and/or outdoor recreational facilities, such as swimming pools and tennis courts.

c. Indoor recreational facilities, such as racquetball or tennis courts, fitness centers or swimming pools.

d. Common public and private open space including trails.

e. Primary or accessory uses that are not identified as a permitted or conditional use in the underlying zone but which are defined in the code.

Response: Consistent with the Park Place Concept Plan, this project includes parks, common public and private open spaces with trails and uses appropriate for a master-planned mixed-use/neighborhood commercial areas and civic space. The neighborhood commercial areas are intended to be supportive of and compatible with surrounding areas. Therefore, these criteria are met.

D. Regulations That May Not be Adjusted. Adjustments are prohibited for the following items:

1. To allow a primary or accessory use that is not identified as a permitted, or conditional use in the underlying zone, with the exception of the additional uses permitted under OCMC 17.65.070.C.6 above;

2. To any regulation that contains the word "prohibited";

3. As an exception to a threshold review, such as a Type III review process; and

4. Minimum density for residential sites may not be reduced.

Response: Adjustments of the listed or prohibited regulations are not planned or anticipated. These criteria are met.

E. Approval Criteria. A request for an adjustment to one or more applicable development regulations under this section shall be approved if the review body finds that the applicant has shown the following criteria to be met:

1. Granting the adjustment will equally or better meet the purpose of the regulation to be modified;

Response: The existing conditions on-site show that greater areas than originally planned are needed for the protection of natural resource and geologic hazards areas. Granting the adjustments will allow better use of this highly constrained project site and protection of steep slope and drainageway areas. The Park Place Concept Plan envisions residential areas that can support mixed-use/neighborhood commercial, parks, and other community amenities. These planned factors require that the envisioned density be met to a similar degree.

Due to these constraints, a percentage of smaller lots are necessary in order to balance the minimum density of the underlying zoning and the number of residences envisioned within the Park Place Concept Plan. The purpose of density standards within the Park Place Concept Area is to provide a reasonable transition between existing neighborhoods and future higher density areas near the North and South Village central areas. Zoning densities provide a similar reasoning, establishing a reasonable range of dwelling units per net developable area in order to both provide homes and prevent crowding of existing neighborhoods.

The modified Holly Lane street standard allows the passage of a vital City transportation connection through a narrow area without greatly affecting existing homes or areas that are not within the Urban Growth Boundary. The need for this modification is recognized within the Park Place Concept Plan. As part of the Park Place Crossing Master Plan project, the S Holly Lane collector will be constructed through the site with future connections between S Livesay Road and S Holcomb Boulevard (note the connection to S Livesay Road as part of this Master Plan will be emergency vehicle access only). Per Oregon City Municipal Code Table 16.12.016 a collector right-of-way width is 85 feet, however within the project site where S Holly Lane crosses between tax lots 2-2E-28D-00190 and 2-2E-27BC-01000 there is not adequate room to accommodate this. Given this restriction, a reduced section is necessary to allow room for roadway construction and grading (retaining walls, daylight slopes, etc.).

Similarly, the adjusted standards protect the drainageway and steep slope areas in a superior manner while still achieving the permitted residential uses at the desired densities. Adjustment of residential design standards allows the smart use of the project site without the establishment of alleys and rear-entry garages in locations that would impede on natural resources areas and create greater areas of impervious surface. The outlined adjustments are needed and appropriate and better meet the purpose of the regulations to be modified. This criterion is met.

2. If more than one adjustment is being requested, the cumulative effect of the adjustments results in a project that is still consistent with the overall purpose of the zone;

Response: The needed adjustments are complimentary, and the cumulative effect of the adjustments results in a project that is still consistent with the overall purpose of the zone and the Park Place Concept Plan. The adjustments are small, however, because of the differences between the concept plan and existing conditions, together serve to implement the vision of the Park Place Concept Plan and the Low and Medium-Density Residential zoning districts. The adjustments are within the limits set by OCMC 17.65.070

for General Development Plans and therefore consistent with the intent and purpose of the zone. This criterion is met.

3. City-designated Goal 5 resources are protected to the extent otherwise required by Title 17;

Response: Adjustment of the applicable OCMC regulations allows appropriate improvement and of the land without infringement on City-designated Goal 5 resources, such as within the Natural Resources Overlay District areas present at the northwest and southeast corners of the project site. With these adjustments, open space areas can be created to preserve these natural resources, recreational opportunities can be provided within the newly created open space areas to connect residents with their surroundings, and the open spaces can be structured in such a way that these natural areas are protected, enhanced, and maintained. This criterion is met.

4. Any impacts resulting from the adjustment are mitigated such that the development does not create significant adverse impacts on adjacent properties;

Response: Negative impacts resulting from these adjustments are not anticipated. The adjustments allow for a master plan project that is consistent with the Park Place Concept Plan and is responsive to the existing surrounding environmental constraints, natural resources preservation, avoidance of natural hazards areas, and the needs of abutting existing and future neighborhoods. Mitigation for the increased density planned includes additional traffic mitigation contributions and open spaces beyond those envisioned within the Park Place Concept Plan. These contributions allow for the preservation of more additional natural areas than previously envisioned as part of the Park Place Concept Plan and allow for the continued enjoyment of Park Place’s natural beauty and important ecosystem functions.

The needed adjustments, including those related to density, are considered within the provided Transportation Impact Study (Exhibit E). The planned number of units remains below the threshold established by Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005) for the Park Place Crossing annexation area. This criterion is met.

5. If an environmental zone, the proposal has as few significant detrimental environmental impacts on the resource and resource values as is practicable; and

Response: The area includes Natural Resources Overlay District areas within the northwest and southeast portions of the site but does not anticipate impacts to these areas other than for the establishment of trails. Adjustments to the standards affecting the master plan for Park Place Crossing allows these areas to remain largely unaffected by the project. The specific impacts will be reviewed further with successive Detailed Development Plan applications. Please refer to the NROD Memorandum (Exhibit G) for further information. This criterion is met.

6. The proposed adjustment is consistent with the Oregon City Comprehensive Plan and a concept plan if applicable.

Response: The adjustments are consistent with the Oregon City Comprehensive Plan and Park Place Concept Plan. Adjustments to the planned density of the area allow the implementation of the Park Place Concept Plan in creating neighborhoods complete with mixed use/neighborhood commercial centers, civic areas, and parks. The adjustments allow the efficient use of land, which would be of greater difficulty without the adjustments, due to the site's constraints. Specific applicable Comprehensive Plan policies are reviewed later within this narrative. This criterion is met.

[…]

17.65.090 - Regulations that apply.

An applicant is entitled to rely on land use regulations in effect on the date its general development plan application was initially submitted, pursuant to ORS 227.178(3), as that statute may be amended from time to time. After a general development plan is approved, and so long as that general development plan is in effect, an applicant is entitled to rely on the land use regulations in effect on the date its general development plan application was initially submitted, as provided above, when seeking approval of detailed development plans that implement an approved general development plan. At its option, an applicant may request that a detailed development plan be subject to the land use regulations in effect on the date its detailed development plan is initially submitted.

Response: These standards are understood, and the Applicant can choose to rely on land use regulations in effect on the date of submittal of this General Development Plan application, or upon future land use regulations in effect on the date of submittal of further Detailed Development Plans, at their option. This criterion is met.

Oregon City Comprehensive Plan

Section 1 – Citizen Involvement

Goal 1.1: Citizen Involvement Program

Implement a Citizen Involvement Program that will provide an active and systematic process for citizen participation in all phases of the land use process to enable citizens to consider and act upon a broad range of issues affecting the livability, community sustainability, and quality of neighborhoods and the community as a whole.

Policy 1.1.1 **Utilize Neighborhood Associations, as the vehicle for neighborhood-based input into the process to meet the requirements of the Land Conservation and Development Commission (LCDC) Statewide Planning Goal 1, Citizen Involvement. The Citizen Involvement Committee (CIC) shall serve as the officially recognized citizen committee needed to meet LCDC Statewide Planning Goal 1.**

Goal 1.4: Community Involvement

Provide complete information for individuals, groups, and communities to participate in public policy planning and implementation.

Policy 1.4.1. **Provide information and notices on community involvement opportunities when appropriate.**

Response: Citizen Involvement was accomplished per the requirements of OCMC 17.50. The Applicant participated in a regularly scheduled Park Place Neighborhood Association meeting (Exhibit H). Public notice of the public hearing will be accomplished per the requirements for a Type III land use application included in OCMC 17.50. The application is consistent with these Comprehensive Plan policies.

Section 2 – Land Use

Goal 2.1: Efficient Use of Land

Ensure that property planned for residential, commercial, office, and industrial use is used efficiently and that land will be developed following the principles of "Sustainable Development."

Policy 2.1.1 **Create incentives for new development to use land more efficiently, such as by having minimum floor area ratios or maximums for parking and setbacks.**

Response: Minimum floor area ratios, parking maximums, and setback maximums generally apply to multifamily residential, commercial, or industrial uses. The planned single-family detached and attached residential project utilizes existing code provisions for adjustments to allow for more efficient use of the subject site. These adjustments through the master plan process include lot size reductions and density adjustments. Adjustments to density standards of the R-5 zoning district allow for the establishment of residential areas to implement the projected Park Place Concept Plan and support the envisioned Park Place commercial areas while preserving open spaces and natural areas. Reduced lot sizes support the needed densities and housing unit counts anticipated by the City. The needed adjustment to street standards allows for the placement of Holly Lane within a constrained area between the project boundary, Urban Grown Boundary, and existing homes. The housing type mix encourages more efficient housing while encouraging varied home sizes, a variety of product price points, and home ownership. The application is consistent with this policy.

Policy 2.1.2 **Encourage the vertical and horizontal mixing of different land use types in selected areas of the city where compatible uses can be designed to reduce the overall need for parking, create vibrant urban areas, reduce reliance on the private automobile, create more business opportunities and achieve better places to live.**

Response: The Master Plan provides for a mixture of single-family attached, single-family detached, and other possible residential land use types with the future Mixed-Use/Neighborhood Commercial phase. The areas planned are arranged to create vibrant neighborhoods, parks, open spaces, and commercial areas. The General Development Plan is consistent with this policy.

Policy 2.1.3 **Encourage sub-area master planning for larger developments or parcels, including re-development, where it may be feasible to develop more mixed uses, or campus-style industrial parks, with shared parking and landscaping areas. Allow developments to vary from prescriptive standards if planned and approved under this provision.**

Response: As a ±92-acre area with planned mixed uses, the project is a larger development, and therefore requires a master plan. A master plan is also required per Condition of Approval of the project area's annexation Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005). Consistent with this policy and previous approval, the project has created a master plan which implements the Park Place Concept Plan and creates a sub-area master plan. The application is consistent with this policy.

Goal 2.4: Neighborhood Livability

Provide a sense of place and identity for residents and visitors by protecting and maintaining neighborhoods as the basic unit of community life in Oregon City while implementing the goals and policies of the other sections of the Comprehensive Plan.

Policy 2.4.1 **Develop local neighborhood plans to strengthen and protect residential neighborhoods and historic areas from infill development; such as development along linear commercial corridors.**

Policy 2.4.2 **Strive to establish facilities and land uses in every neighborhood that help give the neighborhoods vibrancy, a sense of place, and a feeling of uniqueness; such as activity centers and points of interest.**

Policy 2.4.3 **Promote connectivity between neighborhoods and neighborhood commercial centers through a variety of transportation modes.**

Response: Park Place Crossing is planned to be a complete and vibrant neighborhood that provides a unique selection of active open spaces and trails, a City park, and MUC/NC areas to support local commerce opportunities. Adjustments to lot size and density requirements allow for the conservation of steep slope and drainageway areas envisioned by the Park Place Concept Plan.

The planned street, pathway, and trail layout allows for connectivity between the project and existing and future neighborhoods using a variety of transportation methods. The planned trail crossing of Tour Creek will allow for connectivity between Park Place Crossing and existing neighborhoods to the northwest of the project. The ease of travel within Park Place Crossing will allow neighborhood residents to stay within the nearby area for recreation, outdoor enjoyment, and shopping within the Park Place North Village. The Park Place Crossing Master Plan is consistent with these policies.

Goal 2.5: Retail and Neighborhood Commercial

Encourage the provision of appropriately scaled services to neighborhoods.

Policy 2.5.2 **Allow and encourage the development of small retail centers in residential neighborhoods, primarily providing goods and services for local residents and workers. Generally, these centers should be located at intersections of two or more streets that are classified neighborhood collector or higher.**

Policy 2.5.4 **Encourage the development of successful commercial areas organized as centers surrounded by higher density housing and office uses, rather than as commercial strips adjacent to low-density housing.**

Response: The Park Place Crossing Master Plan implements the Park Place Concept Plan, which organizes the area into a North and South Village. The North Village, of which this is a part, centers around community needs such as parks, civic and open spaces, shopping, and higher density residential areas. Outer areas, such as Park Place Crossing, are planned as lower density. The Park Place Crossing GDP reserves space for MUC/NC in line with the Park Place Concept Plan and provides pedestrian and vehicular connectivity to the future North Village Town center. The application is consistent with these policies.

Goal 2.7: Comprehensive Plan Map

Maintain and review the comprehensive plan map as the official long-range planning guide for land use development of the city by type, density and location.

Policy 2.7.1 Maintain a sufficient land supply within the city limits and the Urban Growth Boundary (UGB) to meet local, regional, and state requirements for accommodating growth.

Policy 2.7.2 Use the following 11 land use classifications on the comprehensive plan map to determine the zoning classifications that may be applied to parcels:

- Low Density Residential (LR)
- Medium Density Residential (MR)
- High Density Residential (HR)
- Commercial (C)
- Mixed Use Corridor (MUC)
- Mixed Use Employment (MUE)
- Mixed Use Downtown (MUD)
- Industrial (I)
- Future Urban Holding (FUH)
- Public and Quasi-Public (QP)
- Parks (P)

Response: The Park Place Crossing Master Plan is designated as Medium Density Residential (MR), Mixed Use Corridor (MUC), and Low Density Residential (LR). The General Development Plan is consistent with the applicable requirements of the Oregon City Municipal Code that implement these Comprehensive Plan designations. The Master Plan includes some necessary adjustments to the specified standards, as permitted by the General Development Plan process. The application is consistent with these policies.

Section 5 – Open Spaces, Scenic and Historic Areas, and Natural Resources

Goal 5.1: Open Space

Establish an open space system that conserves fish and wildlife habitat and provides recreational opportunities, scenic vistas, access to nature and other community benefits.

Policy 5.1.1 Conserve open space along creeks, urban drainage ways, steep hillsides, and throughout Newell Creek Canyon.

Policy 5.1.2 Manage open space areas for their value in linking citizens and visitors with the natural environment, providing solace, exercise, scenic views and outdoor education. Built features in open space sites should harmonize with natural surroundings

Response: Open spaces along creeks, drainageways, and steep hillsides are set aside for conservation according to the Park Place Concept Plan and the planned Park Place Crossing Master Plan. The site is not within the Newell Creek Canyon. Open spaces are planned to provide conservation areas for streams, wetland, riparian areas, recreational trails, scenic views and outdoor education. Built features, such as the planned bridge connection across Tour Creek, will be reviewed with an upcoming Detailed Development Plan application and is planned to harmonize with the natural surroundings. The application is consistent with these policies.

Goal 5.3: Historic Resources

Encourage the preservation and rehabilitation of homes and other buildings of historic or architectural significance in Oregon City.

Response: The project site does not contain any homes or other buildings of historic or architectural significance. The General Development Plan is consistent with this goal.

Goal 5.4: Natural Resources

Identify and seek strategies to conserve and restore Oregon City's natural resources, including air, surface and subsurface water, geologic features, soils, vegetation, and fish and wildlife, in order to sustain quality of life for current and future citizens and visitors, and the long-term viability of the ecological systems.

Policy 5.4.1 **Conserve and restore ecological structure, processes and functions within the city to closely approximate natural ecosystem structure, processes, and functions.**

Policy 5.4.4 **Consider natural resources and their contribution to quality of life as a key community value when planning, evaluating or assessing costs of city actions.**

Policy 5.4.5 **Ensure that riparian corridors along streams and rivers are conserved and restored to provide maximum ecological value to aquatic and terrestrial species. This could include an aggressive tree and vegetation planting program to stabilize slopes, reduce erosion, and mitigate against invasive species and stream impacts where appropriate.**

Policy 5.4.8 **Conserve natural resources that have significant functions and values related to flood protection, sediment and erosion control, water quality, groundwater recharge and discharge, education, vegetation and fish, and wildlife habitat.**

Policy 5.4.9 **Protect and enhance riparian corridors along streams in Oregon City to increase shade, reduce streambank erosion and intrusion of sediments, and provide habitat for a variety of plants, animals, and fish.**

Policy 5.4.10 **Encourage and promote the restoration of the hydrologic and ecological character and function of streams and wetlands that have been degraded by channeling or eliminated from the landscape by routing into culverts.**

Policy 5.4.11 **Maintain and enhance the function and quality of natural wetlands and create, where appropriate, wetlands or swales to moderate the quantity and velocity of water runoff entering streams during storm events and to reduce the amount of pollutants carried into streams.**

Response: Verification of wetland and riparian resources designated within the Natural Resource Overlay District will occur with future Detailed Development Plans. For further information with regard to this General Development Plan application, please refer to the NROD Memorandum (Exhibit G). No physical alterations are planned as part of this General Development Plan application. Wetlands are planned for preservation where possible while allowing enjoyment of natural areas. Stormwater management is planned through detention, treatment, and conveyance to natural, existing drainageways. Water quality standards are planned to be met by the project. Specific review of water quality facilities will occur as part of future applications for Detailed Development Plans. The application is consistent with these Comprehensive Plan policies.

Policy 5.4.16 **Protect surface water quality by:**

- **providing a vegetated corridor to separate protected water features from development;**
- **maintaining or reducing stream temperatures with vegetative shading;**
- **minimizing erosion and nutrient and pollutant loading into water; and**
- **providing infiltration and natural water purification by percolation through soil and vegetation.**

Response: Surface water quality is planned for protection through vegetated corridors, vegetative shading, and prevention of erosion and pollution. Stormwater facilities will be designed for management, detention, and treatment of stormwater to remove sediment and other pollutants in accordance with the City's standards. Erosion related to construction activities is not planned as part of this Master Plan, but will be controlled through silt fences and other methods outlined within the City's standards, to be addressed with future Detailed Development Plans. The master plan implements the required setbacks of OCMC 17.49; however, future Detailed Development Plans will address and conform to the specific standards of the Natural Resource Overlay District contained within OCMC 17.49. The application is consistent with this Comprehensive Plan policy.

Policy 5.4.17 **Protect and maintain groundwater recharge through conservation and enhancement of wetlands and open space.**

Response: The master plan allows for the conservation of wetlands and open spaces near areas designated Natural Resource Overlay District. Green streets and stormwater management will allow for the protection and maintenance of groundwater recharge. Future Detailed Development Plans will address and conform to the specific standards of the Natural Resource Overlay District contained within OCMC 17.49. The General Development Plan application is consistent with this policy.

Policy 5.4.18 **Encourage use of native and hardy plants such as trees, shrubs and ground covers in order to maintain ecological function and reduce maintenance costs and chemical use.**

Response: Specific landscape designs are expected as part of the Detailed Development Plan process. The use of native and hardy trees, shrubs, and ground cover is expected within water quality facilities, parks, and open spaces, where applicable, in order to maintain ecological function and reduce maintenance costs and chemical use. Selections will be made in accordance with the standards established by the Oregon City Municipal Code and the applicable Public Works Stormwater and Grading Design Standards. The application is consistent with this policy.

Section 6 – Quality of Air, Water, and Land Resources

Goal 6.1: Air Quality

Promote the conservation, protection and improvement of the quality of the air in Oregon City.

Policy 6.1.1 **Promote land use patterns that reduce the need for distance travel by single-occupancy vehicles and increases the opportunities for walking, biking and/or transit to destinations such as places of employment, shopping and education.**

Policy 6.1.2 **Ensure that development practices comply with or exceed regional, state, and federal standards for air quality.**

Policy 6.1.4 **Encourage the planting and maintenance of the city's tree canopy to allow natural systems to improve air quality.**

Response: The Park Place Crossing Master Plan will create a portion of the conceived North Village in order to provide commercial retail, civic spaces, parks, and open spaces accessed by a transportation system, which increases the opportunities for walking, biking, and future expansion of transit systems, per the Park Place Concept Plan. New trees and other plant materials will be planted, and areas of trees are planned for preservation within sensitive areas. The specifics of those plantings will be included within landscaping and street tree plans included as part of future Detailed Development Plans. The General Development Plan is consistent with these policies.

Goal 6.2: Water Quality

Control erosion and sedimentation associated with construction and development activities to protect water quality.

Policy 6.2.1 **Prevent erosion and restrict the discharge of sediments into surface or groundwater by requiring erosion prevention measures and sediment control practices.**

Policy 6.2.2 **Where feasible, use open, naturally vegetated drainage ways to reduce stormwater and improve water quality.**

Response: Stormwater within Park Place Crossing is planned for management through stormwater facilities. As stated previously, these facilities will be subject to future Detailed Development Plan applications, OCMC standards, and public works design standards. Stormwater facilities are planned to control sediments and utilize open, naturally vegetated drainage ways. Erosion will be prevented during construction through compliance with the applicable public works standards, but is not planned as part of this Master Plan application. Future Detailed Development Plans will provide further details. The General Development Plan is consistent with these policies.

Goal 6.3: Light

Protect the night skies above Oregon City and facilities that utilize the night sky, such as the Haggart Astronomical Observatory, while providing for night-lighting at appropriate levels to ensure safety for residents, businesses, and users of transportation facilities, reduces light trespass onto neighboring properties, conserves energy, and reduces light pollution via use of night-friendly lighting.

Policy 6.3.1 **Minimize light pollution and reduce glare from reaching the sky and trespassing onto adjacent properties.**

Policy 6.3.2	Encourage new developments to provide even and energy-efficient lighting that ensures safety and discourages vandalism. Encourage existing developments to retrofit when feasible.

Response: Lighting, reviewed with future Detailed Development Plan applications, is planned to comply with the Oregon City Municipal Code. The application is consistent with these policies.

Goal 6.4: Noise

To prevent excessive sound that may jeopardize the health, welfare, or safety of the citizens or degrade the quality of life.

Policy 6.4.1	Provide for noise abatement features such as sound-walls, soil berms, vegetation, and setbacks, to buffer neighborhoods from vehicular noise, and industrial uses.
Policy 6.4.2	Encourage land use patterns along high traffic corridors be developed to minimize noise impacts from motorized traffic through building location, design, size and scale.

Response: The Park Place Crossing Master Plan and planned uses are not expected to create noise in excess of the maximum levels established within Oregon City Municipal Code. The application is consistent with these policies.

Section 7 – Natural Hazards

Goal 7.1: Natural Hazards

Protect life and reduce property loss from the destruction associated with natural hazards.

Policy 7.1.1	Limit loss of life and property from natural hazards by regulating or prohibiting development in areas of known or potential hazards.
Policy 7.1.3	Reduce risk to residents and businesses by maintaining accurate information
Policy 7.1.5	Minimize and avoid risk of loss of life and damage from flooding by limiting development in the 100-year flood plain or ensure that accepted methods of flood proofing are utilized.
Policy 7.1.6	Encourage uses of areas subject to flooding that are resilient to periodic effects of flooding, such as parking or other uses not normally occupied by humans.
Policy 7.1.7	Prohibit uses in areas subject to flooding that would exacerbate or contribute to hazards posed by flooding by introducing hazardous materials, filling or obstructing floodways, modifying drainage channels, and other detrimental actions.
Policy 7.1.8	Provide standards in city codes for planning, reviewing, and approving development in areas of potential landslides that will prevent or minimize potential landslides while allowing appropriate development.
Policy 7.1.9	Locate, design, and construct structures in conformance with current building codes and standards for seismic-resistant design.

Response: The Park Place Crossing Master Plan avoids known natural hazards to the extent practicable. Building sites are not located within areas of possible flooding. Future home sites have been located to avoid existing steep slopes and landslide hazards where possible. Other identified steep slopes are planned for regrading where appropriate. Plans submitted demonstrate the City-mapped geologic hazard areas. Structures will be located, designed, and constructed in accordance with City code, building code, and standards for seismic-resistant design. Specific geologic and other natural hazards will be reviewed with future Detailed Development Plan applications and construction permitting. This application for a General Development Plan is consistent with these Comprehensive Plan policies.

Section 8 – Parks and Recreation

Goal 8.1: Developing Oregon City's Park and Recreation System

Maintain and enhance the existing park and recreation system while planning for future expansion to meet residential growth.

Policy 8.1.1 **Provide an active neighborhood park-type facility and community park-type facility within a reasonable distance (as defined by the Park and Recreation Master Plan or within a reasonable distance to be determined by a future Parks and Recreation Master Plan) to residents of Oregon City.**

Policy 8.1.2 **Whenever property adjacent to an existing neighborhood/community park becomes available, consider adding property to the park and develop it to meet the current needs of existing neighborhoods.**

Policy 8.1.14 **Require or encourage developers to dedicate park sites as part of the subdivision review process. When possible, require or encourage developers to build parks to City standards and give them to the City to operate and maintain.**

<u>Response:</u> Park Place Crossing plans to provide a needed community park at the southwest corner of the project site. Approximately 4.4 acres is planned to be reserved for park purposes with trails, pathways, and street facilities leading to the area to allow for ease of circulation. Streets and trails to be provided have been identified within the Transportation System Plan and Trails Master Plan. Park lands are planned for dedication to the City of Oregon City prior to commencement of Phase 2 of Park Place Crossing (approximately 2024/2025 planned construction date). It is expected that timing will allow inclusion of the park facility within an update of the City's Parks Capital Improvement Projects list. The details of park construction and SDC-creditable projects are anticipated to be determined at a later date with submittal of Detailed Development Plan applications. This application for a General Development Plan is consistent with these Comprehensive Plan policies.

Section 10 – Housing

Goal 10.1: Diverse Housing Opportunities

Provide for the planning, development and preservation of a variety of housing types and lot sizes.

Policy 10.1.3 **Designate residential land for a balanced variety of densities and types of housing, such as single-family attached and detached, and a range of multi-family densities and types, including mixed-use development.**

Policy 10.1.4	**Aim to reduce the isolation of income groups within communities by encouraging diversity in housing types within neighborhoods consistent with the Clackamas County Consolidated Plan, while ensuring that needed affordable housing is provided.**
Policy 10.1.5	**Allow Accessory Dwelling Units under specified conditions in single-family residential designations with the purpose of adding affordable units to the housing inventory and providing flexibility for homeowners to supplement income and obtain companionship and security.**
Policy 10.1.7	**Use a combination of incentives and development standards to promote and encourage well-designed single-family subdivisions and multi-family developments that result in neighborhood livability and stability.**

Response: The Park Place Crossing Master Plan provides for ±476 single-family residences, through ±350 detached and ±126 attached units. This project will provide a variety of housing types and lot sizes. A varied supply within Park Place Crossing will help provide housing for a variety of income groups and help reduce isolation of these groups within the community. The design also accounts for the potential preservation of an existing home in Phase 5. These combined factors, in addition to those previously outlined—such as parks, open space, preserved natural areas, and other amenities—will lead to greater neighborhood livability and stability. Other housing specifics will be addressed at the time of Detailed Development Plan.

The needed adjustments to density, lot size, and street cross section allow for the planned Park Place Crossing project to provide the mix of well-designed single-family housing and open spaces that produces a livable and stable neighborhood. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with these Comprehensive Plan policies.

Section 11 – Public Facilities

Goal 11.1: Provision of Public Facilities

Serve the health, safety, education, welfare, and recreational needs of all Oregon City residents through the planning and provision of adequate public facilities.

Policy 11.1.3	**Confine urban public facilities and services to the city limits except where allowed for safety and health reasons in accordance with state land-use planning goals and regulations. Facilities that serve the public will be centrally located and accessible, preferably by multiple modes of transportation.**
Policy 11.1.1	**Support development on underdeveloped or vacant buildable land within the City where urban facilities and services are available or can be provided and where land use compatibility can be found relative to the environment, zoning, and comprehensive plan goals.**
Policy 11.1.4	**Support development on underdeveloped or vacant buildable land within the City where urban facilities and services are available or can be provided and where land use compatibility can be found relative to the environment, zoning, and comprehensive plan goals.**
Policy 11.1.5	**Design the extension or improvement of any major public facility and service to an area to complement other public facilities and services at uniform levels.**

Policy 11.1.6 **Enhance efficient use of existing public facilities and services by encouraging development at maximum levels permitted in the Comprehensive Plan, implementing minimum residential densities, and adopting an Accessory Dwelling Unit Ordinance to infill vacant land.**

Response: This application for a General Development Plan, required by the City Commission as a condition of approval of the site's annexation, does not involve any physical site alterations. The Park Place Crossing Master Plan properties were brought into the City in 2017 through Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005). The properties are undeveloped and are part of the Park Place Concept Area. The annexation approval required that a General Development Plan/Master Plan be submitted for Park Place Crossing. The master plan will allow the efficient urban use of the area in accordance with City regulations and state land use planning goals. The area will be accessible through a variety of transportation modes, and the project will provide transportation infrastructure to serve the project and areas affected by the project. Public facilities and services, with extension by the project, are available for each phase of the project. Utility services are available within S Holcomb Boulevard for Phase 1, via a connection to existing sewer services at the corner of Journey Drive and Trail View Drive. Phases 2 through 6 will extend and expand public services as needed to support the project and future adjacent developments. Information provided as part of this application is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or improvements may occur. This application for a General Development Plan is consistent with the listed policy.

Goal 11.2: Wastewater

Seek the most efficient and economic means available for constructing, operating, and maintaining the City's wastewater collection system while protecting the environment and meeting state and federal standards for sanitary sewer systems.

Policy 11.2.2 **Plan, operate and maintain the wastewater collection system for all current and anticipated city residents within the existing urban growth boundary. Strategically plan for future expansion areas.**

Policy 11.2.5 **Implement the City's wastewater policies through the Wastewater Master Plan.**

Response: The Park Place Crossing Master Plan is located within the City limits and Urban Growth Boundary, and the project is consistent with the City's Sanitary Sewer Master Plan. Extension of sanitary sewer located adjacent to the site will be accomplished according to the phase of the project. Phase 1 will connect via an interim connection to the existing sewer at the corner of Journey Drive and Trail View Drive. Phase 1 will be rerouted to the interim connection within Phase 2 to the connection to an existing sewer system within Oak Valley Drive. Future projects south of Park Place Crossing will establish a permanent solution for wastewater that will convey sanitary sewer to Redland Road/Highway 213 per the Park Place Concept Plan. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with the listed policy.

Goal 11.3: Water Distribution

Seek the most efficient and economic means available for constructing, operating, and maintaining the City's water distribution system while protecting the environment and meeting state and federal standards for potable water systems.

Policy 11.3.1 **Plan, operate and maintain the water distribution system for all current and anticipated city residents within its existing urban growth boundary and strategically plan for future expansion areas.**

Response: The project site is located within the Urban Growth Boundary and is planned to be served by the extension and improvement of existing water distribution systems located within S Holcomb Boulevard. The project will contribute to the improvement and maintenance of the water system by contributing Systems Development Charges. Expansion of the water system will allow for future expansion throughout the Park Place Concept Area south of S Livesay Road. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with the listed policy.

Goal 11.4: Stormwater Management

Seek the most efficient and economical means available for constructing, operating, and maintaining the City's stormwater management system while protecting the environment and meeting regional, state, and federal standards for protection and restoration of water resources and fish and wildlife habitat.

Policy 11.4.1 **Plan, operate, and maintain the stormwater management system for all current and anticipated city residents within Oregon City's existing urban growth boundary and strategically plan for future expansion areas.**

Policy 11.4.2 **Adopt "green streets" standards to reduce the amount of impervious surface and increase the use of bioswales for stormwater retention where practicable.**

Policy 11.4.3 **Assure parking lot designs mitigate stormwater impacts. Take measures to reduce waterflow and increase water absorption through the use of bioswales, vegetated landscaped islands with curb cuts to allow water inflow, and tree planting.**

Policy 11.4.4 **Maintain existing drainageways in a natural state for maximum water quality, water resource preservation, and aesthetic benefits.**

Policy 11.4.5 **Design stormwater facilities to discharge surface water at pre-development rates and enhance stormwater quality in accordance with criteria found in the City's Stormwater and Grading Design Standards.**

Response: Park Place Crossing involves the eventual provision and operation of a stormwater management system with future Detailed Development Plan applications. The planned facilities are consistent with the City's Stormwater Master Plan and public works standards. The project will incorporate "green streets" standards to reduce impervious surfaces by incorporating stormwater swales and planters where required, logical, and feasible and a stormwater management facility to manage stormwater. From these management facilities (a temporary Phase 1 facility and permanent Phase 2 facility), stormwater is directed to an existing natural drainageway at the southeast corner of Park Place Crossing. The Preliminary Stormwater Report and the planned drainage systems are consistent with these goals. Specific details will be included as part of future Detailed

Development Plans. This application for a General Development Plan is consistent with the listed policy.

Goal 11.6: Transportation Infrastructure

Optimize the City's investment in transportation infrastructure.

Policy 11.6.1 **Investments will be made to accommodate multi-modal traffic as much as possible to include bike lanes, bus turnouts and shelters, sidewalks, etc., especially on major and minor arterial roads, and in regional and employment centers.**

Response: Park Place Crossing provides for needed transportation infrastructure as well as through the provision of payments for intersection improvements and payment of Systems Development Charges. These investments to the City's transportation infrastructure will allow for the provision of needed projects to multimodal systems, including bus turnouts and shelters, bike lanes, sidewalks, and other improvements. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with the listed policy.

Goal 11.7: Non-City Utility Operations

Coordinate with utilities that provide electric, gas, telephone and television cable systems, and high speed internet to Oregon City residents to ensure adequate service levels.

Policy 11.7.1 **Require local service lines in new subdivisions be placed underground.**

Policy 11.7.2 **Coordinate with private utility providers to install infrastructure during street construction and maintenance activities to reduce the need to repeatedly cut into newly paved streets.**

Policy 11.7.3 **Adopt lighting practices in street and other public facilities, and encourage it in private development to reduce glare, light pollution, light trespass, and energy use, while maintaining even lighting ensuring good visibility and safety for the public.**

Policy 11.7.4 **Encourage development of broadband networks in street rights-of-way in a coordinated way to provide state of the art technology to its residents.**

Policy 11.7.5 **Maintain and enforce the cell tower ordinance. Innovations in reducing, camouflaging or screening cell towers will be adopted, supported and encouraged.**

Response: The Park Place Crossing Master Plan anticipates the future provision of underground local service lines and provide appropriate lighting for the neighborhood. The specifics of these utility provisions will be included as part of future land use applications but are anticipated to be consistent with City and utility provider standards. Specific details will be included as part of future Detailed Development Plans. The application is consistent with this policy.

Goal 11.9: Fire Protection

Maintain a high level of fire suppression and emergency medical services capacity.

Policy 11.9.1 **Ensure that all areas, including newly annexed areas, receive fire protection and emergency medical services.**

Response: Water and transportation systems are planned to be sufficient to provide appropriate fire protection for Park Place Crossing. Specific details will be included as part of future Detailed Development Plans. The application is consistent with this policy.

Section 12 – Transportation

Goal 12.1: Land Use-Transportation Connection

Ensure that the mutually supportive nature of land use and transportation is recognized in planning for the future of Oregon City.

Policy 12.1.1 **Maintain and enhance citywide transportation functionality by emphasizing multi-modal travel options for all types of land uses.**

Policy 12.1.3 **Support mixed uses with higher residential densities in transportation corridors and include a consideration of financial and regulatory incentives to upgrade existing buildings and transportation systems.**

Policy 12.1.4 **Provide walkable neighborhoods. They are desirable places to live, work, learn and play, and therefore a key component of smart growth.**

Response: Park Place Crossing provides for a network of public streets to serve the master plan area. The planned street network includes multimodal travel options such as bicycle and pedestrian improvements consistent with City code and the City's Transportation System Plan. Necessary right-of-way and easements for transportation improvements will be dedicated with future land use applications. Residential homes of varying types are planned in close proximity to parks, open spaces, civic areas, and mixed-use/neighborhood commercial areas in order to provide close-by destinations. The result of the master plan is a walkable neighborhood that is a desirable place to live, work, learn, and play. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with these Comprehensive Plan policies.

Goal 12.3: Multi-Modal Travel Options

Develop and maintain a transportation system that provides and encourages a variety of multi-modal travel options to meet the mobility needs of all Oregon City residents.

Policy 12.3.1 **Provide an interconnected and accessible street system that minimizes vehicle miles-traveled and inappropriate neighborhood cut-through traffic.**

Policy 12.3.2 **Provide an interconnected and accessible pedestrian system that links residential areas with major pedestrian generators such as employment centers, public facilities, and recreational areas.**

Policy 12.3.3 **Provide a well-defined and accessible bicycle network that links residential areas, major bicycle generators, employment centers, recreational areas, and the arterial and collector roadway network.**

Policy 12.3.4 **Ensure the adequacy of pedestrian and bicycle connections to local, county, and regional trails.**

Response: The Park Place Crossing GDP provides several projects identified within the TSP and Trails Master Plan that will improve multimodal travel options within the City. The Tour Creek bridge crossing will allow greater pedestrian and bicycle connectivity and reduce out-of-direction travel. The planned connections are in compliance with the applicable codes, standards, and master plans. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with these Comprehensive Plan policies.

Goal 12.8: Implementation/Funding

Identify and implement needed transportation system improvements using available funding.

Policy 12.8.3 **Provide incentives for private sector contributions to multi-modal transportation links and facilities, for example, establishing new standards in the zoning code.**

Response: Park Place Crossing provides for necessary future transportation infrastructure as well as through the provision of payments for intersection improvements and payment of Systems Development Charges. These investments to the City's transportation infrastructure will allow for the provision of needed projects to multimodal systems, including bus turnouts and shelters, bike lanes, sidewalks, and other improvements. Specific details will be included as part of future Detailed Development Plans. The application is consistent with this policy.

Section 13 – Energy Conservation

Goal 13.2: Energy Conservation

Plan public and private development to conserve energy.

Policy 13.2.1 **Promote mixed-use development, increased densities near activity centers, and home-based occupations (where appropriate).**

Policy 13.2.5 **Construct bikeways and sidewalks, and require connectivity of these facilities to reduce the use of petroleum-fueled transportation.**

Response: Park Place Crossing has been planned to encourage bicycle and pedestrian connectivity and other facilities to reduce the use of petroleum-fueled transportation. The Park Place Concept Plan envisions mixed-use/neighborhood commercial sales and service to provide opportunities for walkable neighborhoods and reduce the number of vehicle trips necessary for residents to reach services. Specific details will be included as part of future Detailed Development Plans. This application for a General Development Plan is consistent with these Comprehensive Plan policies.

Ordinance No. 18-1007 - AN-17-0004 / ZC-17-0005 Park Place Annexation and Zone Change

Appendix A: Conditions of Approval

1. **Highway 213 at Beavercreek Road intersection (an Oregon Highway intersection) is forecasted to fall below adopted mobility standards prior to year 2035. As a result, the City has adopted a new Refinement Plan and amendments to OCMC Chapter 12.04 implementing the new Refinement Plan, that is not yet acknowledged. This re-zoning shall not be effective until the new Refinement Plan including alternative mobility measures is adopted and acknowledged.**

Response: A final "Highway 213 Corridor Alternative Mobility Targets" report and associated code amendments (City project L 17-03) for the Highway 213/Beavercreek Road intersection were adopted by the City Commission in March 2018. The attached Transportation Impact Study (Exhibit E) reviews the effects of the project in relation to the standards set by the adopted report. This Condition of Approval has been completed.

2. **Prior to the effective date of this zone change, the property will remain zoned FU-10. No new structures or additions to existing structures or site grading that triggers erosion control permits or overlay district review, other than what otherwise would be allowed under the County's applicable FU-10 zoning, will be allowed. In addition the property shall be subject to the City's overlay districts, fence regulations in OCMC 17.54.100 as well as the City's nuisance, business licensing and animal regulations.**

Response: The properties were zoned FU-10 prior to the effective date of the zone change and were changed to City zoning following the completion and adoption of the "Highway 213 Corridor Alternative Mobility Targets" report. The project site is now zoned R-10, R-5, and Neighborhood Commercial. This Condition of Approval has been completed.

3. **A trip cap for the approximate 92-acre annexation shall be imposed on all development as follows: 538 AM peak hour trips; 679 PM peak hour trips; and 7406 total weekday trips. Any proposal involving development exceeding this trip cap will require additional analysis showing compliance with the Transportation Planning Rule, OAR 660-12-0060 subject to review by the Planning Commission and City Commission as a modification.**

Response: The planned residential component of the Park Place Crossing General Development Plan is anticipated to generate 290 morning peak hour trips, 390 evening peak hour trips, and 4,064 average weekday trips, representing only ±54 percent of the trip cap established by Condition of Approval #3 of Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005). A Transportation Impact Study reviewing these requirements and detailing the trip generation for the project is attached as part of Exhibit E. This Condition of Approval has been completed.

4. **Prior to issuing any development approval authorized by this annexation and zone change, the applicant shall obtain General and Detailed Development Plan approval, that includes the approximate 92-acre property, pursuant to OCMC 17.65. Until such time, all development shall be conform to requirements of the County's FU-10 zoning. The General Development Plan and all phases of development authorized by it, must implement the Park Place Concept Plan and Oregon City's adopted Public Facilities Plans with regard to the provision of open space, park and trails, sewer, water, stormwater and transportation improvements. These include, but are not limited to, addressing the timing of parkland acquisitions and development, proposed phasing of major roads to ensure a timely connection to Holly Lane and an analysis of utility phasing that can foster redevelopment of the entire concept plan area. All land division and site plan and design review applications shall be in conformance with the approved Master Plan, although the normal provisions for Amendments to Master Plans apply.**

Response: Development of the site has not occurred since annexation of the property and approval of Ordinance No. 18-1007 and is anticipated once the Park Place Crossing General Development Plan for the overall project and Detailed Development Plans for each phase are completed. A Detailed Development Plan application for Phase 1 will include some additional details regarding the remainder of the Master Plan area with the understanding that each phase will have a further Detailed Development Plan submitted to further refine the design of the Park Place Crossing Master Plan.

The required General Development Plan implements the Park Place Concept Plan and City's Public Facilities Plans through the provision of public improvements, parks, trails, and open spaces. Phasing of parkland acquisitions, road connections and phasing, and utility phasing are addressed within this narrative and the Preliminary Plans. Future land division, site plan, and design review are planned to be in conformance with this General Development Plan or any future amendments. This Condition of Approval is completed.

5. **As a result of future transportation analyses associated with specific development plans for any of the properties subject to this annexation, the applicant may be obligated in subsequent conditions of approval to mitigate for development impacts by participating in funding of both TSP and non-TSP projects regardless of whether those project are listed in the conditions of approval for this annexation and zone change pursuant to the applicable approval criteria for a Master Plan.**

Response: This requirement is understood. A Transportation Impact Study (TIS) is included as part of this application as Exhibit E. The applicable transportation projects listed within the conditions for this annexation and zone change and any additional appropriate projects are reviewed as part of the TIS. This Condition of Approval is completed.

6. **At such time as a Master Plan is reviewed, the applicant shall submit additional materials to address specific requirements outlined in the city's Guidelines for Transportation Impact Analyses and calculate the proportionate share of transportation impacts of the proposed development including proportional mitigation of the application's impacts on that intersection, or such other mitigation measure(s) as may be approved which assure(s) that the intersection will either meet, or perform no worse than, the then-applicable performance standards. More intense development than identified in this report is likely to increase the applicant's share of project differently than calculated below. The applicant's final share may be modified as necessary when a Master Plan is approved to reflect any a modification of the development's trip generation or a change in project costs resulting from revisions to project costs associated with updates to the City's Transportation System Plan or Capital Improvement program that will be paid on a schedule determined as part of the Master Plan.**

Response: The project Transportation Impact Study (Exhibit E) addresses the City's Guidelines for Transportation Impact Analyses (July 2021) and reviews the proportional mitigation of the project's impacts on the studied intersections. The Park Place Crossing Master Plan anticipate significantly fewer vehicle trips, approximately 54 percent of those projected as part of the annexation TIS; therefore, the final share of proportional mitigation will be modified. Transportation Impact Study updates will be submitted with each Detailed Development Plan, as necessary. This Condition of Approval has been completed.

a. **Redland Road at Holcomb Boulevard/Abernethy Road (a non-Oregon Highway intersection) is forecasted to fall below adopted performance standards prior to year 2035. The applicant shall demonstrate either of the following:**

1. **That the City has adopted amendments to the City's Transportation System Plan to include projects that satisfy the applicable mobility standards as specified in OCMC 12.04.205 at this location; or**

Response: The City has adopted amendments to the Transportation System Plan as part of the "Highway 213 Corridor Alternative Mobility Targets" report and associated code amendments. The Transportation Impact Study (Exhibit E) addresses these TSP amendments. This Condition of Approval has been completed.

2. **Accept a condition of approval for a development application that obligates the applicant to implement a project that satisfies applicable mobility standards at that intersection.**

Response: The Applicant has also provided information regarding the proportional mitigation of the Abernethy Road/Holcomb Boulevard/Redland Road intersection. This Condition of Approval has been completed.

b. **The developer shall participate in the funding of improvements for the I-205/OR99E ramp terminal projects (TSP Projects D75 and D76) in proportion to the development's traffic volumes as a percentage of total year 2035 intersection volumes from the TSP. The project cost for D75 is $2,990,000. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 0.96 percent of the 2035 volume and the development's share of the project is $28,700. The project cost of D76 is $1,990,000. The development accounts for 0.87 percent of the 2035 volume and the development's share is $17,300.**

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

c. **The developer shall participate in the funding of improvements for the Main Street/14th Street improvements (TSP Projects D7 and D8) in proportion to the development's traffic volume as a percentage of the predicted 2035 traffic volume at the intersection calculated in the TSP. The cost of these projects as listed in the 2017 TSDC Project List is $845,000 and $960,000, respectively. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 3.63 percent of the 2035 volume and the development's share of the project is $65,500.**

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

d. **The developer shall participate in the funding of improvements for the Abernethy/Holcomb/Redland intersection in proportion to the development's traffic volume as a percentage of the predicted 2035 traffic volume. No project is currently identified in the TSP. The project concept is to provide an additional lane on the eastbound approach; it may involve restriping or widening and signal modifications. No project cost is available at this time. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 19.7 percent of the 2035 volume.**

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

e. **The developer shall participate in the funding of improvements for the intersection of OR213/Redland Road (TSP Project D79) in proportion to the development's traffic volume as a percentage of the predicted 2035 traffic volume at the intersection calculated in the TSP. The 2017 TSDC project list shows a project cost of $10,105,000. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 4.77 percent of the 2035 volume and the development's share of the project is $482,000.**

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

f. The developer shall participate in the funding of improvements for the Holly Lane/Holcomb Boulevard intersection (TSP Project D43) in proportion to the development's traffic volume as a percentage of the predicted 2035 traffic volume. Project D43 is a roundabout with an estimated project cost in the TSP of $1,040,000 according to the 2017 TSDC Project List. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 38.1 percent of the 2035 volume and the development's share of the project is $396,000.

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

g. The developer shall participate in the funding of improvements for the Holly Lane/Redland Road intersection (TSP Project D36) in proportion to the development's traffic volume as a percentage of the predicted 2035 traffic volume. Project D36 is a roundabout with an estimated project cost $1,040,000 according to the 2017 TSDC Project List. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 28.3 percent of the 2035 volume and the development's share of the project is $294,000.

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

h. The developer shall participate in the funding of improvements for the Highway 213/Beavercreek Road intersection in proportion to the development's traffic volume as a percentage of the predicted 2035 traffic volume. A project to add a right-turn lane on westbound Beavercreek Road and a merge lane on northbound Highway 213 was identified in the July 2017 Highway 213 Corridor Alternative Mobility Study and was adopted as Project D95 as an amendment to the TSP. The project's cost listed in the TSP amendment is $2.7 million. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 0.35 percent of the 2035 volume and the development's share of the project is $9,400.

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

i. The developer shall participate in the funding of improvements for pedestrian and bicycle projects on Holcomb Boulevard that implement the Holcomb Boulevard Pedestrian Enhancement Concept Plan (HBPECP, adopted by Ord. 05-1003) in accordance with the Transportation System Plan sidewalk Infill projects W11, W12, W13, bike lane project B12, and crossing projects C3, C4, C5 and C6 in proportion to the development's motor vehicle traffic volume using Holcomb Boulevard as a percentage of the total motor vehicle traffic volume on Holcomb Boulevard. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 11.5 percent of the 2035 volume. The combined cost of these seven projects is $3,735,000. The development's share of the projects' cost is calculated to be $429,500. The developer is entitled to System Development Charge credits pursuant to OCMC 13.12.040 for qualified public improvement as part of development.

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

j. **The developer shall participate in the funding of improvements for the Redland Road/Anchor Way intersection in proportion of the development's traffic as a development's traffic volume as a percentage of the predicted 2035 traffic volume. Project D35 specifies operational improvements at the intersection with an estimated project cost of $425,000 according to the 2017 TSDC Project List. Based on this methodology and the preliminary PM peak hour trip generation from the proposed development, the development accounts for 25.0 percent of the 2035 volume and the development's share of the project is $106,000.**

Response: This requirement is understood and will be modified with future Detailed Development Plan applications as noted above.

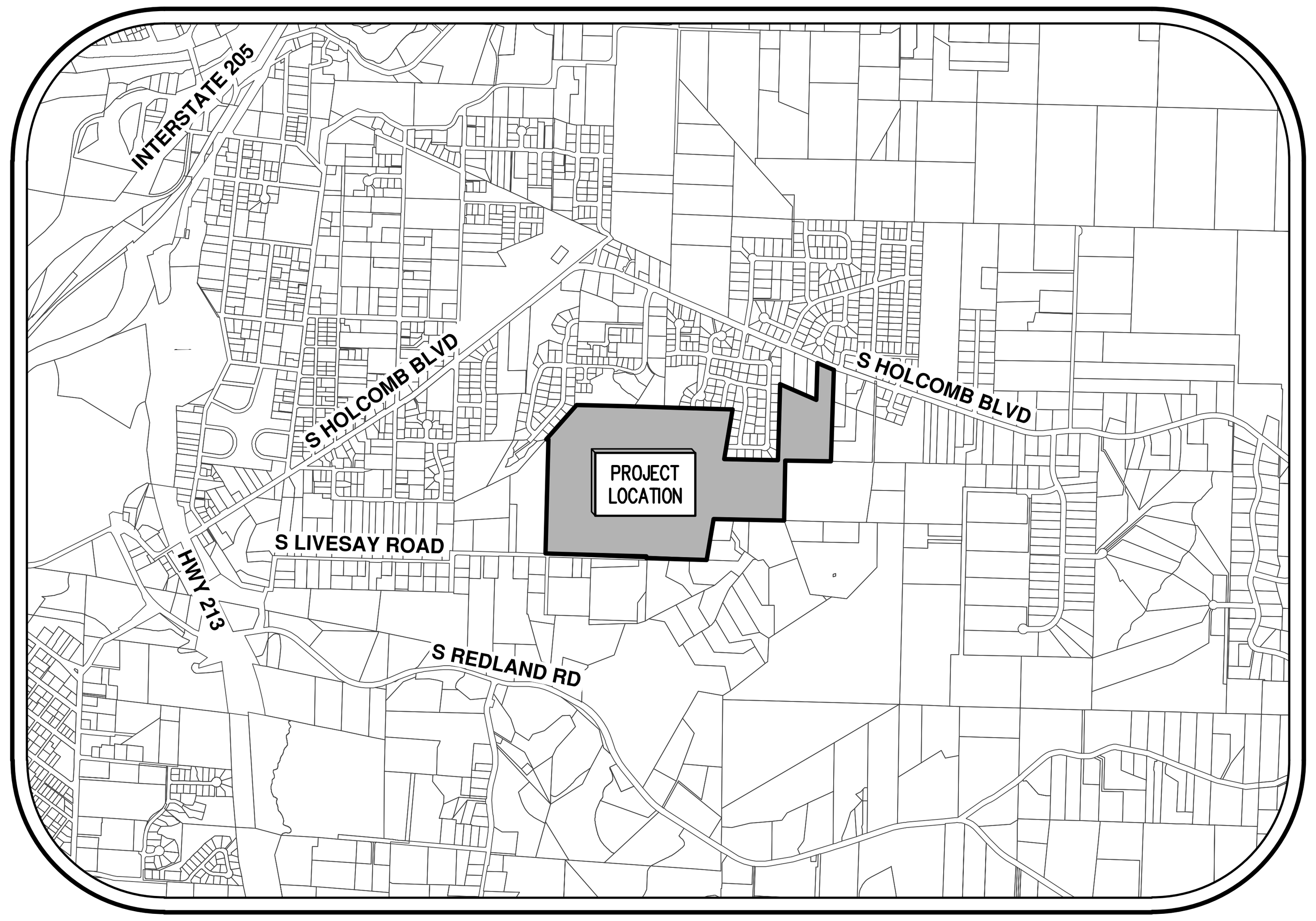
k. **The applicant's preliminary proportionate share for project listed above as conditions of approval are based on the total trip generation for the annexation property using the proposed trip cap of 538 AM peak hour trips; 679 PM peak hour trips; and 7,406 total weekday trips. A less intense development is likely to decrease the applicant's share of projects as calculated above. A more intense development, in addition to requiring analysis showing compliance with the Transportation Planning Rule, is likely to increase the applicant's share of projects as calculated above.**

Response: These requirements are understood. The Park Place Crossing Master Plan Transportation Impact Study (Exhibit E) anticipates a net additional 290 AM peak hour trips, 390 PM peak hour trips, and 4,064 total weekday trips. These expected trips are equal to ±54.6 percent of the trip cap established by Ordinance No. 18-1007 (AN-17-0004/ZC-17-0005). Because the full build-out planned for Park Place Crossing is significantly less than the trip caps listed above, the result is a decrease in the Applicant's share of the listed projects. A more intense development is not planned; therefore, additional analyses showing compliance with the Transportation Planning Rule is not required. The total of AM peak hour, PM peak hour, and total weekday trips will be determined and updated at each phase of Detailed Development Plan.

IV. Conclusion

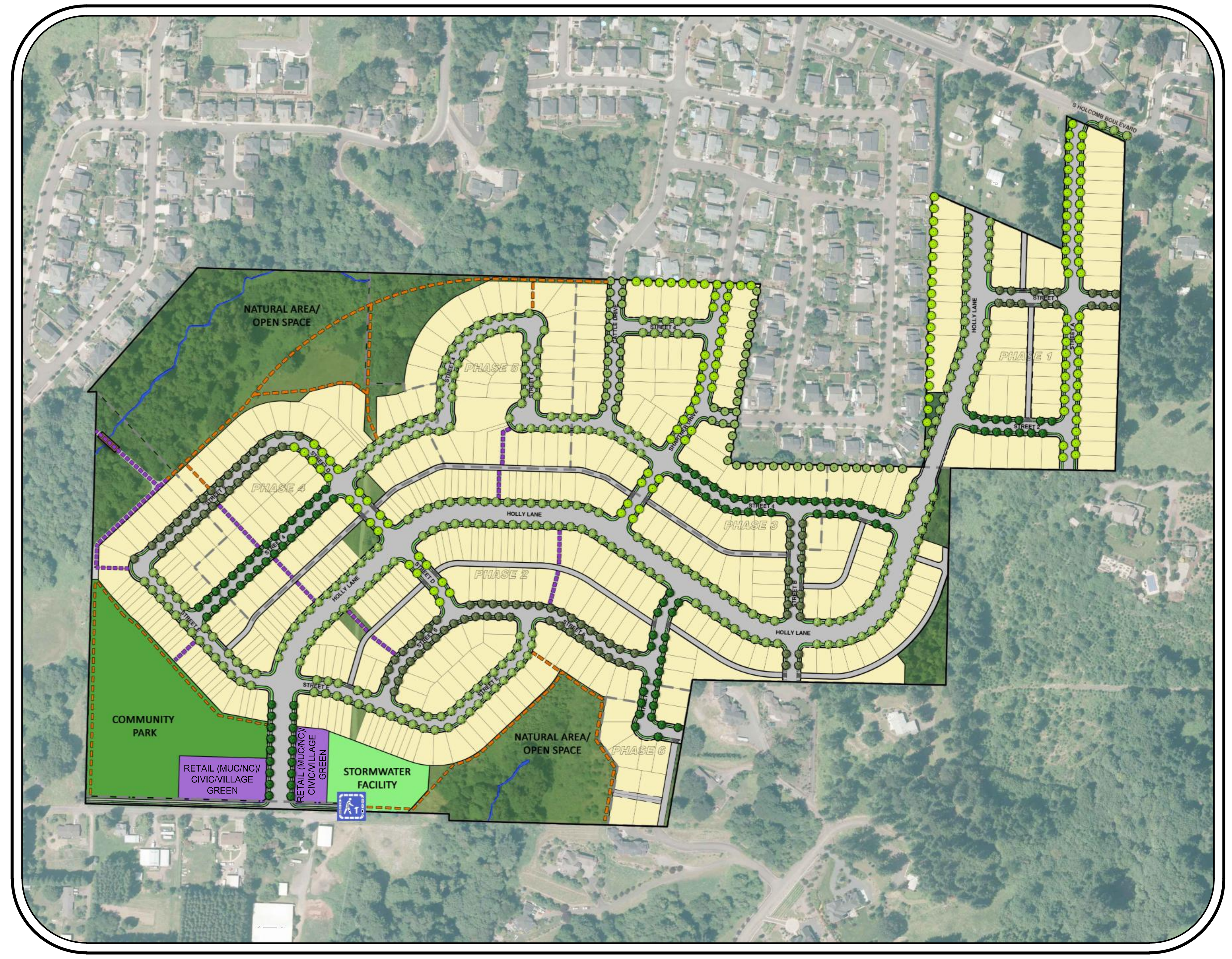
The required findings have been made, and this written narrative and accompanying documentation demonstrate that the application is consistent with the applicable provisions of the Oregon City Municipal Code, Oregon City Comprehensive Plan, Park Place Concept Plan, and the conditions of approval of Ordinance No. 18-1007 (AN-17-0004 / ZC-17-0005). The evidence in the record is substantial and supports approval of the application.

PARK PLACE CROSSING MASTER PLAN



VICINITY MAP

NOT TO SCALE



SITE MAP

SCALE: 1"=300'

LEGEND

	EXISTING	PROPOSED
DECIDUOUS TREE		
CONIFEROUS TREE		
FIRE HYDRANT		
WATER BLOWOFF		
WATER METER		
WATER VALVE		
DOUBLE CHECK VALVE		
AIR RELEASE VALVE		
SANITARY SEWER CLEAN OUT		
SANITARY SEWER MANHOLE		
SIGN		
STREET LIGHT		
MAILBOX		

	EXISTING	PROPOSED
STORM DRAIN CLEAN OUT		
STORM DRAIN CATCH BASIN		
STORM DRAIN AREA DRAIN		
STORM DRAIN MANHOLE		
GAS METER		
GAS VALVE		
GUY WIRE ANCHOR		
UTILITY POLE		
POWER VAULT		
POWER JUNCTION BOX		
POWER PEDESTAL		
COMMUNICATIONS VAULT		
COMMUNICATIONS JUNCTION BOX		
COMMUNICATIONS RISER		

	EXISTING	PROPOSED
RIGHT-OF-WAY LINE		
BOUNDARY LINE		
PROPERTY LINE		
CENTERLINE		
DITCH		
CURB		
EDGE OF PAVEMENT		
EASEMENT		
FENCE LINE		
GRAVEL EDGE		
POWER LINE	PWR	PWR
OVERHEAD WIRE	OHW	OHW
COMMUNICATIONS LINE	COM	COM
FIBER OPTIC LINE	CFO	CFO
GAS LINE	GAS	GAS
STORM DRAIN LINE	STM	STM
SANITARY SEWER LINE	SAN	SAN
WATER LINE	WAT	WAT

PARK PLACE CROSSING MASTER PLAN

APPLICANT:
ICON CONSTRUCTION & DEVELOPMENT, LLC
1969 WILLAMETTE FALLS DRIVE
SUITE 260
WEST LINN, OREGON 97068

PLANNING/ENGINEERING/ SURVEYING FIRM:
AKS ENGINEERING & FORESTRY, LLC.
CONTACTS: MONTY HURLEY/ CHRIS GOODELL
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OREGON 97062
PH: 503-563-6151
FAX: 503-563-6152

PROJECT LOCATION:
SOUTH OF S HOLCOMB BOULEVARD, NORTH AND EAST OF S LIVESAY ROAD
OREGON CITY, OREGON

EXISTING LAND USE:
EXISTING HOMES AND OUTBUILDINGS WITH GRASS FIELDS AND TREES

PROJECT PURPOSE:
MASTER PLAN
(GENERAL DEVELOPMENT PLAN)

VERTICAL DATUM:
ELEVATIONS ARE BASED ON NATIONAL GEODETIC SURVEY BENCHMARK DESIGNATION V 723 (PID RD1497) LOCATED AT THE SE CORNER OF HWY 99E AND HWY I-205. ELEVATION = 62.48 FEET (NAVD 88).

PROPERTIES:

TAX LOT	MAP
100	2-2E-28D
190	2-2E-28D
200	2-2E-28D
300	2-2E-28D
301	2-2E-28D
302	2-2E-28D
303	2-2E-28D
400	2-2E-28D
500	2-2E-28D
502	2-2E-28D
1000	2-2E-27BC
2000	2-2E-27BC
3700	2-2E-28D
3701	2-2E-28D

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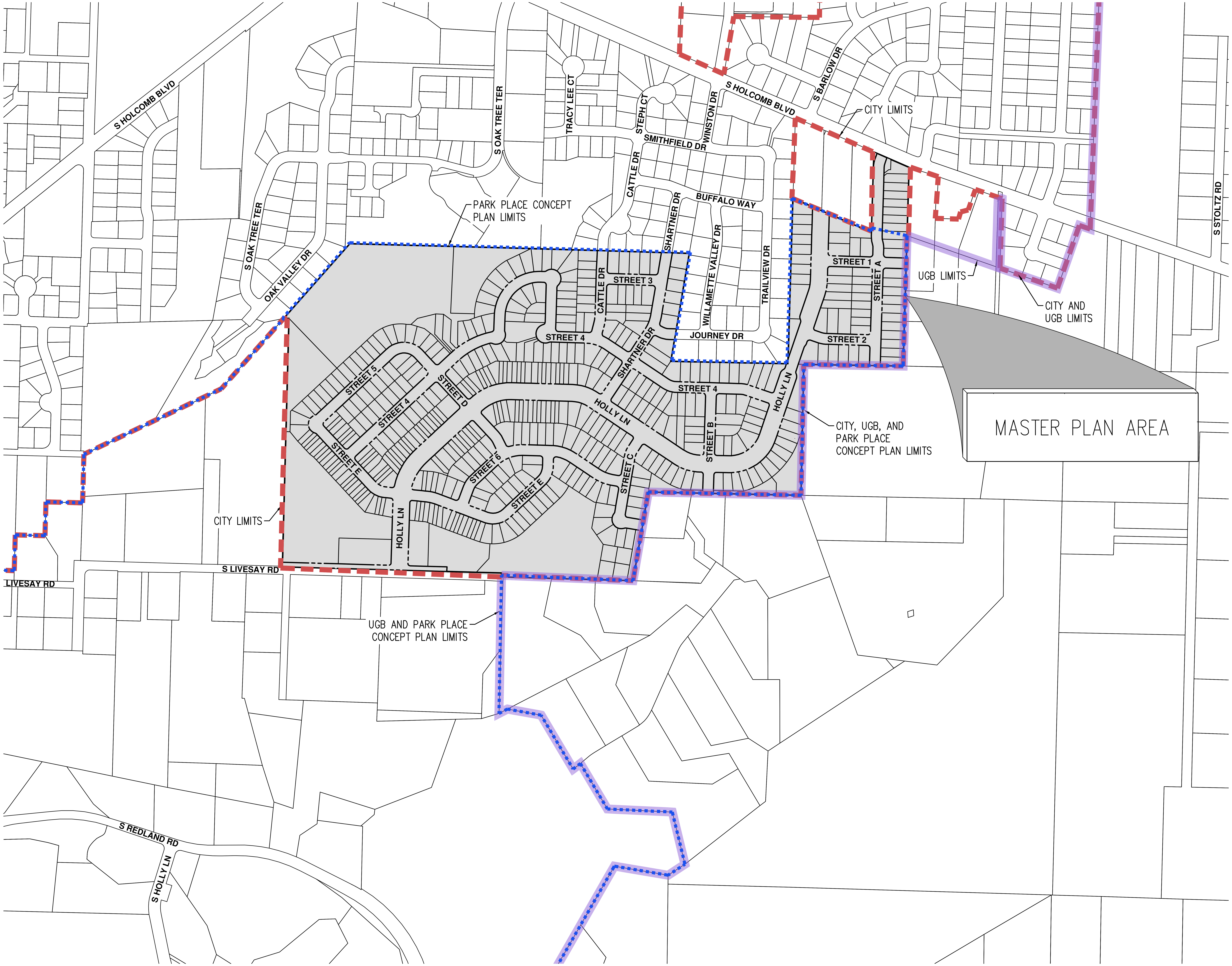
ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

COVER SHEET WITH VICINITY & SITE MAPS
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION
RENEWAL DATE: 6/30/23

JOB NUMBER: 7404
DATE: 03/17/2022
DESIGNED BY: CMS
DRAWN BY: NRA
CHECKED BY: CMS

P-01



LEGEND:

- CITY LIMITS
- UGB LIMITS
- PARK PLACE CONCEPT PLAN LIMITS
- AREA SUBJECT TO MASTER PLAN

N

SCALE: 1"=250 FEET

250 0 50 125 250

ORIGINAL PAGE SIZE: 22" x 34"

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VICINITY MAP
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

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CHECKED BY:	CMS

P-02

AKS DRAWING FILE: 7404 VICINITY.DWG | LAYOUT: P-02

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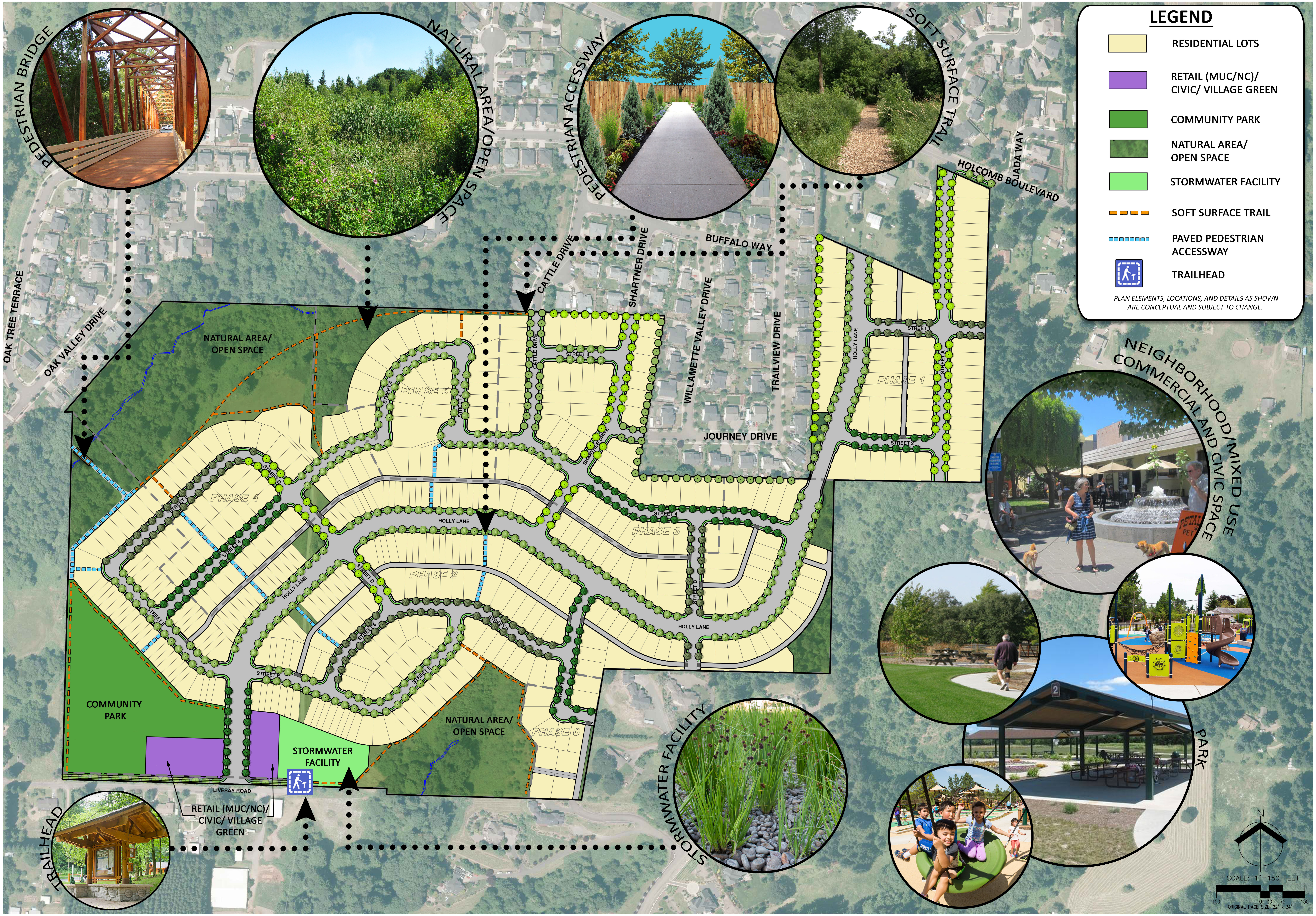

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PRELIMINARY CONCEPT AND OPEN SPACE PLAN

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

REGISTERED LANDSCAPE ARCHITECT KIRSTI A. HAUSWALD OREGON 06/06/13

JOB NUMBER:	7404
DATE:	03/18/2022
DESIGNED BY:	ZTN
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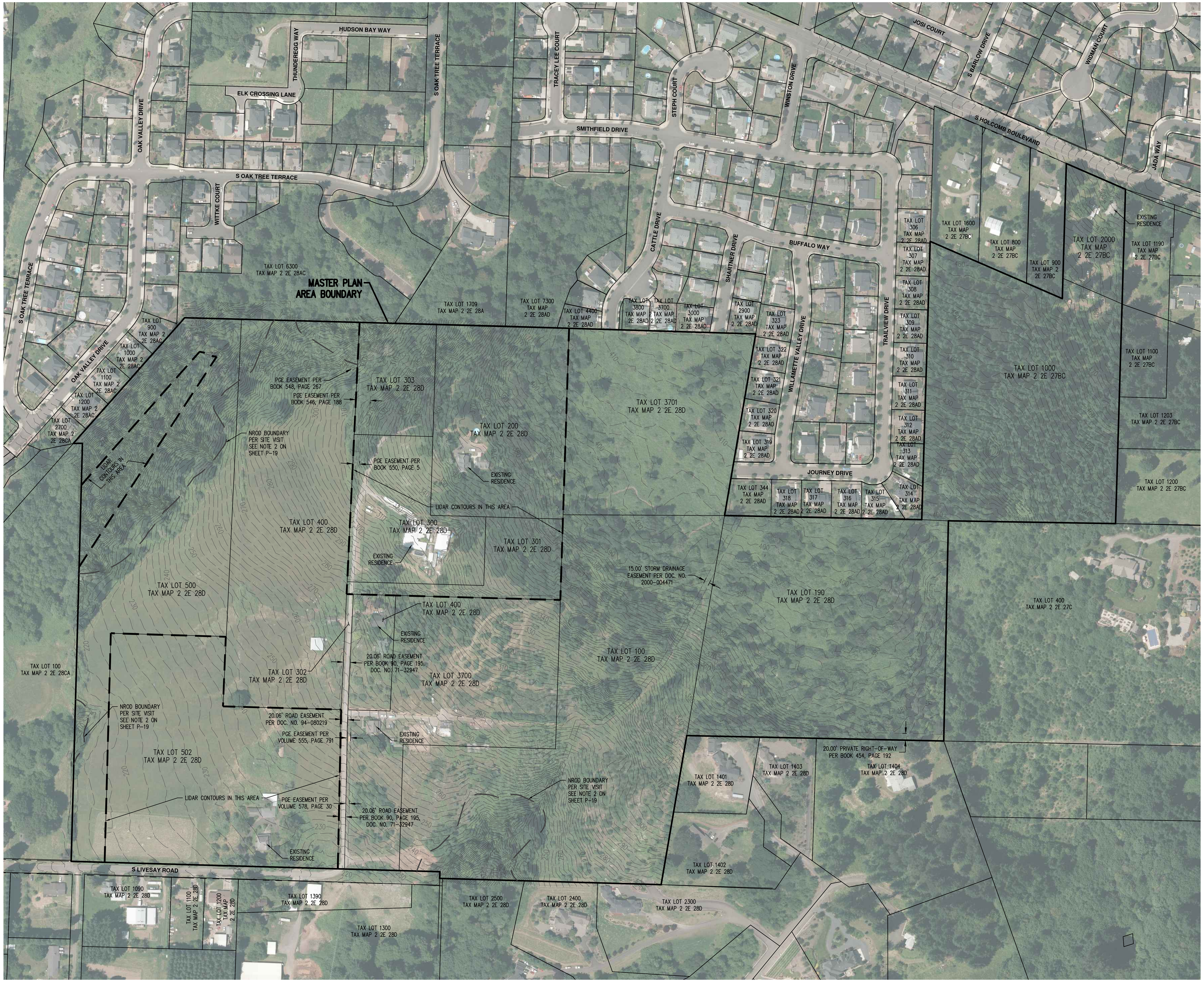
CHECKED BY:	ZTN

P-03



NOTES:

1. EXISTING CONDITION INFORMATION SHOWN IS BASED ON A VARIETY OF SOURCES INCLUDING: TOPOGRAPHIC AND UTILITY SURVEYING, BOUNDARY SURVEYING, GEOGRAPHIC INFORMATION SYSTEM (GIS), AERIAL PHOTOGRAPH AND TAX ASSESSOR MAP INFORMATION. ALL DIMENSIONS AND AREAS SHOWN ARE PRELIMINARY AND APPROXIMATE.
2. CONTOUR INTERVAL IS 2 FEET. CONTOURS SHOWN ARE PER A MIX OF SURVEYED ELEVATIONS AND LIDAR DATA AND SHOULD BE CONSIDERED APPROXIMATE.
3. TAXLOTS 200, 300, 301, 303, AND 502 HAVE NOT BEEN SURVEYED, NOR HAVE THEY BEEN EVALUATED FOR NROD AREAS.
4. FOR SLOPE ANALYSIS AND NATURAL RESOURCE OVERLAY INFORMATION PLEASE REFER TO SHEETS P-19 AND P-20.
5. VERTICAL DATUM: ELEVATIONS ARE BASED ON NATIONAL GEODETIC SURVEY BENCHMARK DESIGNATION V 723 (PID RD1497) LOCATED AT THE SE CORNER OF HWY 99E AND HWY I-205. ELEVATION = 62.48 FEET (NAVD 88).
6. HORIZONTAL DATUM: A LOCAL DATUM PLANE SCALED FROM OREGON STATE PLANE NORTH 3601 NAD83(2011) EPOCH 2010.0000 BY HOLDING A PROJECT MEAN GROUND COMBINED SCALE FACTOR OF 1.0001150551 AT A CALCULATED CENTRAL PROJECT POINT WITH GRID VALUES OF (NORTH 626648.798, EAST 7672411.244). THE MERIDIAN CONVERGENCE ANGLE AT THE CALCULATED CENTRAL POINT IS −1°27'43". THE STATE PLANE COORDINATES WERE DERIVED FROM THE TRIMBLE VRS NOW NETWORK.
7. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. BOUNDARIES MAY BE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.

EXISTING TAX LOT SUMMARY:

TAX LOT	# OF RESIDENCES	AREA (ACRE)
100:	NONE	14.3±
190:	NONE	10.8±
200:	1 RESIDENCE	5.2±
300:	1 RESIDENCE	3.1±
301:	NONE	1.4±
302:	NONE	0.4±
303:	NONE	1.8±
400:	1 RESIDENCE	10.4±
500:	NONE	10.3±
502:	1 RESIDENCE	9.4±
1000:	NONE	9.7±
2000:	1 RESIDENCE	1.5±
3700:	1 RESIDENCE	6.8±
3701:	NONE	6.6±
TOTAL:	6 RESIDENCES	91.7±

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

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PRELIMINARY EXISTING CONDITIONS PLAN WITH AERIAL PHOTO

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

REGISTERED PROFESSIONAL ENGINEER OREGON MONTGOMERY B. HURLEY

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

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DRAWN BY:	NRA
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P-04

NOTES:

1. EXISTING CONDITION INFORMATION SHOWN IS BASED ON A VARIETY OF SOURCES INCLUDING: TOPOGRAPHIC AND UTILITY SURVEYING, BOUNDARY SURVEYING, GEOGRAPHIC INFORMATION SYSTEM (GIS), AERIAL PHOTOGRAPH AND TAX ASSESSOR MAP INFORMATION. ALL DIMENSIONS AND AREAS SHOWN ARE PRELIMINARY AND APPROXIMATE.
2. CONTOUR INTERVAL IS 2 FEET. CONTOURS SHOWN ARE PER A MIX OF SURVEYED ELEVATIONS AND LIDAR DATA AND SHOULD BE CONSIDERED APPROXIMATE.
3. TAXLOTS 200, 300, 301, 303, AND 502 HAVE NOT BEEN SURVEYED, NOR HAVE THEY BEEN EVALUATED FOR NROD AREAS.
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7. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. BOUNDARIES MAY BE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.
8. TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

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PRELIMINARY EXISTING CONDITIONS PLAN WITH TREES

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

REGISTERED PROFESSIONAL LAND SURVEYOR OREGON MONTGOMERY B. HURLEY

RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
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DRAWN BY:	NRA
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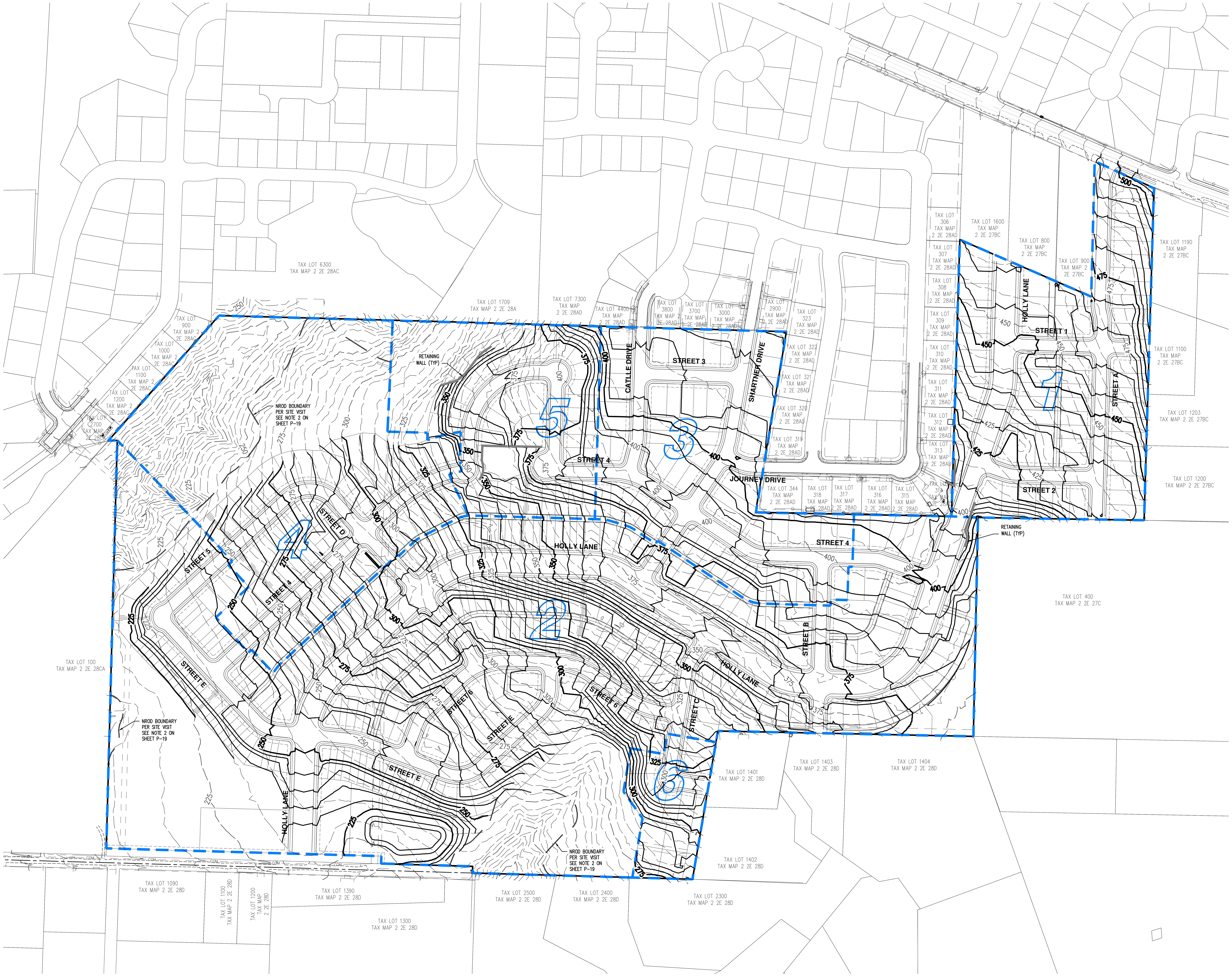
P-05



NOTES:

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2. CONTOUR INTERVAL IS 5 FEET. CONTOURS SHOWN ARE PER A MIX OF SURVEYED ELEVATIONS AND LIDAR DATA AND SHOULD BE CONSIDERED APPROXIMATE.

3. TAXLOTS 200, 300, 301, 303, AND 502 HAVE NOT BEEN SURVEYED, NOR HAVE THEY BEEN EVALUATED FOR NROD AREAS.

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LEGEND

EXISTING GROUND CONTOUR (5 FT)	
EXISTING GROUND CONTOUR (25 FT)	350
FINISHED GRADE CONTOUR (5 FT)	
FINISHED GRADE CONTOUR (25 FT)	325

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

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PRELIMINARY GRADING PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

REGISTERED PROFESSIONAL ENGINEER 94342PE OREGON MONTGOMERY B. HURLEY
RENEWAL DATE: 6/30/23

PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER:	7404
DATE:	03/17/2022
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DRAWN BY:	NRA
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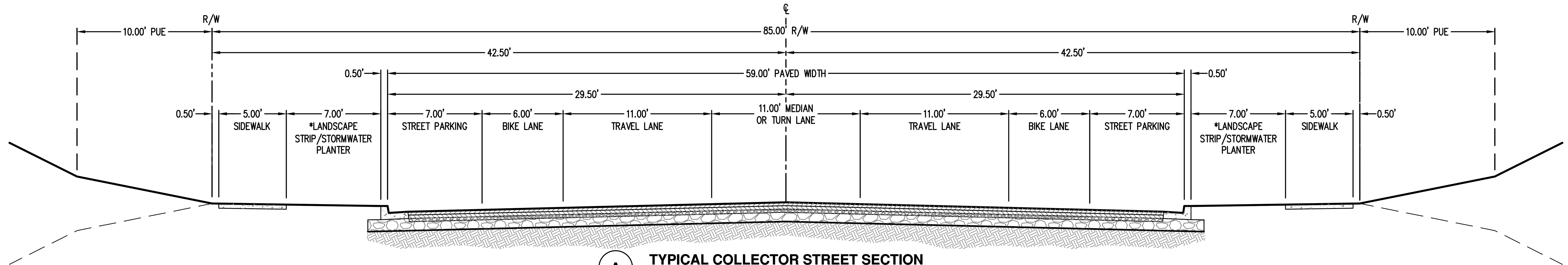
P-06

AKS DRAWING FILE: 7404 GRADING.DWG | LAYOUT: P-06

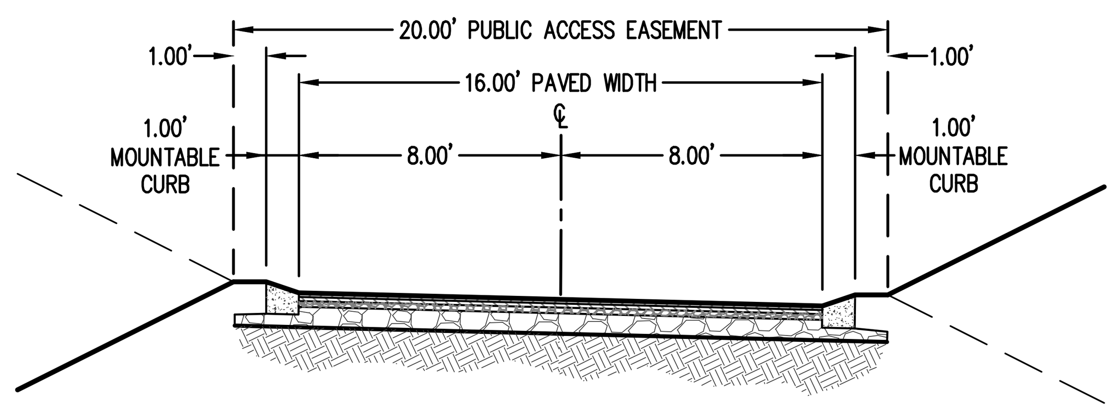


A **TYPICAL COLLECTOR STREET SECTION**

NOT TO SCALE

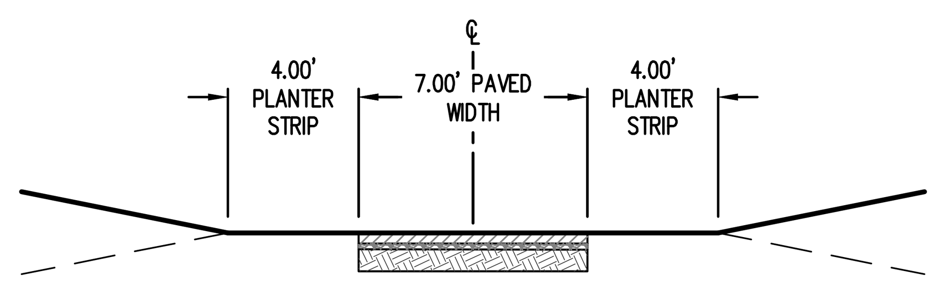
HOLLY LANE

*SEE NOTE



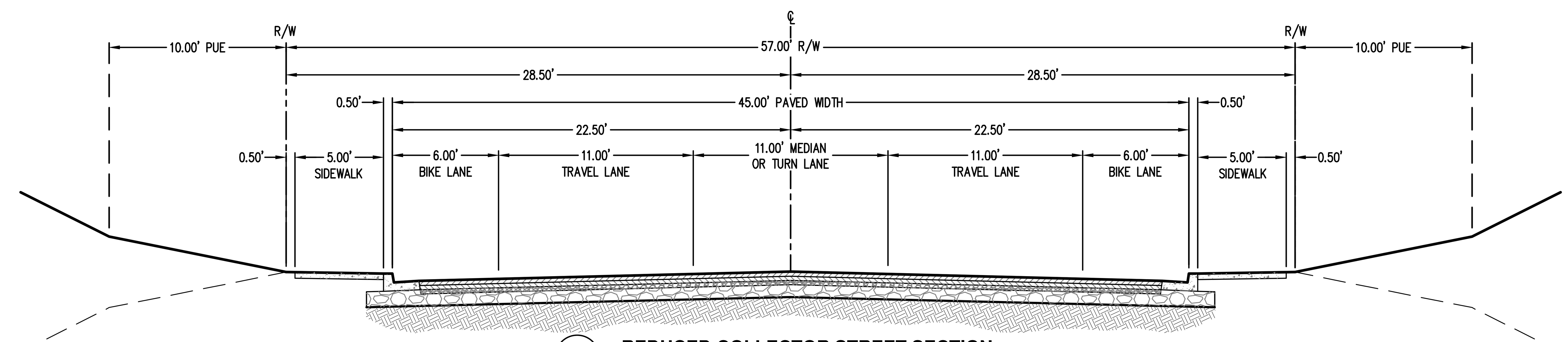
G **ALLEY SECTION**

NOT TO SCALE



F **PEDESTRIAN ACCESSWAY SECTION**

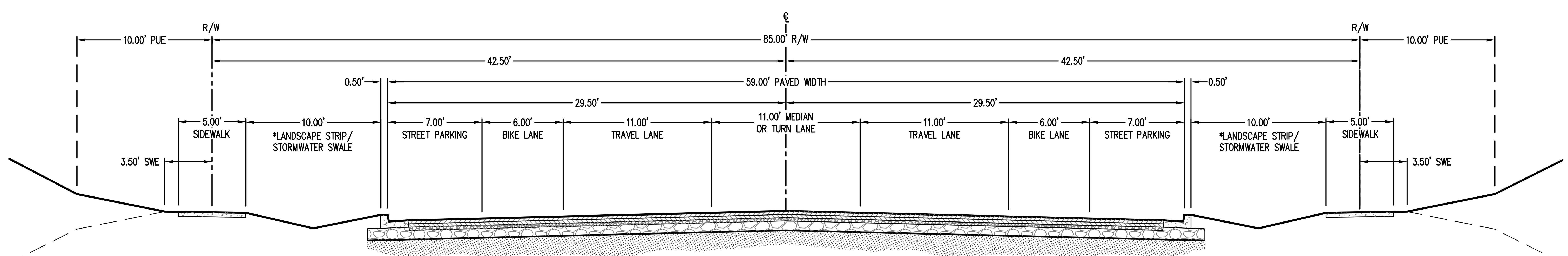
NOT TO SCALE



B **REDUCED COLLECTOR STREET SECTION**

NOT TO SCALE

REDUCED HOLLY LANE (BETWEEN TAX LOT 314 TAX MAP 2 2E 28AD AND TAX LOT 400 TAX MAP 2 2E 27C.)

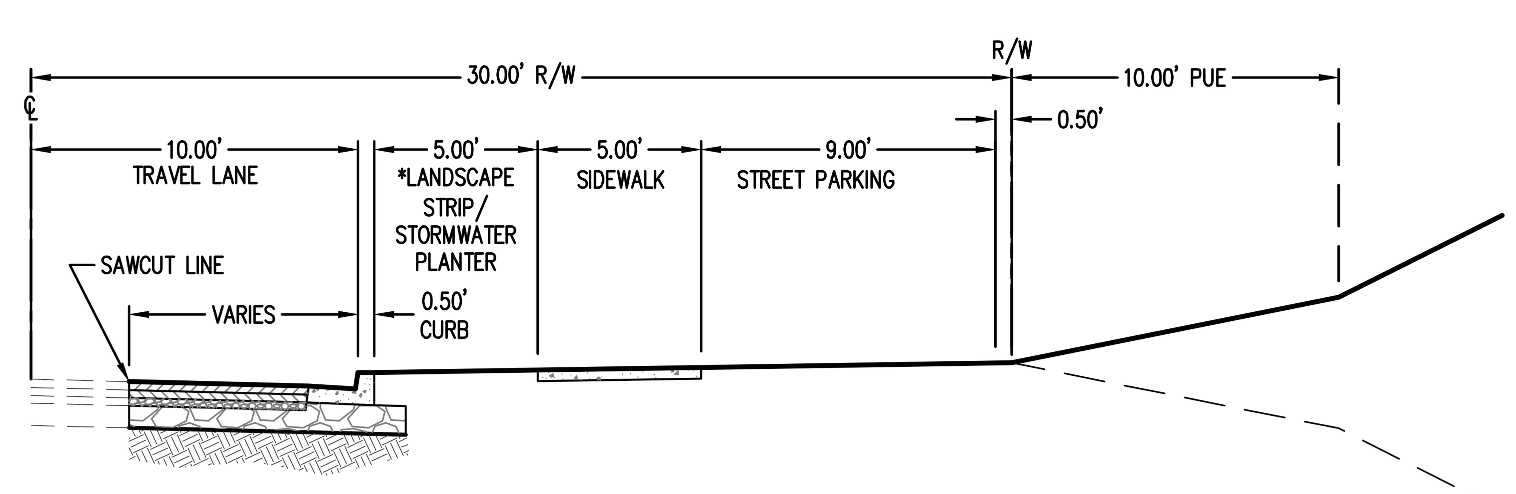


C **ALTERNATE COLLECTOR STREET SECTION**

NOT TO SCALE

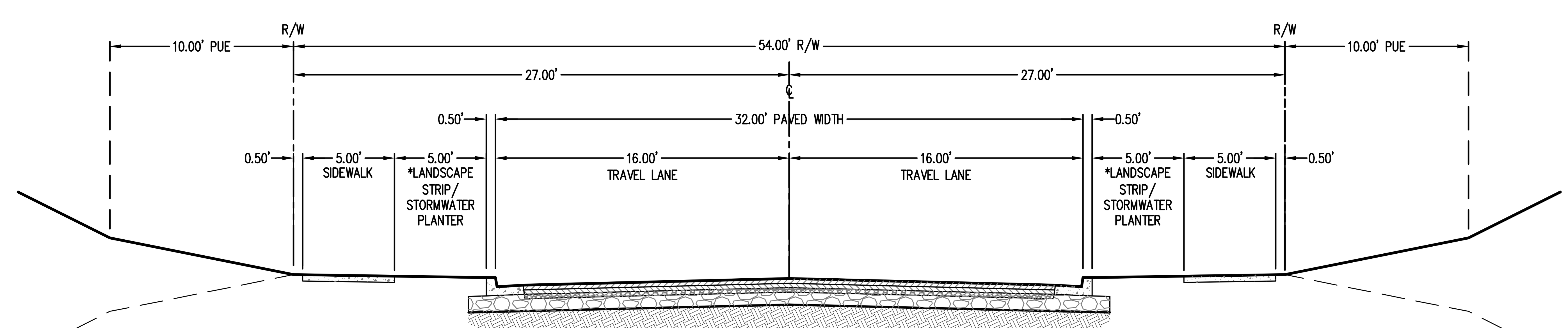
HOLLY LANE

*SEE NOTE



E **S HOLCOMB BOULEVARD HALF STREET SECTION**

NOT TO SCALE



D **TYPICAL LOCAL STREET SECTION**

NOT TO SCALE

STREET 1, STREET 2, STREET 3, STREET 4, STREET 5, STREET 6,
STREET A, STREET B, STREET C, STREET D, STREET E, CATTLE DRIVE, SHARTNER DRIVE

*SEE NOTE

NOTE:

*STORMWATER PLANTERS/SWALES ARE SHOWN FOR ILLUSTRATIVE PURPOSES. PLANTERS/SWALES WILL BE IMPLEMENTED IN THE LANDSCAPE STRIPS AS DEEMED NECESSARY, REQUIRED, AND PRACTICAL. DETAILED PLANTER/SWALE INFO WILL BE INCLUDED ON FUTURE DETAILED DEVELOPMENT PLANS.

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PRELIMINARY STREET CROSS-SECTIONS
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY
NOT FOR CONSTRUCTION

REGISTERED PROFESSIONAL ... OREGON ... CORY B. HURLEY

RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
DATE:	03/17/2022
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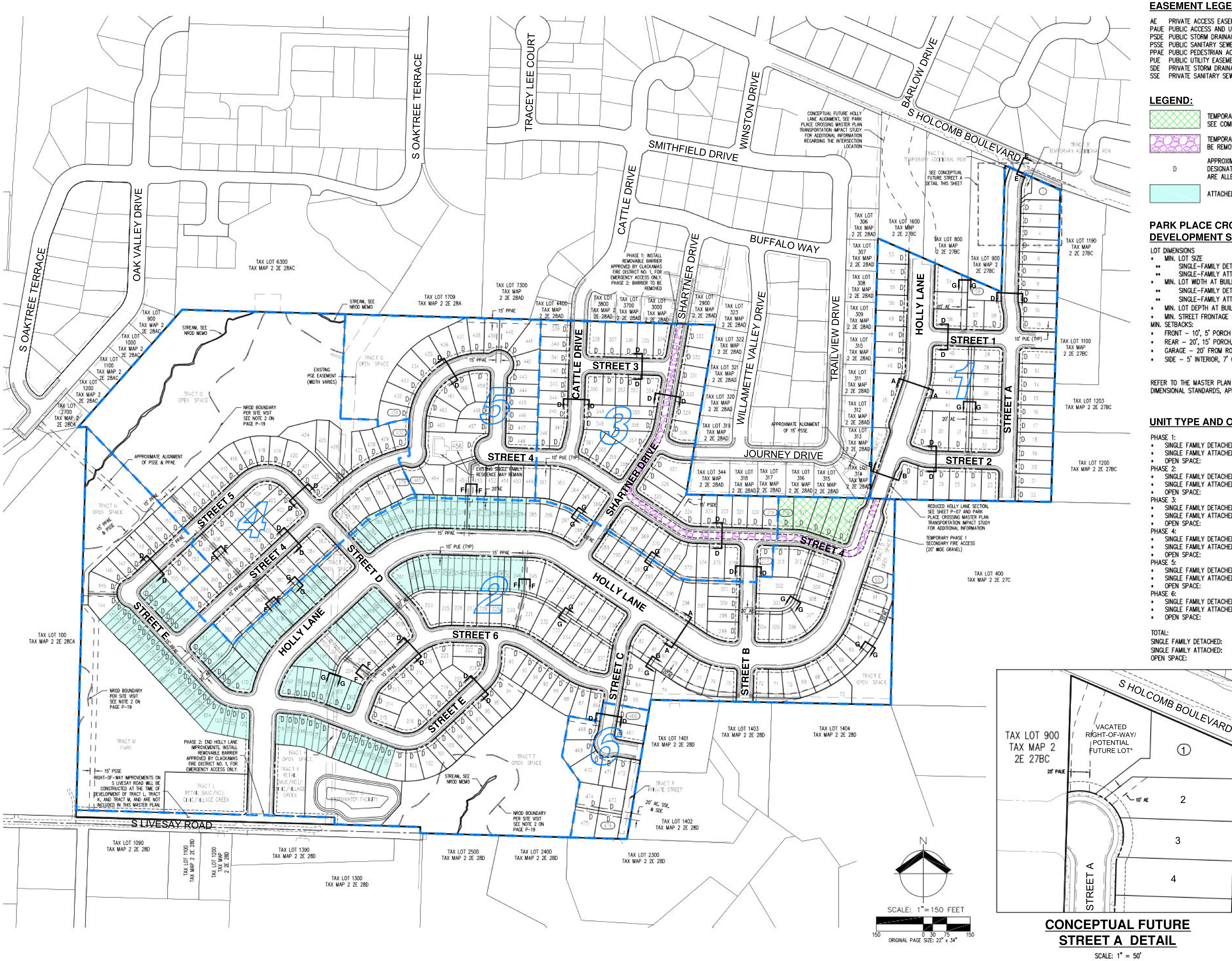
P-07

AKS DRAWING FILE: 7404 STREET SECTIONS.DWG | LAYOUT: P-07



EASEMENT LEGEND:

AE PRIVATE ACCESS EASEMENT (ALLEY)
PAUE PUBLIC ACCESS AND UTILITY EASEMENT
PSDE PUBLIC STORM DRAINAGE EASEMENT
PSSE PUBLIC SANITARY SEWER EASEMENT
PPAE PUBLIC PEDESTRIAN ACCESS EASEMENT
PUE PUBLIC UTILITY EASEMENT
SDE PRIVATE STORM DRAINAGE EASEMENT
SSE PRIVATE SANITARY SEWER EASEMENT

LEGEND:

TEMPORARY PHASE 1 STORM FACILITY
SEE COMPOSITE UTILITY PLAN FOR ADDITIONAL INFORMATION

TEMPORARY PHASE 1 SECONDARY FIRE ACCESS TO BE REMOVED DURING PHASE 2

D — APPROXIMATE DRIVEWAY LOCATION. LOTS WITHOUT A 'D' DESIGNATION EITHER SHARE ACCESS WITH AN ADJACENT LOT OR ARE ALLEY ACCESS

ATTACHED SINGLE-FAMILY LOT

PARK PLACE CROSSING MASTER PLAN DEVELOPMENT STANDARDS:

LOT DIMENSIONS
- MIN. LOT SIZE
  - SINGLE-FAMILY DETACHED – 4,000 SF
  - SINGLE-FAMILY ATTACHED – 1,800 SF
- MIN. LOT WIDTH AT BUILDING LINE
  - SINGLE-FAMILY DETACHED – 35'
  - SINGLE-FAMILY ATTACHED – 20'
- MIN. LOT DEPTH AT BUILDING LINE – 70'
- MIN. STREET FRONTAGE – 20' UNLESS FLAG LOT

MIN. SETBACKS:
- FRONT – 10', 5' PORCH
- REAR – 20', 15' PORCH, 10' ADU
- GARAGE – 20' FROM ROW, 5' FROM ALLEY
- SIDE – 5' INTERIOR, 7' CORNER

REFER TO THE MASTER PLAN NARRATIVE FOR INFORMATION REGARDING BASE ZONES, DIMENSIONAL STANDARDS, APPLIED ADJUSTMENTS, VARIANCE, AND EXCEPTIONS.

UNIT TYPE AND OPEN SPACE SUMMARY:

PHASE 1:
- SINGLE FAMILY DETACHED: 59
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 0.1± ACRE

PHASE 2:
- SINGLE FAMILY DETACHED: 133
- SINGLE FAMILY ATTACHED: 126
- OPEN SPACE: 6.5± ACRE

PHASE 3:
- SINGLE FAMILY DETACHED: 59
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 0.0± ACRE

PHASE 4:
- SINGLE FAMILY DETACHED: 53
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 7.6± ACRE

PHASE 5:
- SINGLE FAMILY DETACHED: 35
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 1.5± ACRE

PHASE 6:
- SINGLE FAMILY DETACHED: 11
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 0.0± ACRE

TOTAL:
SINGLE FAMILY DETACHED: 350 (74%)
SINGLE FAMILY ATTACHED: 126 (26%)
OPEN SPACE: 15.7± ACRE

CONCEPTUAL FUTURE STREET A DETAIL

SCALE: 1" = 50'

NOTE:

*STREET A CONNECTION TO S HOLCOMB BOULEVARD IS AN INTERIM ACCESS THAT WILL NO LONGER BE NECESSARY UPON THE CONNECTION OF HOLLY LANE TO HOLCOMB BOULEVARD. WHEN THE INTERSECTION OF HOLLY LANE AND HOLCOMB BOULEVARD IS ESTABLISHED, THE NORTH END OF STREET A WILL BE ABANDONED, VACATED, AND OWNERSHIP RETURNED TO THE DECLARANT WITH APPROPRIATE EASEMENTS REMAINING IN PLACE.

PRELIMINARY SITE AND PHASING PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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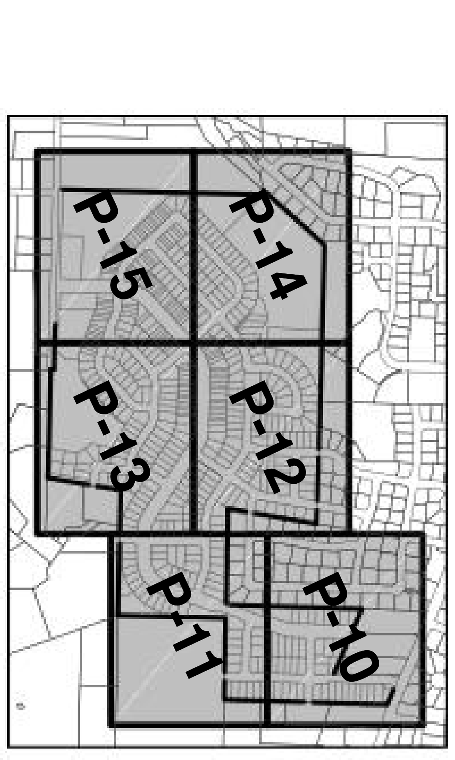
P-08



SCALE: 1" = 150 FEET

ORIGINAL PAGE SIZE: 22" x 34"

UTILITY LEGEND

	EXISTING	PROPOSED
STORM DRAIN LINE	STM	STM
STORM DRAIN CLEAN OUT	○	●
STORM DRAIN CATCH BASIN	□	■
STORM DRAIN AREA DRAIN	□	■
STORM DRAIN MANHOLE	◎	◉
SANITARY SEWER LINE	SAN	SAN
SANITARY SEWER CLEAN OUT	○	●
SANITARY SEWER MANHOLE	○	●
WATER LINE	WAT	WAT
FIRE HYDRANT		
WATER BLOWOFF		
WATER METER		
WATER VALVE		

PRELIMINARY COMPOSITE UTILITY PLAN - OVERALL

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

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P-09

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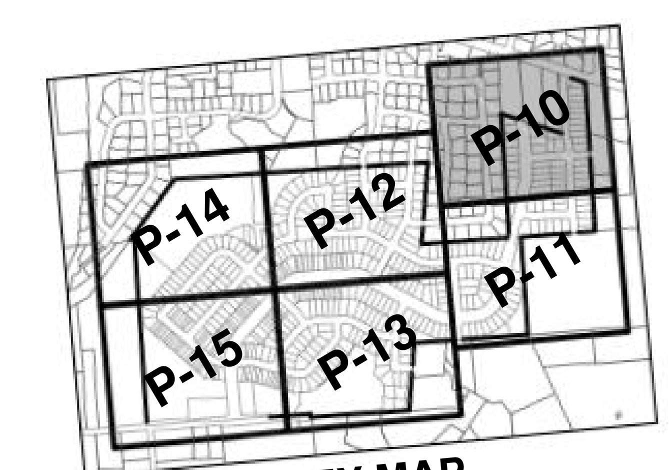
NOTE:

1. UTILITY SERVICES NOT SHOWN ON THIS PLAN. UTILITY SERVICES WILL BE SHOWN ON FUTURE DETAILED DEVELOPMENT PLAN.
2. EXISTING UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBER 20134946, 20132787, 20132791, 20132798, 20132807, 20132485, 20134960, 20134962, 20132485, 20134972, 20176080, 20134975, 20176082, 20134984, 20134988, 20134992, & 20176027. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
3. FIELD WORK WAS CONDUCTED MAY 13–JULY 15, 2020
4. WATER LINES ALONG THE EAST END OF S LIVESAY ROAD WERE DRAWN PER CITY GIS UTILITY MAPS. LOCATIONS ARE APPROXIMATE.
5. PROPERTIES ABOVE ELEVATION CONTOUR 450 FEET ARE REQUIRED TO BE SERVED OFF OF CRW'S WATER DISTRIBUTION SYSTEM FROM THE BARLOW CREST PUMP STATION AND CRW HUNTER HEIGHTS RESERVOIR.

STORMWATER PLANTER AND/OR SWALE LOCATIONS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. DETAILED INFORMATION FOR STORMWATER PLANTERS AND/OR SWALES MAY BE PROVIDED IN FUTURE DETAILED DEVELOPMENT PLAN APPLICATIONS IF THEY ARE NECESSARY FOR STORMWATER MANAGEMENT. IF NECESSARY, STORMWATER PLANTERS AND/OR SWALES WILL BE INSTALLED PER OREGON CITY STANDARD DRAWINGS 619-622, WHERE THEY ARE REQUIRED AND PRACTICAL.

EASEMENT LEGEND:

AE	PRIVATE ACCESS EASEMENT (ALLEY)
PAUE	PUBLIC ACCESS AND UTILITY EASEMENT
PSDE	PUBLIC STORM DRAINAGE EASEMENT
PSSE	PUBLIC SANITARY SEWER EASEMENT
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
PUE	PUBLIC UTILITY EASEMENT
SDE	PRIVATE STORM DRAINAGE EASEMENT
SSE	PRIVATE SANITARY SEWER EASEMENT



KEY MAP

SCALE: 1" = 1000'

N

SCALE: 1" = 50 FEET

ORIGINAL PAGE SIZE: 22" x 34"

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PRELIMINARY COMPOSITE UTILITY PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

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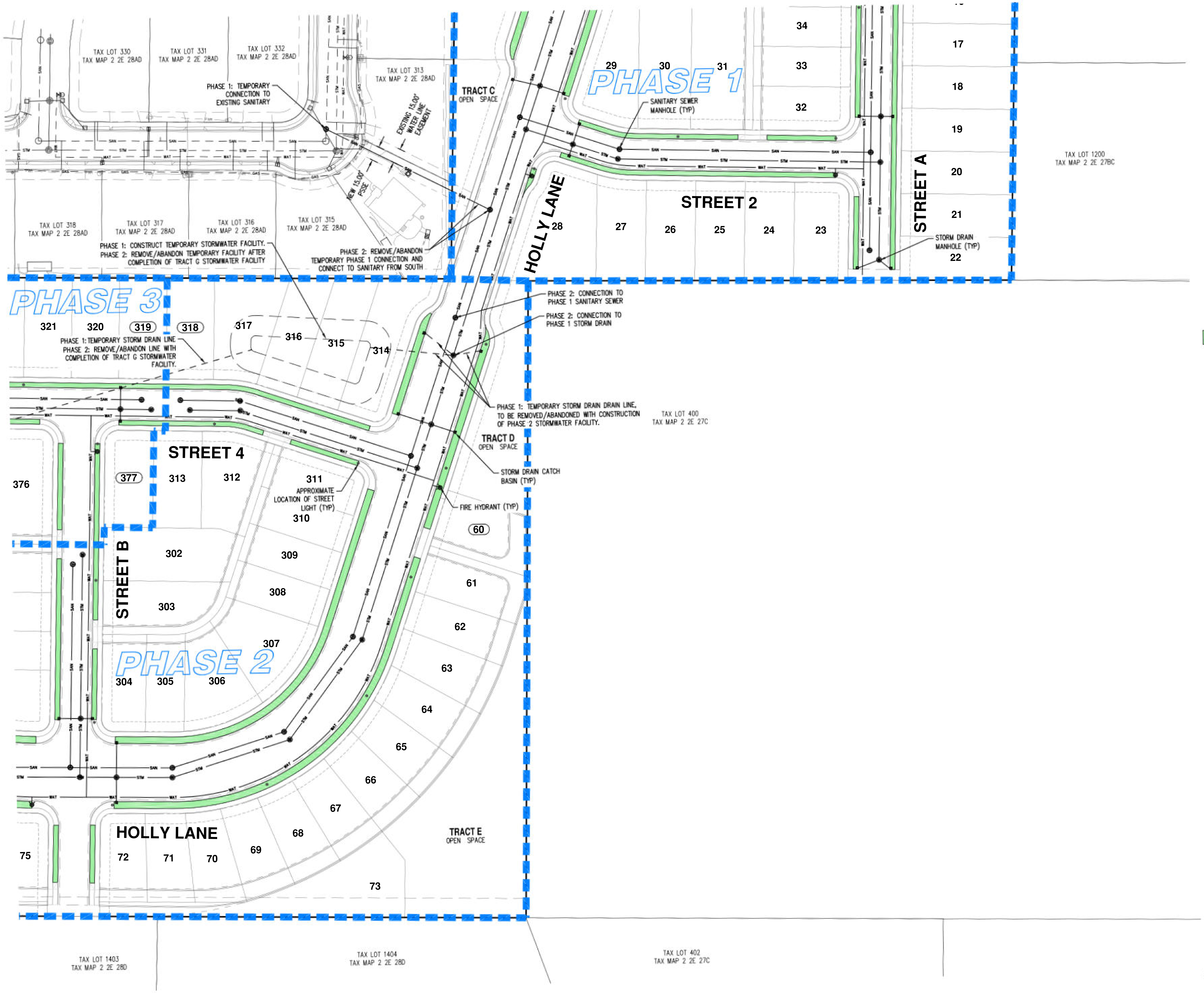
P-10

Item #1.



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EASEMENT LEGEND:

AE	PRIVATE ACCESS EASEMENT (ALLEY)
PAUE	PUBLIC ACCESS AND UTILITY EASEMENT
PSDE	PUBLIC STORM DRAINAGE EASEMENT
PSSE	PUBLIC SANITARY SEWER EASEMENT
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
PUE	PUBLIC UTILITY EASEMENT
SDE	PRIVATE STORM DRAINAGE EASEMENT
SSE	PRIVATE SANITARY SEWER EASEMENT

KEY MAP
SCALE: 1" = 1000'

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PRELIMINARY COMPOSITE UTILITY PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

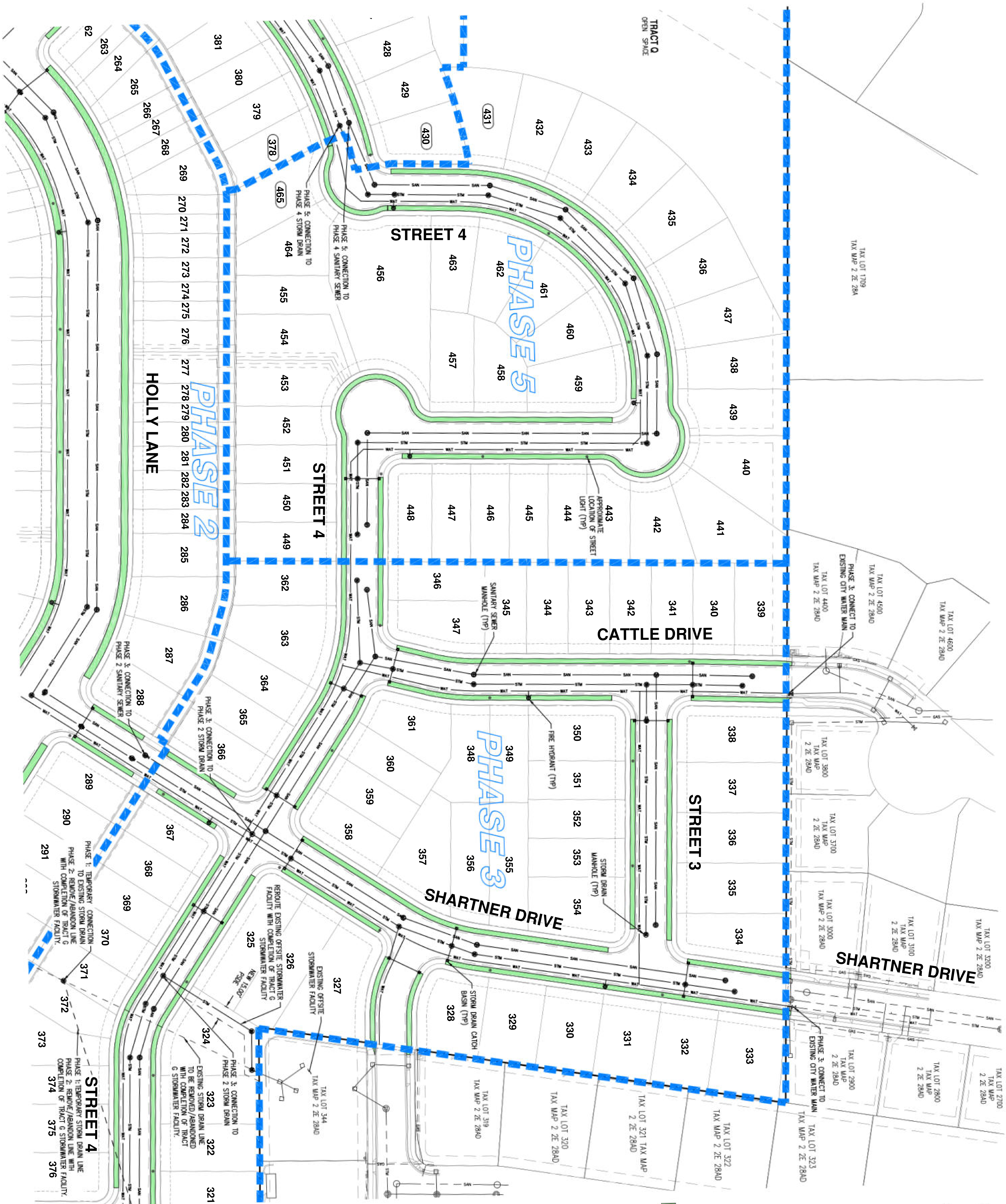
RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
DATE:	03/17/2022
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

P-11

AKS DRAWING FILE: 7404 COMPOSITE UTILITY.DWG | LAYOUT: P-11

AKS DRAWING FILE: 7404 COMPOSITE UTILITY.DWG | LAYOUT: P-12



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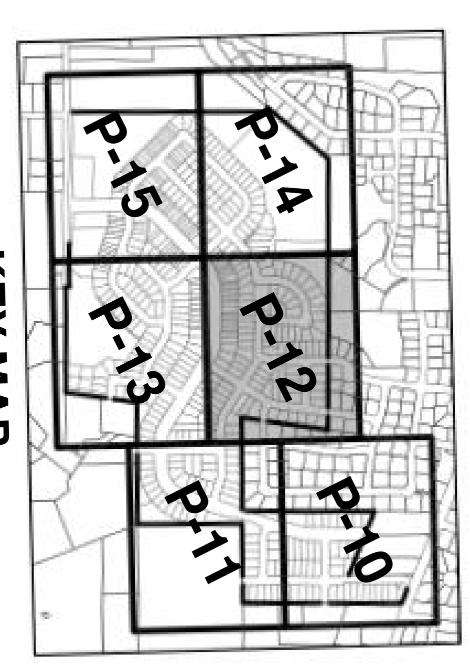

KEY MAP
SCALE: 1" = 1000'

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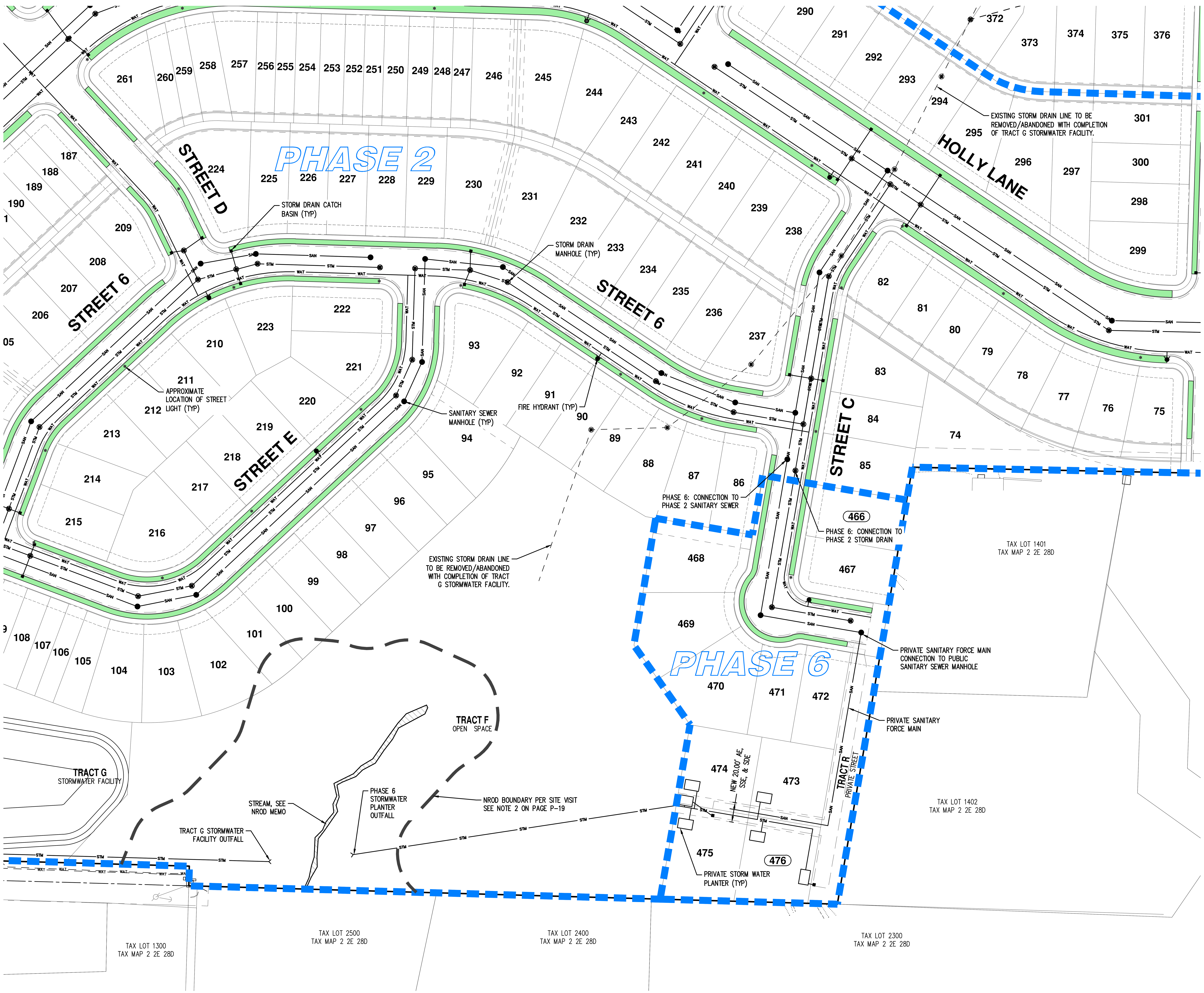
PRELIMINARY COMPOSITE UTILITY PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

REGISTERED PROFESSIONAL ... MONTGOMERY B. HURLEY
RENEWAL DATE: 6/30/23

JOB NUMBER: 7404
DATE: 03/17/2022
DESIGNED BY: CMS
DRAWN BY: NRA
CHECKED BY: CMS

P-12



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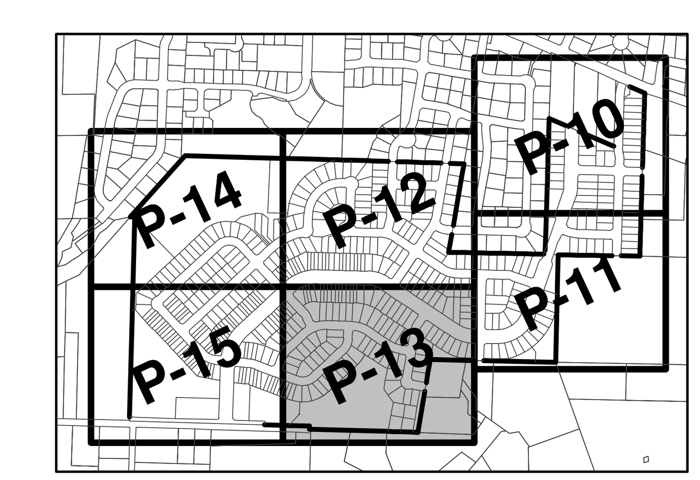

KEY MAP
SCALE: 1" = 1000'

SCALE: 1"= 50 FEET
ORIGINAL PAGE SIZE: 22" x 34"

PRELIMINARY COMPOSITE UTILITY PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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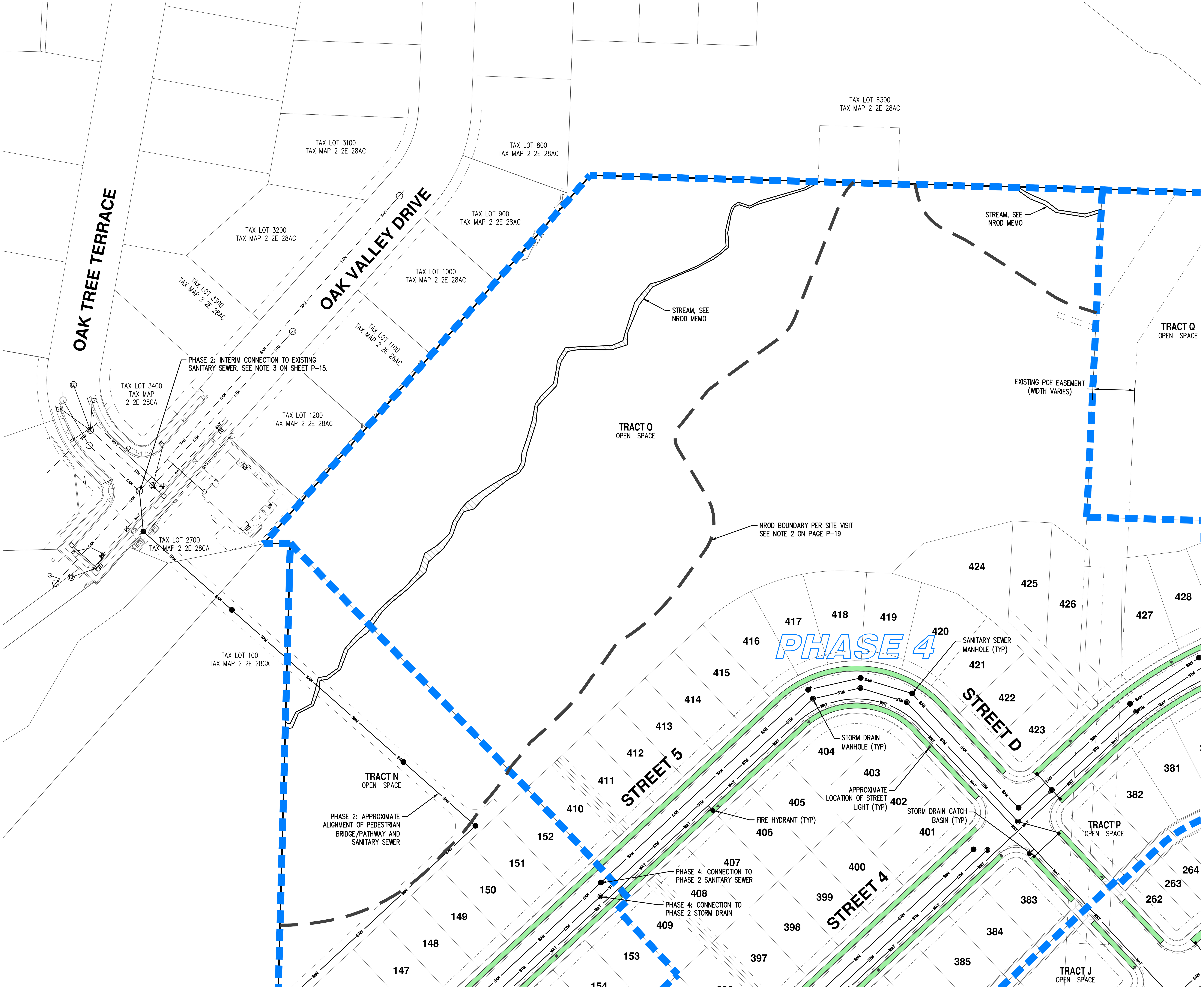
CHECKED BY:	CMS

P-13

Item #1.



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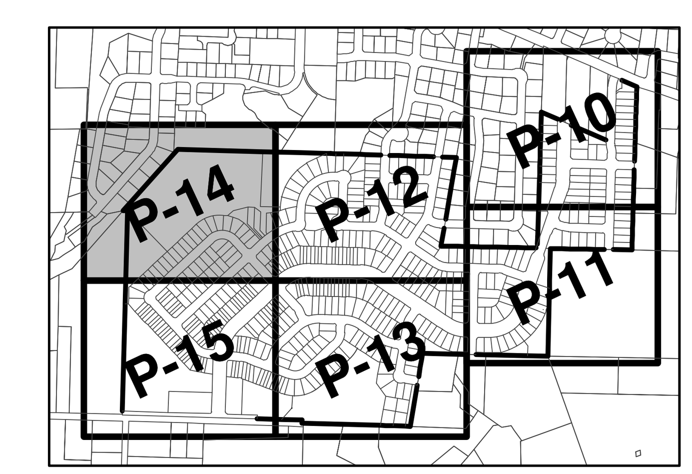

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PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

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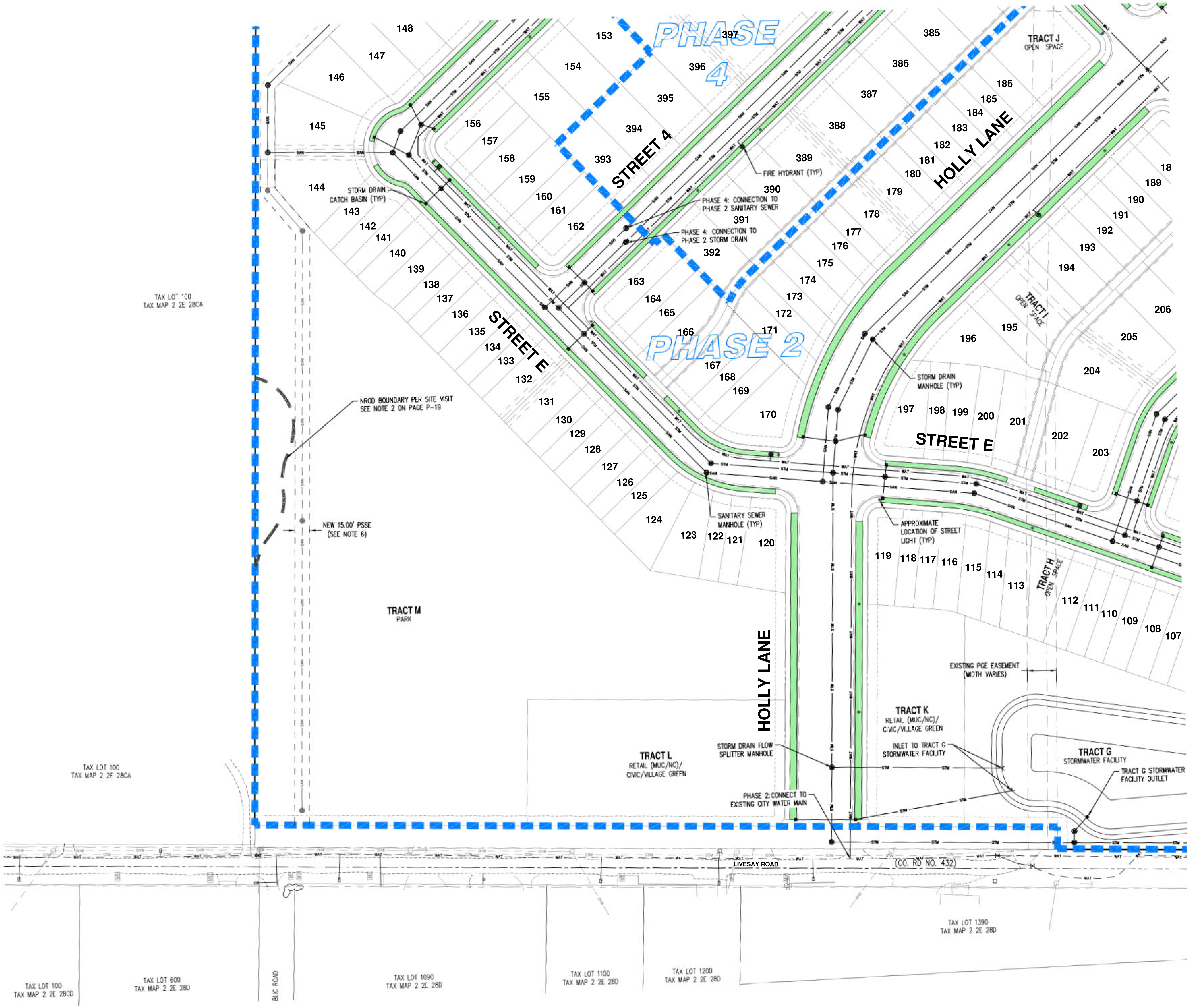
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

P-14

Item #1.

AKS DRAWING FILE: 7404 COMPOSITE UTILITY.DWG | LAYOUT: P-14



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6. APPROXIMATE FUTURE ROUTE FOR SANITARY SEWER CONNECTION TO REDLAND ROAD PER THE PARK PLACE CONCEPT PLAN. UPON INFRASTRUCTURE AVAILABILITY, THE INTERIM OAK VALLEY DRIVE CONNECTION WILL BE DISCONNECTED, AND SANITARY SEWER REDIRECTED TO THIS FUTURE SEWER LINE.

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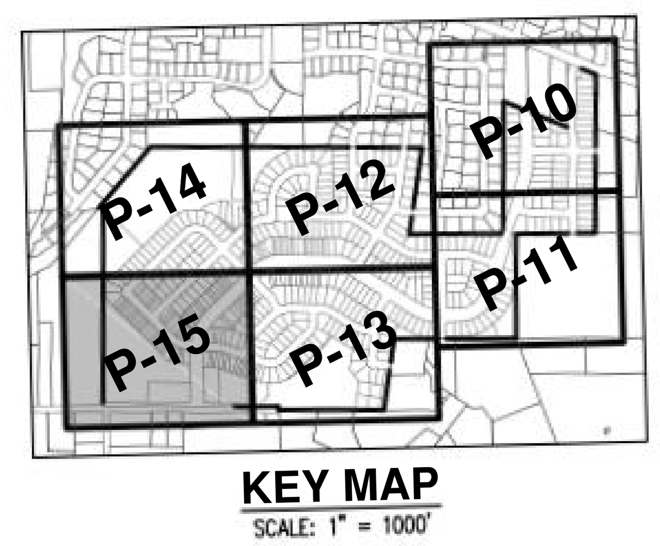

KEY MAP
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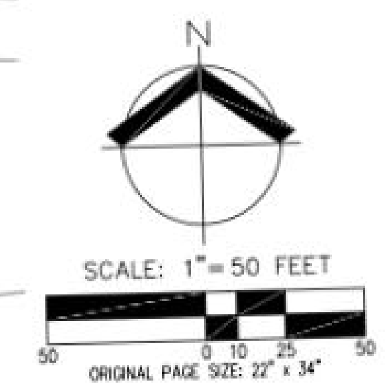

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PRELIMINARY COMPOSITE UTILITY PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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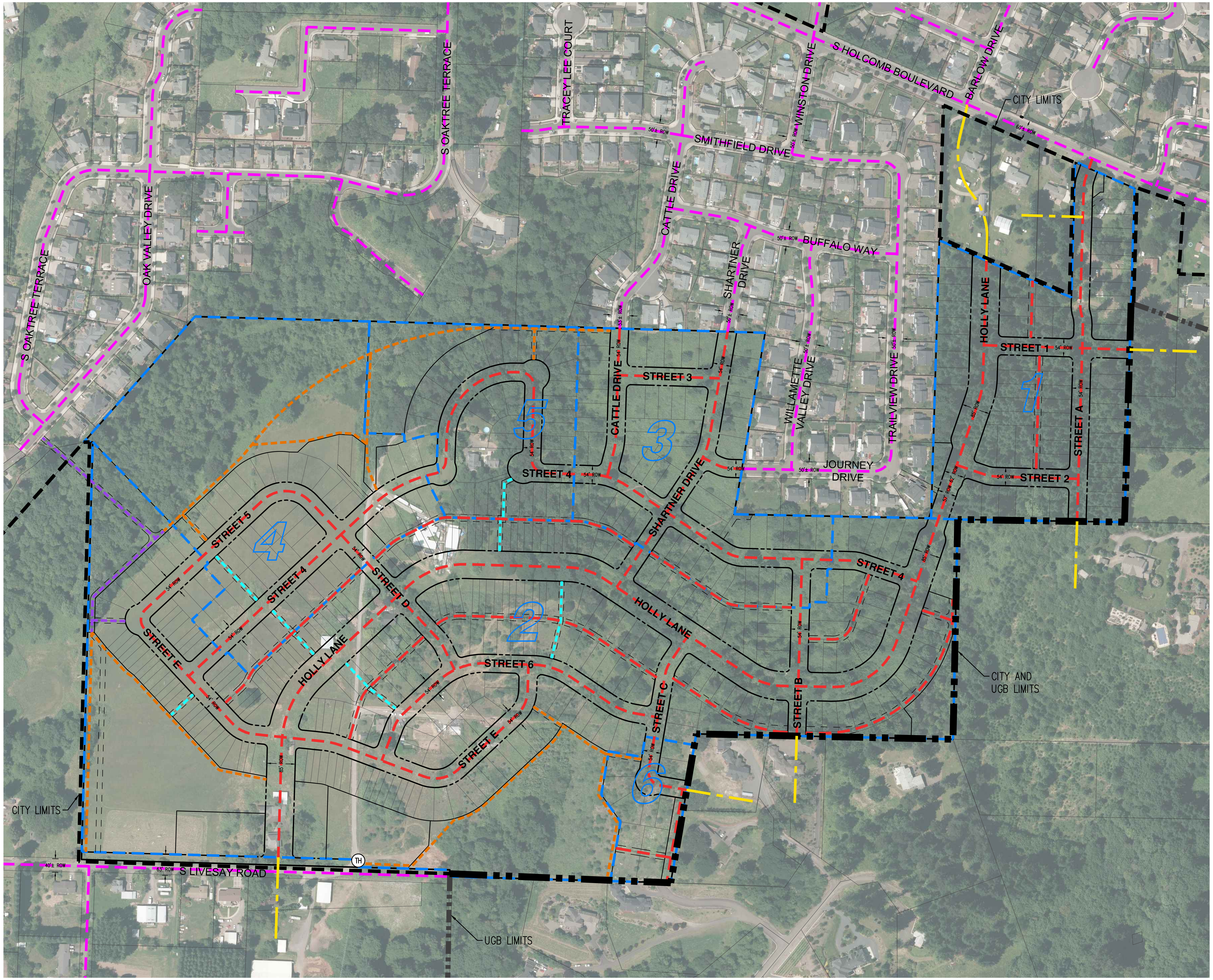
P-15



LEGEND:

- VEHICULAR, PEDESTRIAN, AND BICYCLE ACCESS STREETS, PRIVATE STREETS, AND ALLEYS
- PAVED PEDESTRIAN ACCESSWAY
- SOFT SURFACE TRAIL
- PAVED TRAIL
- EXISTING OFF-SITE STREETS
- FUTURE OFF-SITE STREETS
- TH TRAILHEAD, SEE SHEET P-11

NOTES:

1. POTENTIAL OFF-SITE FUTURE STREETS ARE FOR ILLUSTRATIVE PURPOSES ONLY. THESE AREAS ARE NOT INCLUDED IN THIS GENERAL DEVELOPMENT PLAN AND DEVELOPMENT OF THESE OFF-SITE PROPERTIES IS NOT INCLUDED WITH THIS PROJECT.
2. STREETS AS SHOWN ARE NOT BINDING ON OFF-SITE PROPERTIES.
3. TRAIL AND PEDESTRIAN BRIDGE ALIGNMENTS ARE PRELIMINARY AND MAY BE ADJUSTED WITH FUTURE DETAILED DEVELOPMENT PLANS.

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

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PRELIMINARY NEIGHBORHOOD CIRCULATION PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
DATE:	03/17/2022
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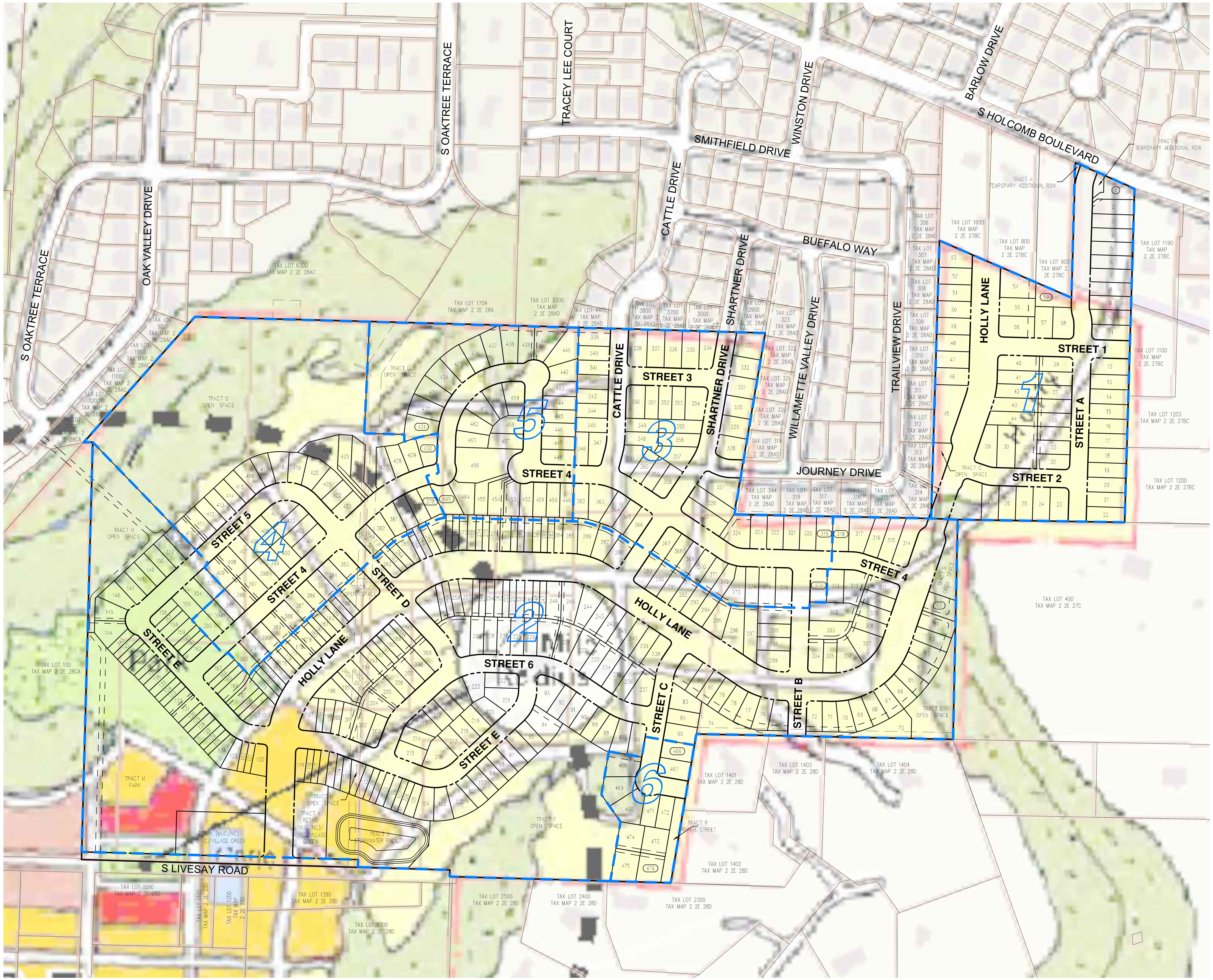
DRAWN BY:	NRA
CHECKED BY:	CMS

P-16

AKS DRAWING FILE: 7404 CIRCULATION.DWG | LAYOUT: P-16



NOTE:

CONCEPT PLAN OVERLAY IS PER OREGON CITY WEBMAPS.

OREGON CITY PARK PLACE CONCEPT PLAN OVERLAY LEGEND:

- LOW/MEDIUM DENSITY RESIDENTIAL
- MEDIUM/HIGH DENSITY RESIDENTIAL
- COMMUNITY PARK
- CONSTRAINED LAND (OPEN SPACE)
- RETAIL (MUC/NC)
- CIVIC

PARK PLACE CROSSING MASTER PLAN AREA BREAKDOWN (ACRES):

TOTAL SITE AREA:	±91.7
OPEN SPACE:	±15.7
STORM FACILITY:	±1.2
RETAIL (MUC/NC)/ CIVIC/VILLAGE GREEN:	±1.3
COMMUNITY PARK:	±4.4*
REMAINING AREA:	±69.1

OREGON CITY PARK PLACE CONCEPT PLAN AREA BREAKDOWN (ACRES):

TOTAL SITE AREA:	±91.7
OPEN SPACE:	±11.4
RETAIL (MUC/NC)/ CIVIC/VILLAGE GREEN:	±1.3
COMMUNITY PARK:	±4.1*
REMAINING AREA:	±74.9

NOTE:

*PER DISCUSSIONS WITH CITY STAFF, THE PARK PLACE CROSSING MASTER PLAN IS EXPECTED TO PROVIDE A PROPORTIONATE PERCENTAGE OF PARK LAND FOR ITS RESIDENTS. APPROXIMATELY 51 PERCENT OF THE PLANNED DWELLING UNITS FOR THE PARK PLACE CONCEPT PLAN AREA NORTH VILLAGE ARE INCLUDED WITHIN THIS MASTER PLAN (±476 PLANNED PARK PLACE CROSSING UNITS/937 TOTAL NORTH VILLAGE UNITS). THE NEIGHBORHOOD PARK REPRESENTS ±8.0 ACRES ON THE PARK PLACE CONCEPT PLAN; THEREFORE, PARK PLACE CROSSING WOULD BE EXPECTED TO CONTRIBUTE PROPORTIONALLY ±51 PERCENT OF THE NEEDED AREA, OR ±4.1 ACRES. THIS APPLICATION ANTICIPATES THAT ±4.4 ACRES WITHIN THE PARK PLACE CROSSING MASTER PLAN AREA WILL BE DEDICATED FOR THE PARK LAND. TECHNICAL DETAILS FOR HOW THE PARK LAND WILL BE REQUIRED/TRANSFERRED ARE BEING COORDINATED WITH THE CITY OF OREGON CITY PARKS DEPARTMENT.

LAYOUT SUMMARY:

SINGLE-FAMILY ATTACHED DWELLING UNITS: 126
SINGLE-FAMILY DETACHED DWELLING UNITS: 350
TOTAL DWELLING UNITS: 476

PROPORTIONAL SHARE = 476/937^ = 0.51 = 51%

^937 IS THE ANTICIPATED TOTAL DWELLING UNITS IN THE NORTH VILLAGE PER THE PARK PLACE CONCEPT PLAN

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

AKS DRAWING FILE: 7404 CONCEPT.DWG | LAYOUT: P-17

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CITY OF OREGON CITY PARK PLACE CONCEPT PLAN OVERLAY MAP

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

PRELIMINARY
NOT FOR CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER
OREGON
JEFFERY B. HURLEY
RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
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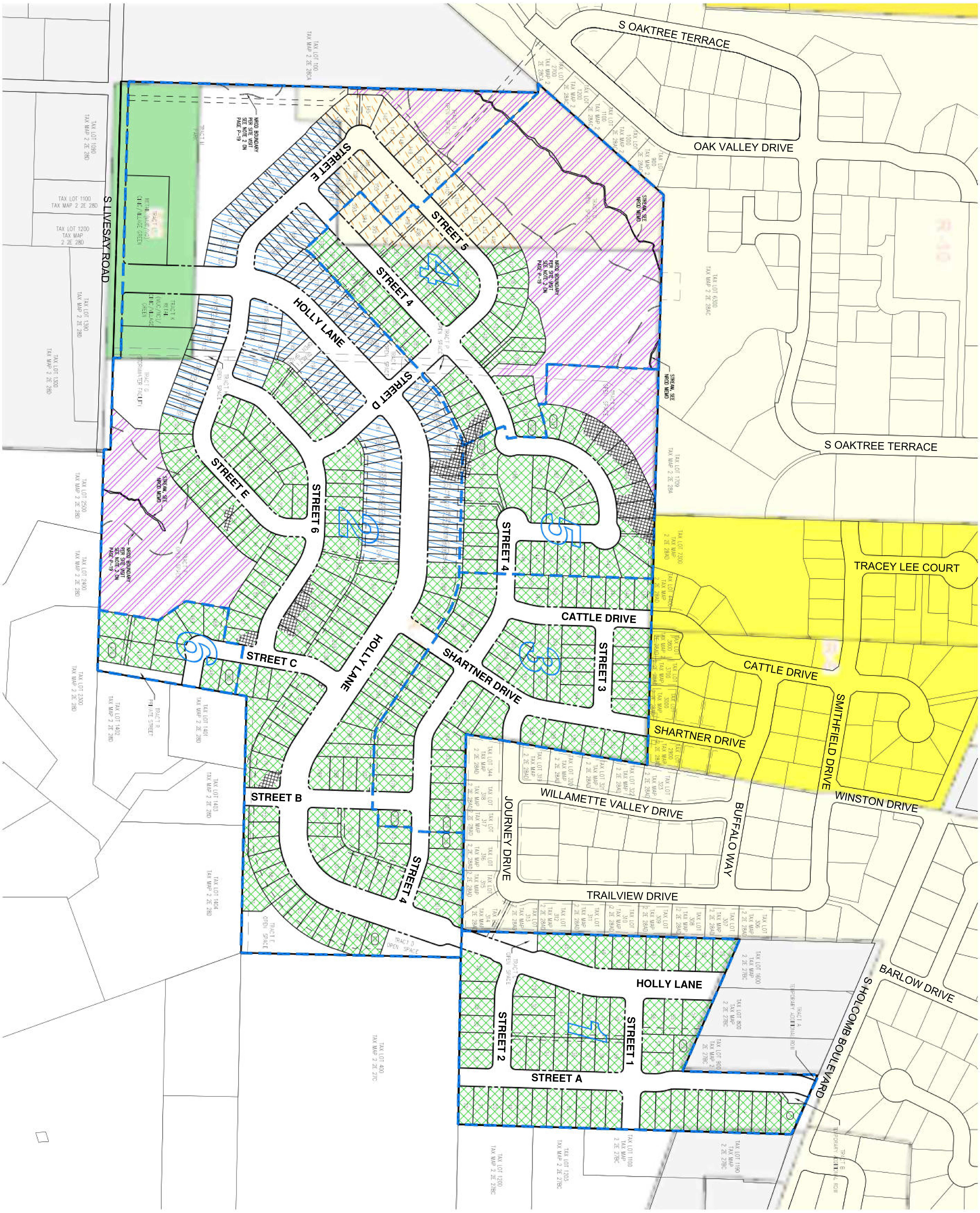
P-17



NOTE:

1. ZONING OVERLAY AND GEOLOGIC HAZARD AREAS ARE PER OREGON CITY WEBMAPS.
2. PORTIONS OF THE MAPPED GEOLOGIC HAZARD – STEEP SLOPE AREAS WITHIN THE PARK PLACE CROSSING MASTER PLAN AREA PER OREGON CITY WEBMAPS ARE A RESULT OF MAN-MADE ACTIVITIES (I.E. HOUSES, DRIVEWAYS, ROADS, ETC.).

ZONING OVERLAY LEGEND:

- R-5
- R-6
- R-10
- NC

DENSITY STANDARDS:

R-5
- MINIMUM NET DENSITY – 7.0 DU/ACRE
- MAXIMUM NET DENSITY – 8.7 DU/ACRE (DETACHED)
- MAXIMUM NET DENSITY – 12.4 DU/ACRE (ATTACHED)

R-10
- MINIMUM NET DENSITY – 3.5 DU/ACRE
- MAXIMUM NET DENSITY – 4.4 DU/ACRE

CITY GEOLOGIC HAZARD OVERLAY AREA (SLOPES GREATER THAN 25%)
- MAXIMUM NET DENSITY – 2 DU/ACRE

DENSITY AREA SUMMARY:

R-5 ZONE DETACHED HOME AREA:	36.7± ACRE
R-5 ZONE ATTACHED HOME AREA:	6.9± ACRE
R-10 ZONE AREA:	2.8± ACRE
NROD CONSERVATION TRACT AREA:	14.3± ACRE
GEOLOGIC HAZARD AREA WITHIN DEVELOPABLE AREA: (SLOPES GREATER THAN 25%)	1.3± ACRE
RIGHT OF WAY:	21.1± ACRE

DENSITY CALCULATIONS

NET DEVELOPABLE AREA:
36.7 + 6.9 + 2.8 + 1.3 = 47.7 ACRE

COMPOSITE MAXIMUM RESIDENTIAL DENSITY:
((36.7/47.7)*8.7) + ((6.9/47.7)*12.4) + ((2.8/47.7)*4.4) + ((1.3/47.7)*2.0) = 8.8 DU/ACRE

17.65.070.C.4 – INCREASE IN ALLOWED MAXIMUM RESIDENTIAL DENSITY OF UP TO TEN PERCENT.
8.8*110% = 9.7 DU/ACRE

17.49.240 – DENSITY TRANSFER:
14.3*(1/3) = 4.8 ACRE
47.7 + 4.8 = 52.5 ACRE

MAXIMUM DWELLING UNITS:
9.7*52.5 = 509 DU

COMPOSITE MINIMUM RESIDENTIAL DENSITY:
((36.7/47.7)*7.0) + ((6.9/47.7)*7.0) + ((2.8/47.7)*3.5) + ((1.3/47.7)*2.0) = 6.7 DU/ACRE

MINIMUM DWELLING UNITS:
6.7*47.7 = 320 DU

ACHIEVED DENSITY:
476/52.5 = 9.1 DU/ACRE

SCALE: 1"= 150 FEET
0 30 75 150
ORIGINAL PAGE SIZE: 22" x 34"

CITY OF OREGON CITY ZONING OVERLAY MAP AND DENSITY ANALYSIS
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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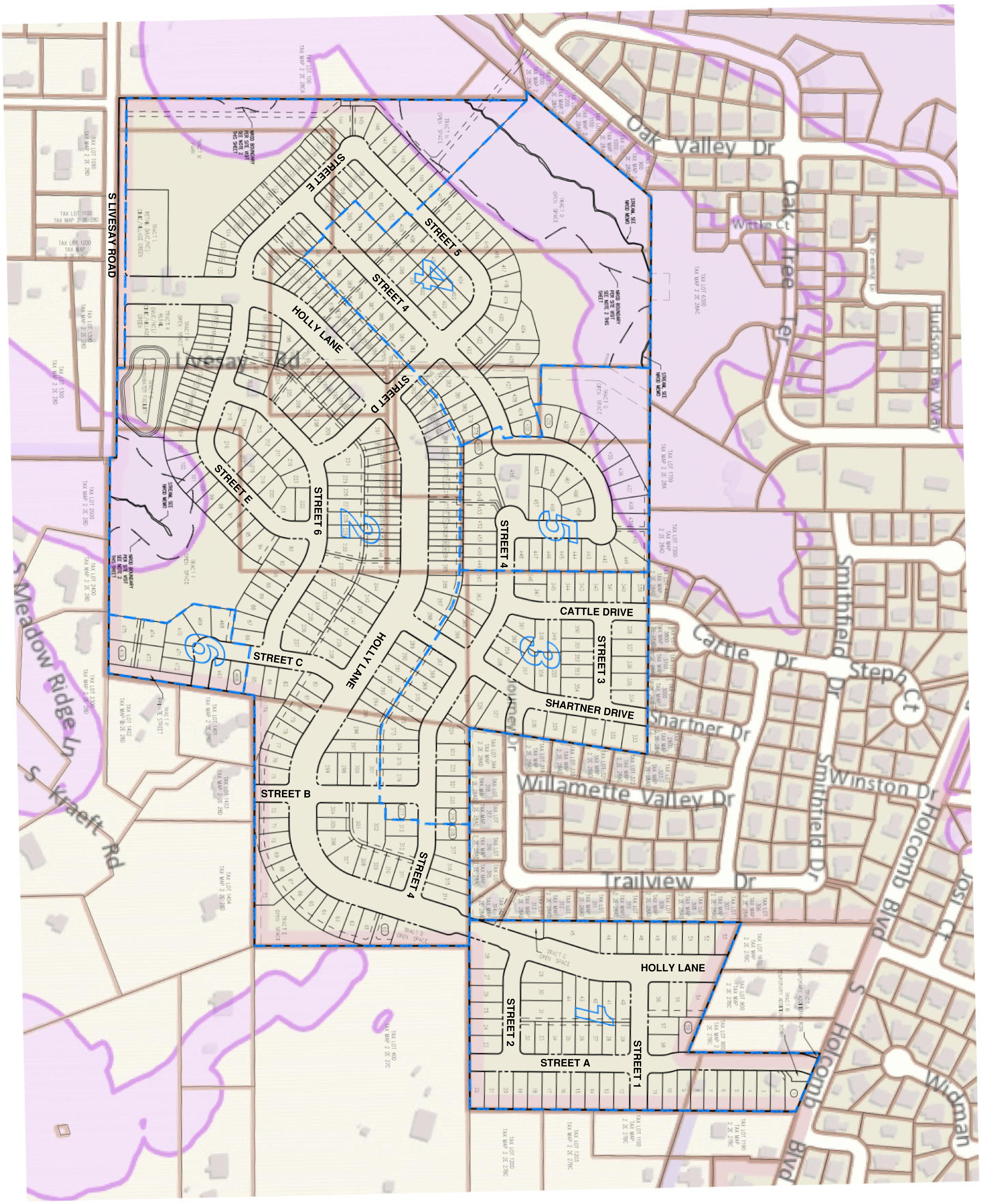
P-18

AKS DRAWING FILE: 7404 NROD.DWG | LAYOUT: P-19



NOTES:

1. NROD OVERLAY IS PER OREGON CITY WEBMAPS.
2. NROD BOUNDARY PER SITE VISIT WILL BE VERIFIED AT THE TIME OF EACH RESPECTIVE PHASES' DETAILED DEVELOPMENT APPLICATIONS. SEE ADDITIONAL INFO IN APPENDIX G OF THIS SUBMITTAL, NATURAL RESOURCES OVERLAY DISTRICT MEMORANDUM.

NROD OVERLAY LEGEND:

NROD – NATURAL RESOURCE OVERLAY DISTRICT

SCALE: 1" = 150 FEET

ORIGINAL PAGE SIZE: 22" X 34"

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
DATE:	03/17/2022
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

CITY OF OREGON CITY NATURAL RESOURCE OVERLAY DISTRICT MAP

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

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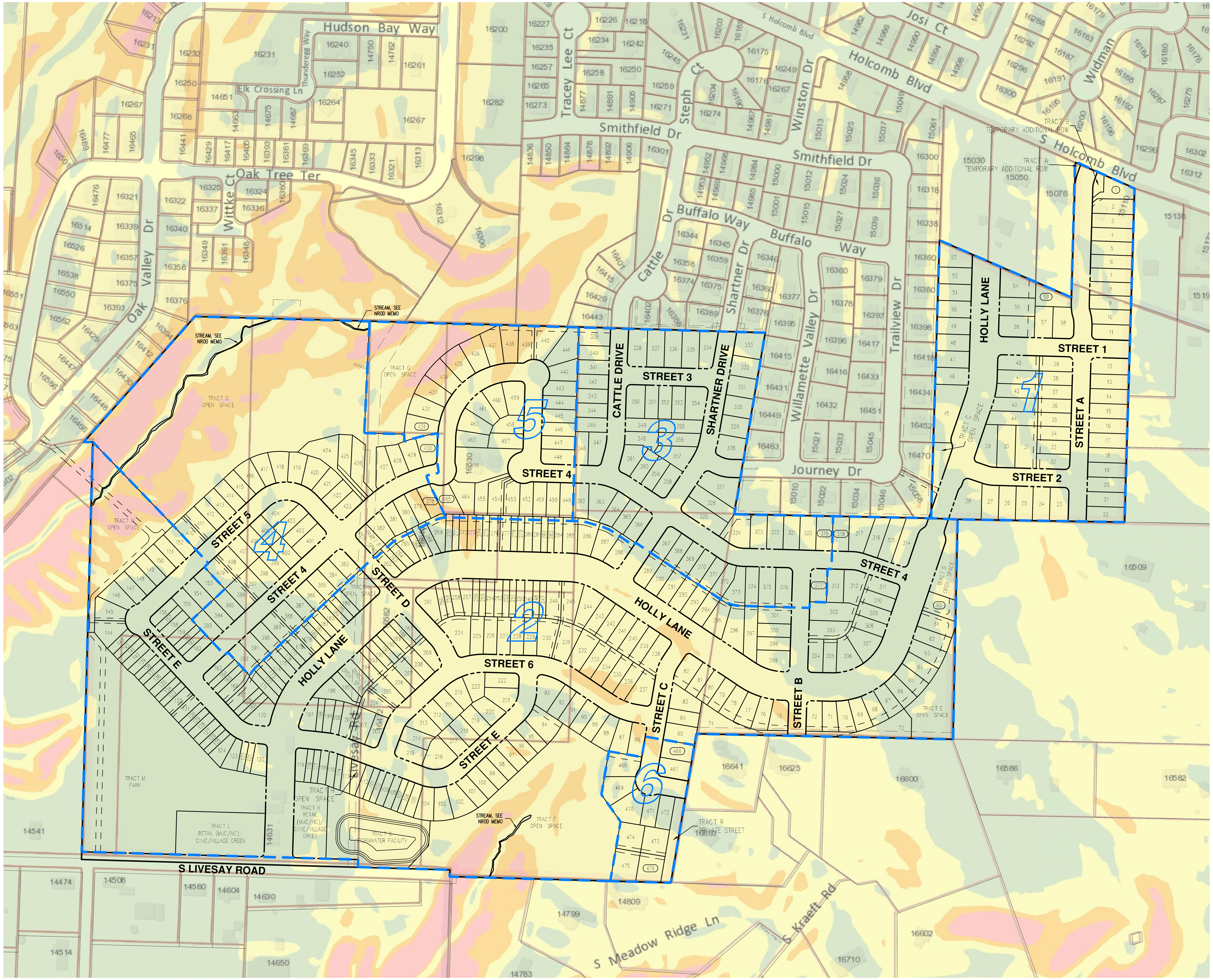
P-19



NOTE:

1. GEOLOGIC HAZARD OVERLAY IS PER OREGON CITY WEBMAPS
2. GEOLOGIC HAZARDS WILL BE VERIFIED AT THE TIME OF EACH RESPECTIVE PHASES' DETAILED DEVELOPMENT PLAN APPLICATION. NO GEOLOGIC HAZARD REVIEW APPLICATION OR CHECKLIST IS INCLUDED AT THIS TIME.
3. PORTIONS OF THE MAPPED GEOLOGIC HAZARD – STEEP SLOPE AREAS WITHIN THE PARK PLACE CROSSING MASTER PLAN AREA PER OREGON CITY WEBMAPS ARE A RESULT OF MAN-MADE ACTIVITIES (I.E. HOUSES, DRIVEWAYS, ROADS, ETC.).

SLOPE CATEGORIES LEGEND:

- SLOPES 0–10%
- SLOPES 10–25%
- SLOPES 25–35%
- SLOPES >35%

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PRELIMINARY GEOLOGIC HAZARD SLOPE ANALYSIS
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

REGISTERED PROFESSIONAL ENGINEER
OREGON
MONTGOMERY B. HURLEY
PRELIMINARY NOT FOR CONSTRUCTION
RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
DATE:	03/17/2022
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

P-20

AKS DRAWING FILE: 7404 SLOPES.DWG | LAYOUT: P-20

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VANCOUVER, WA
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

Date: 12/8/2021
To: Oregon City Planning Division
From: Stacey Reed, PWS, Senior Wetland Scientist
Project Name: Park Place Crossing General Development Plan / Master Plan
AKS Job No.: 7404
Project Site: Clackamas County Assessor's Map 2 2E 27BC Tax Lots 1000, 2000; 2 2E 28D; Clackamas County Assessor's Map Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 500, 502, 3700, 3701

Subject: General Development Plan / Master Plan NROD Analysis

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Introduction

This memo is in response to the Park Place Crossing General Development Plan / Master Plan, located north and east of S Livesay Road and south of S Holcomb Road in Oregon City, Clackamas County, Oregon; Tax Lots 1000, 2000 of Clackamas County Assessor's Map 2 2E 27BC and Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 401, 500, 502, 3700, and 3701 of Clackamas County Assessor's Map 2 2E 28D. Tax Lots 200, 300, 301, 303, and 502 are not currently controlled by the applicant and therefore are not addressed in this NROD analysis memo. Additional future site visits are necessary to evaluate these tax lots for potential protected water features. The NROD study area boundary for this project site is depicted in Figures 1 through 5.

According to Oregon City's Natural Resource Overlay District (NROD) map, NROD associated with Protected Water Features extends across the northwestern portion of the site, as well as extending slightly into the southwestern and eastern corners of the project site. Our site visit determined Perennial and Intermittent Streams (referred to as Waters 1, 2, and 3) were present within the NROD areas, requiring vegetated corridor buffers.

Three isolated wetlands (referred to as Wetlands A-C) and Wetland D (which extends off-site to the southeast) were delineated on the project site. None of the wetlands delineated on the project site are mapped within an NROD boundary; therefore, according to Chapter 17.49.035 of Oregon City Municipal Code (OCMC), Chapter 17.49 NROD review does not apply to these wetlands. Wetlands A-D are likely to be regulated by the Oregon Department of State Lands (DSL) requiring state authorization for impact.

The preliminary site plan avoids impacts to Protected Water Features, only proposing minor encroachment into the vegetated corridor (NROD) for paved pedestrian paths, including a bridge crossing, and for the development of two residential lots. Vegetated corridor encroachment will require an NROD Permit and Compensatory Mitigation in accordance with Chapter 17.49.180 of OCMC. On-site NROD enhancement mitigation opportunity exits. The project protects Goal 5 inventoried Protected Water Features.

This memo has been prepared to address Oregon City Code of Ordinances requirements listed under Chapter 17.65 Master Plan and Planned Unit Developments. The applicant is not requesting an NROD boundary verification or an NROD permit under this submittal. A separate future NROD permit application will be submitted to address the prohibited uses within NROD. The applicant will obtain necessary approval from Oregon Department of State Lands (DSL) and/ or the U.S. Army Corps of Engineers (USACE) prior to impact to jurisdictional wetland or water impacts.

Background Mapping and Existing Site Conditions

The western portion of the study area consists of an open field, historically used for grazing. The pasture is dominated by tall fescue (*Schedonorus arundinaceus*, FAC), sweet vernal grass (*Anthoxanthum odoratum*, FACU), common velvet grass (*Holcus lanatus*, FAC), Canadian thistle (*Cirsium arvense* FAC), yellow glandweed (*Parentucellia viscosa*, FAC), and vetch (*Vicia* species, FAC). Scattered patches of Himalayan blackberry (*Rubus armeniacus*, FAC), English hawthorn (*Crataegus monogyna*, FAC), and Oregon white oak (*Quercus garryana*, FACU*)* are present.

The riparian corridor adjacent to Water 1 (tributary to Tour Creek) is dominated by Douglas-fir (*Pseudotsuga menziesii*, FACU), big-leaf maple (*Acer macrophylum*, FACU), red alder (*Alnus rubra*, FAC), Himalayan blackberry, salmon raspberry (*Rubus spectabilis*, FAC), pineland sword fern (*Polystichum munitum*, FACU), bentgrass (*Agrostis* species, FAC), piggyback plant (*Tolmiea menziesii*, FAC), Pacific waterleaf (*Hydrophyllum tenuipes*, FAC), and white insideout flower (*Vancouveria hexandra*, UPL).

The central and eastern portions of the site are heavily dominated by Himalayan blackberry thickets. Scattered patches of Douglas-fir, big-leaf maple, Oregon white oak, English hawthorn, and beaked hazelnut (*Corylus cornuta*, FACU) are present.

The study area is generally undeveloped, except for residences and associated detached buildings in the southern and northeastern portion of the study area. The surrounding land-uses consist of a residential subdivision to the north and rural residential land use to the south. A stormwater drainage easement extends through the center of the site, which conveys stormwater discharge from the residential subdivision to the north into Water 2 delineated under this study.

The following soil units are mapped within the study area, according to the Natural Resources Conservation Service (NRCS) Clackamas County Area Soil Survey Map (Figure 3). According to the NRCS Clackamas County hydric soils list, none of the soils within the study area are mapped as being hydric.

- Helvetia silt loam, (Unit 37C), 8% to 15% slopes—Non-hydric
- Laurelwood silt loam, (Unit 54B), 3% to 8% slopes—Non-hydric
- Saum silt loam, (Unit 78B), 3% to 8% slopes—Non-hydric
- Saum silt loam, (Unit 78C), 8% to 15% slopes—Non-hydric
- Woodburn silt loam, (Unit 91B), 3% to 8% slopes—Non-hydric
- Woodburn silt loam, (Unit 91C), 8% to 15% slopes—Non-hydric
- Xerochrepts and Haploxerolls, (Unit 92F), very steep—Non-hydric

According to Oregon City's 1999 Local Wetland Inventory (LWI) map, only a portion of the study area is within the approved LWI boundary. Within the LWI study area boundary, a stream and wetland feature are mapped in the northwest portion of the site (Figure 4). This feature is in the vicinity of Water 1 delineated in this study.

According to the City's 2009 NROD map, a Title 3 wetland (NROD feature) is mapped on the adjacent property to the north, in the vicinity of the LWI-mapped off-site wetland (Figure 5).

Delineation Site Visit Results

AKS Senior Wetland Scientist Stacey Reed, PWS and Natural Resource Specialist Sonya Templeton conducted site visits on May 28, June 2, and August 5, 2020 to delineate Protected Water Features (wetlands and/or waters) within the project site and assess whether Protected Water Features were present immediately off-site to determine if a vegetated corridor buffer should extend onto the project site.

The methodology used to determine the presence of wetlands followed the Corps' *Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*. Soils, vegetation, and indicators of hydrology were recorded at sample plot locations on a standardized wetland determination data form to document conditions. The on-site ordinary high water mark (OHWM) of features with defined bed and banks were delineated based on physical field indicators in accordance with Oregon Administrative Rule (OAR) 141-085-0515(3).

A wetland and waters delineation report in accordance with OAR 141-090-0030 and OAR-141-090-0035 (1-17) was prepared by AKS to describe the results of a wetland and waters delineation. The delineation report was submitted to DSL and is currently under review per DSL File WD 2021-0311. The professional land surveyed wetland and water boundaries are shown on attached Figure 6.

Summary of Features

Wetlands

The boundary of three palustrine emergent (PEM) isolated wetlands (referred to as Wetlands A-C on attached Figure 6) were delineated on the site. Wetlands A-C are located within NRCS mapped non-hydric soils and appear to be artificially created from former land uses. Wetland A is a small artificially created pond, likely a former irrigation or stock watering pond. Wetland B is an isolated wetland dominated by non-native grasses within a hillslope, likely created from disrupted tiling associated from many years of grazing. Wetland C is an excavated feature that is contained within an artificial berm likely created by old dirt logging roads. Wetland D is a PEM wetland situated on a subtle slope in the southeastern portion of the site. Wetland D appears to be fed by a natural spring. Wetland conditions extend off-site to the southeast.

Waters

Water 1 is a perennial tributary to Tour Creek was delineated in the northwestern portion of the site. The tributary enters the site in the north and flows in a southwesterly direction through the site, continuing off-site to the southwest until its confluence with Tour Creek, several hundred feet to the southwest. Within the study area, the channel bed averages approximately 3-6 feet wide with an average of 2-foot-tall banks, which were incised in some portions. An average of approximately 4-6 inches deep continuous flow was present in the channel during the May 2020 site visits.

Water 2 was delineated in the southern portion of the site and is an intermittent tributary to Abernethy Creek. Water 2 originates on-site from a culvert discharging stormwater from upslope development. The upper extent of the drainage was determined to have an ephemeral flow regime (lacks a well-defined contiguous bed and bank), developing intermittent flow (contains groundwater input with well-defined bed and bank) further downstream. The upstream ephemeral portion of the channel lacked flow during our May 2020 site visits, developing approximately 2-inch-deep flow further downstream. Within the study area Water 2 channel bed is approximately 2-3 feet wide with an average of 1-foot-tall banks. Water 2 continues off-site to the south.

Water 3 is an ephemeral headwater drainage delineated in the southwestern portion of the site. This feature lacked a well-defined OHWM and flow during the May 2020 site visits. Water 3 was approximately 1-2 feet wide, with 6 inches tall banks, and consisted of a silt loam dominated channel bed substrate.

Extent of On-Site NROD

Two Protected Water Features were delineated on the project site. Water 1 (non-fish bearing perennial tributary to Tour Creek) contains adjacent slopes exceeding 25% for more than 150 feet, requiring the vegetated corridor to extend 200 feet from the OHWM/bankfull flow. Water 2 (intermittent stream draining more than 100 acres) also has adjacent slopes exceeding 25% for more than 150 feet, requiring a 200-foot-wide vegetated corridor buffer.

The on-site portions of Water 3 contained an ephemeral flow regime, which does not meet the definition of a Protected Water Feature (per Chapter 17.04.970 of OCMC not a perennial or intermittent stream); therefore, Water 3 may not require a vegetated corridor buffer. A future NROD Permit application can be submitted to amend the NROD map through a Type I or Type II NROD boundary verification. For purposes of this General Development Plan / Master Plan submittal, a 50-foot-wide vegetated corridor has been applied to Water 3. The extent of the on-site vegetated corridor is shown on attached Figure 6.

Preliminary General Development / Master Plan NROD Impacts

The project avoids impacts to Protected Water Features. Permanent encroachment within vegetated corridor adjacent to Water 1 is planned in Phase 4 for a paved pedestrian path and bridge crossing. The paved pedestrian path will be subject to design standards listed under OCMC 17.49.150 for paved pedestrian paths, requiring a NROD Permit and mitigation in accordance with OCMC 17.49.180. It is anticipated the bridge footings will not require removal or fill within Water 1.

Unavoidable encroachment for two residential lots associated with Phase 2 may require impact into the outer edges of the vegetated corridor/NROD, requiring an NROD Permit and mitigation. A potential soft surface pedestrian path may encroach into the outer edges of the vegetated corridor associated with the intermittent stream. It is likely the soft surface trail can be designed to meet the exemption criteria listed in Section 17.49.080.F of City code. If the trail cannot meet the exemption criteria, compensatory mitigation will be required. The General Development / Master Plan includes protection of remaining NROD within open space tracts.

Preliminary General Development / Master Plan NROD Mitigation Plan

Mitigation in accordance with OCMC 17.49.180, consisting of on-site enhancement at 2:1 enhancement to impact ratio is required for portions of the pedestrian trail and lots within vegetated corridor. On-site mitigation opportunity exists within remaining vegetated corridor (NROD) adjacent to both Waters 1 and 2. Required tree and shrub enhancement planting shall be conducted in accordance with Mitigation Option 2, requiring a rate of 5 trees and 25 shrubs to be planted every 500 square feet of disturbance area. Portions of the remaining on-site vegetated corridor lack native tree canopy and are dominated by invasive Himalayan blackberry. Enhancement consisting of removal of all non-native invasive and nuisance vegetation and densely planting with native woody vegetation per quantity requirements listed under Mitigation Option 2 within the first 50 feet closest to the tributaries will offset the vegetated corridor encroachment and provide a net functional benefit to Waters 1 and 2. All vegetation used for enhancement mitigation must be native and listed on the Oregon City Native Plant List.

A minimum of 5-years of monitoring and maintenance will be required for the vegetated corridor mitigation enhancement areas.

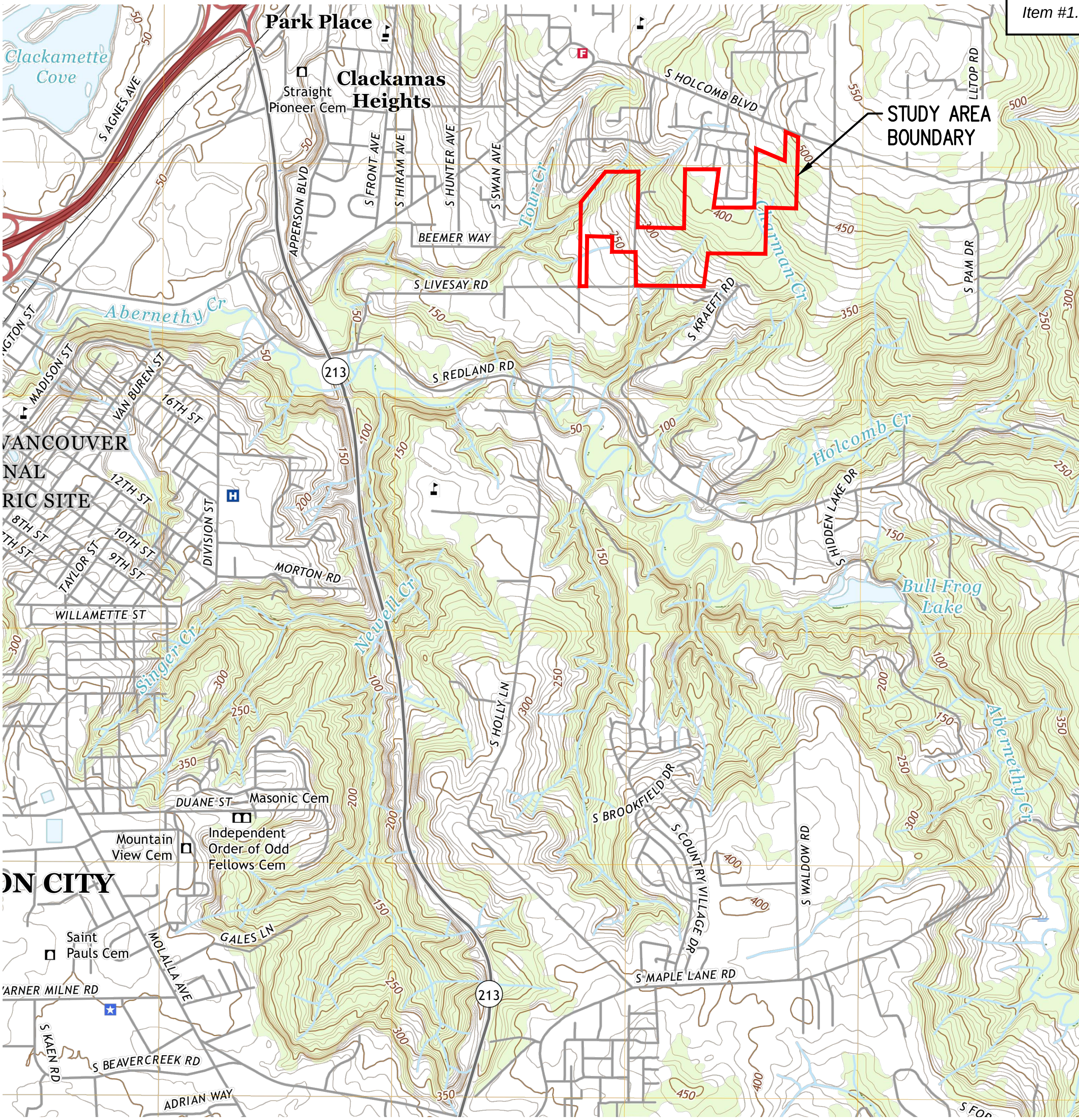
List of Preparers

Stacey Reed

Stacey Reed, PWS
Senior Wetland Scientist

List of Attached Figures

Item #1.



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: OREGON CITY, OR (2020)

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SCALE: 1"= 2000 FEET

2000 0 400 1000 2000

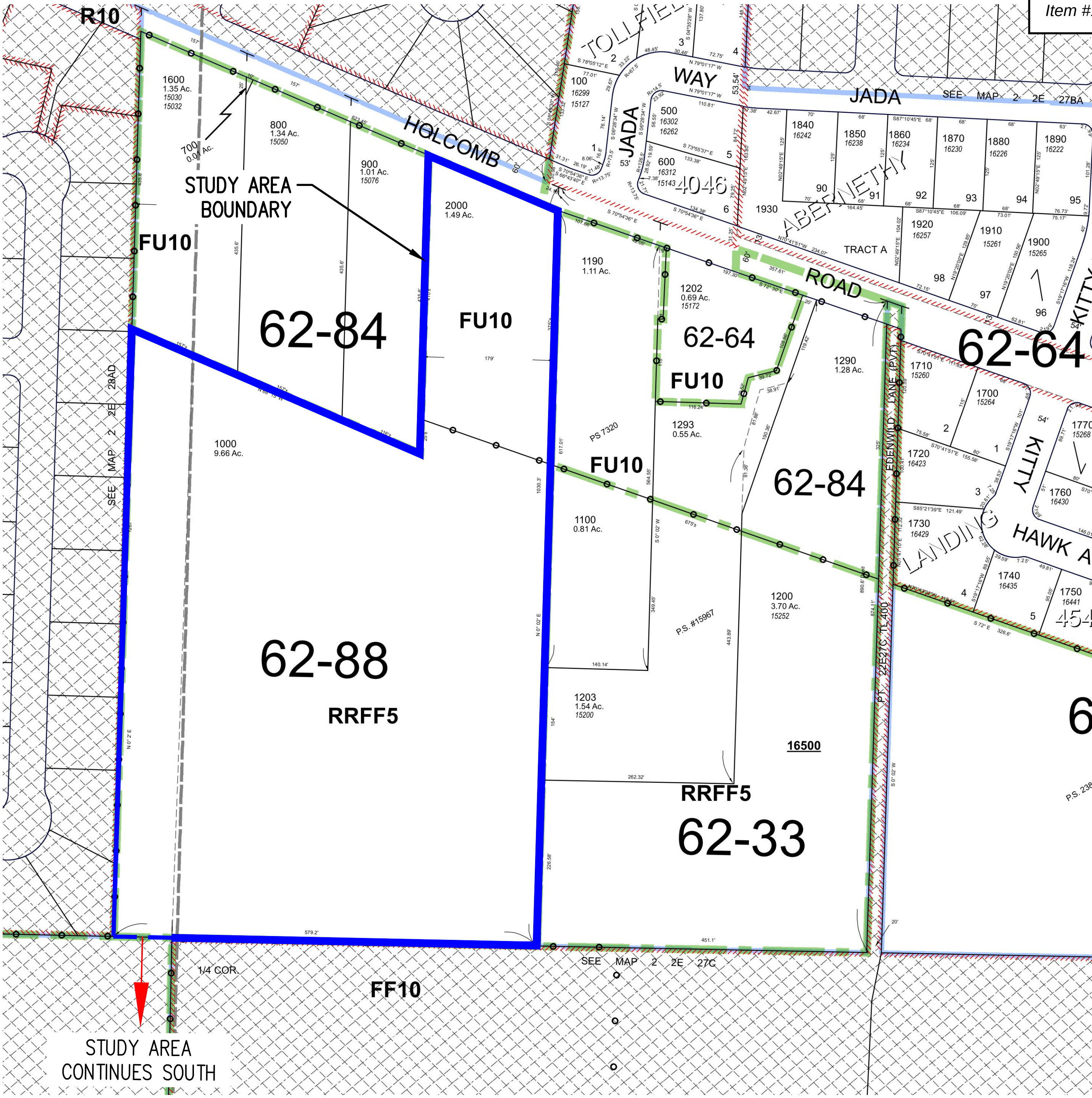
ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 07/16/2021

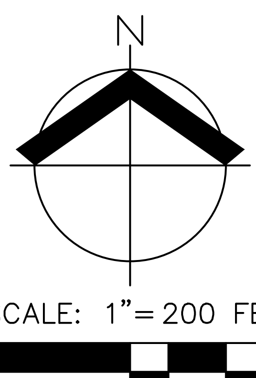
USGS VICINITY MAP PARK PLACE CROSSING GENERAL DEVELOPMENT NROD ANALYSIS	FIGURE 1
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD, STE 100 TUALATIN, OR 97062 503.563.6151 WWW.AKS-ENG.COM	DRWN: SKT CHKD: SAR 7404

DWG: 7404 BACKGROUND FIGURES | FIGURE 1

Item #1.



CLACKAMAS COUNTY
TAX LOTS 1000 AND 2000
TAX MAP 2 2E 27BC



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ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 07/16/2021

TAX MAP (MAP 2 2E 27BC)
PARK PLACE CROSSING GENERAL DEVELOPMENT NROD ANALYSIS

FIGURE **2A**

DRWN: SKT
CHKD: SAR

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TUALATIN, OR 97062
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DWG: 7404 BACKGROUND FIGURES | FIGURE 2A

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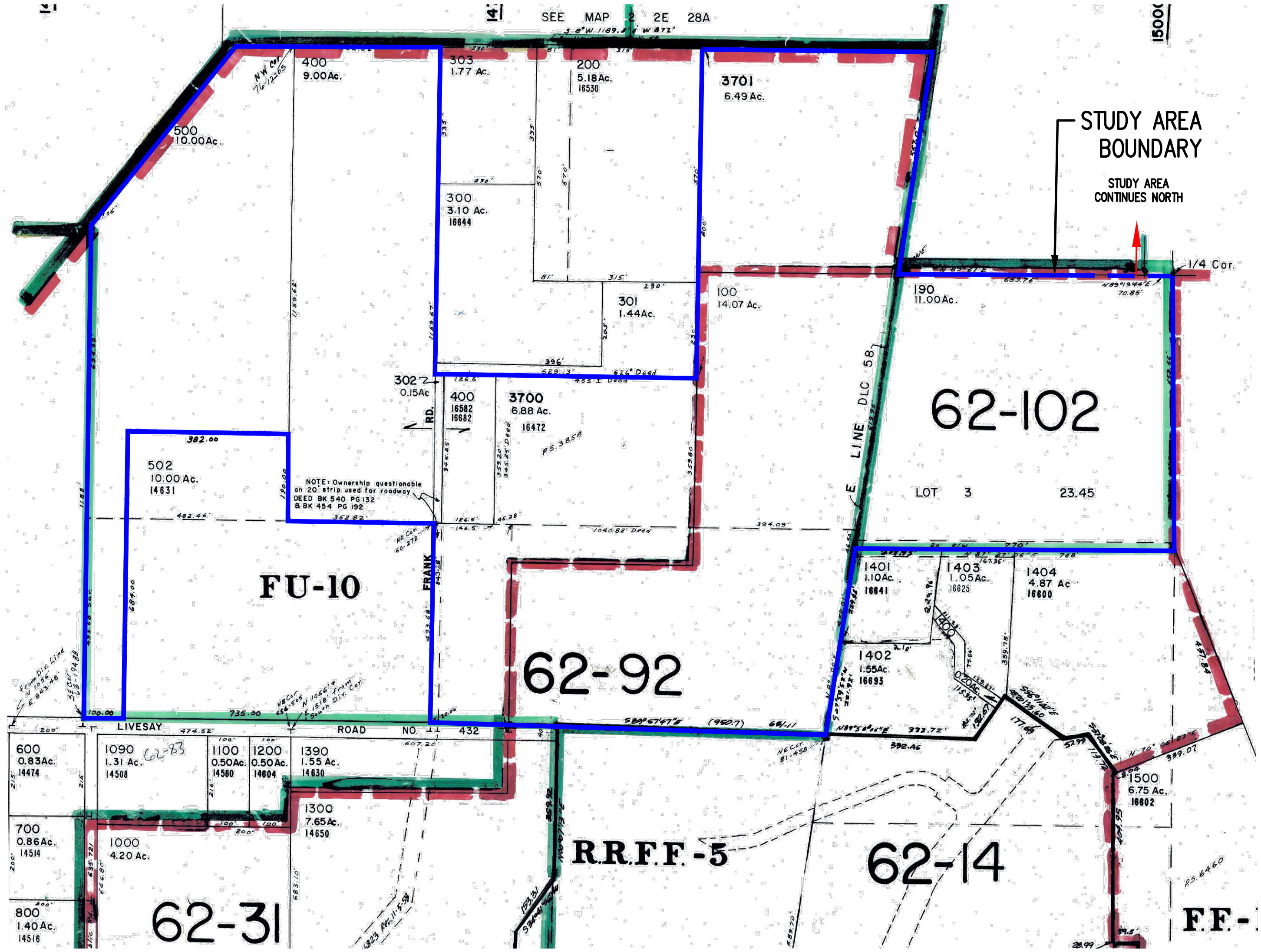
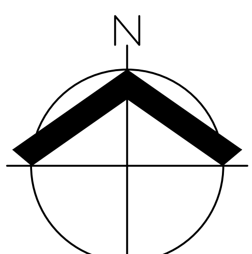


CLACKAMAS COUNTY
TAX LOTS 100, 190, 302,
400, 500, 3700, 3701
TAX MAP 2 2E 28D



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ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 07/16/2021

TAX MAP (MAP 2 2E 28D)
PARK PLACE CROSSING GENERAL DEVELOPMENT NROD ANALYSIS

FIGURE
2B

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DRWN: SKT
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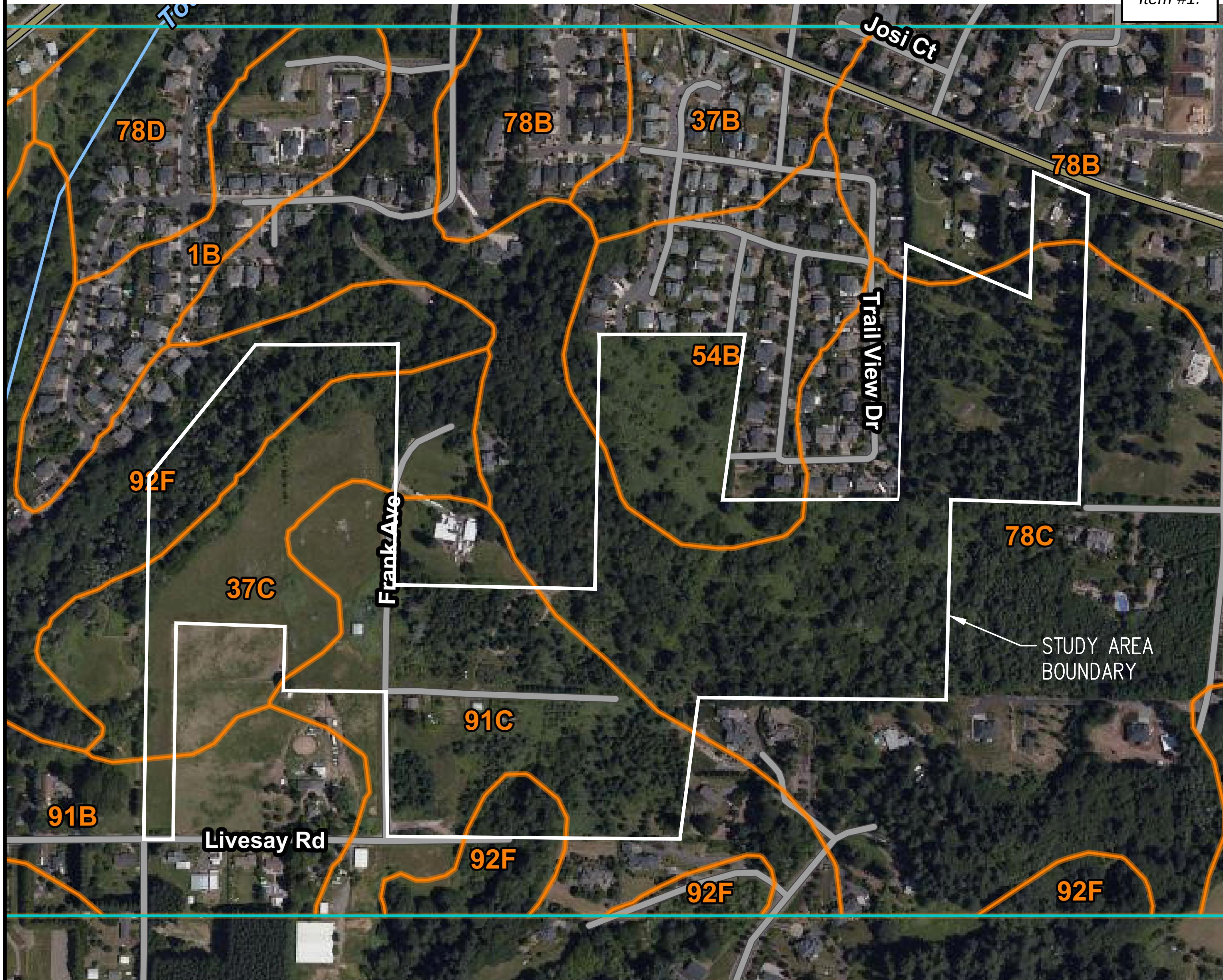
DWG: 7404 BACKGROUND FIGURES | FIGURE 2B

Item #1.



MAP UNIT SYMBOL	MAP UNIT NAME
37C	HELVETIA SILT LOAM, 8% TO 15% SLOPES; NON-HYDRIC
54B	LAURELWOOD SILT LOAM, 3% TO 8% SLOPES; NON-HYDRIC
78B	SAUM SILT LOAM, 3% TO 8% SLOPES; NON-HYDRIC
78C	SAUM SILT LOAM, 8% TO 15% SLOPES; NON-HYDRIC
91B	WOODBURN SILT LOAM, 3% TO 8% SLOPES; NON-HYDRIC
91C	WOODBURN SILT LOAM, 8% TO 15% SLOPES; NON-HYDRIC
92F	XEROCHREPTS AND HAPLOXEROLLS, VERY STEEP; NON-HYDRIC

N

SCALE: 1"=500 FEET

500 0 100 250 500

ORIGINAL PAGE SIZE: 8.5" x 11"

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY

DATE: 07/16/2021

NRCS SOIL SURVEY MAP
PARK PLACE CROSSING GENERAL DEVELOPMENT NROD ANALYSIS

FIGURE
3

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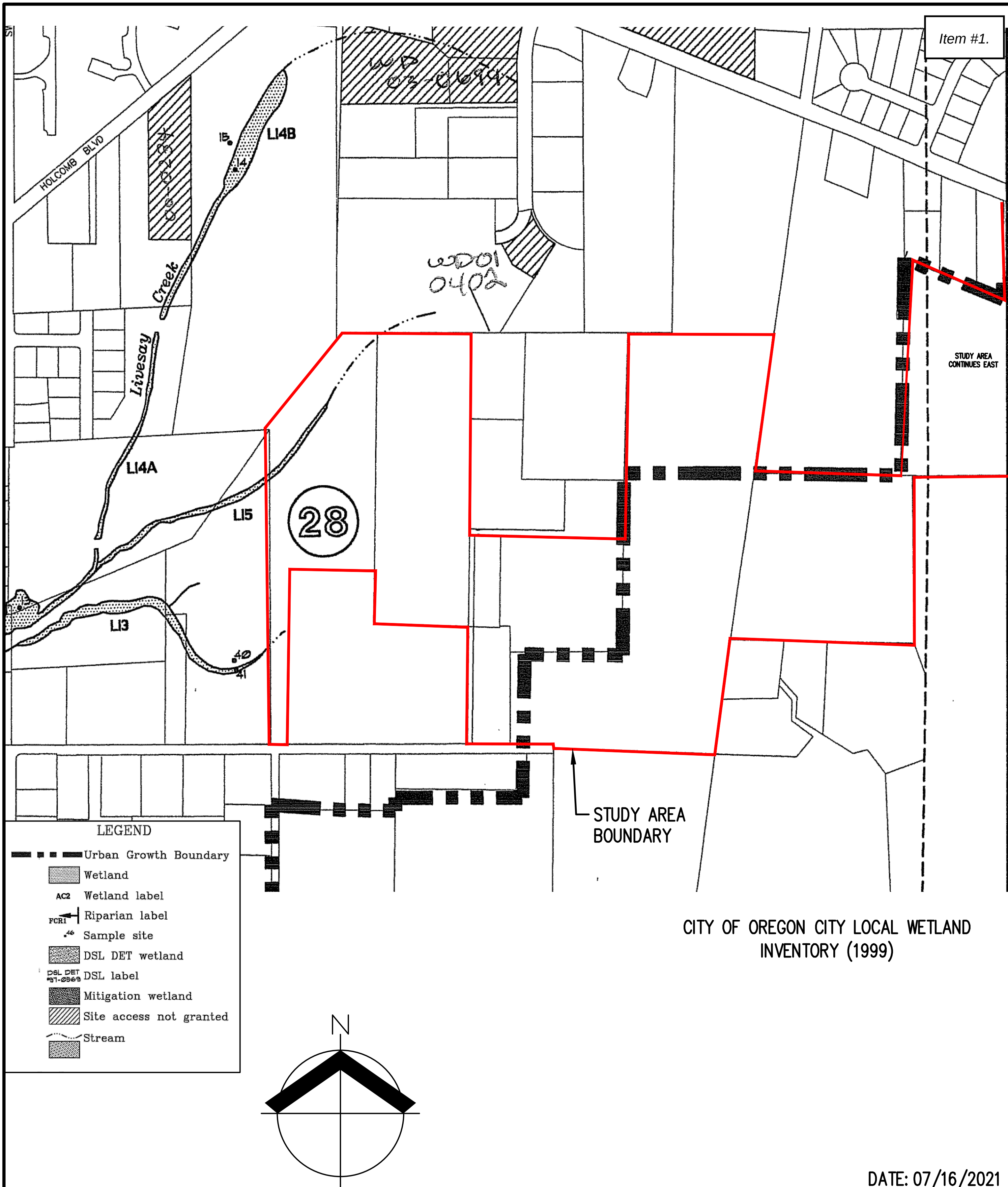
AKS

DRWN: SKT
CHKD: SAR

DWG: 7404 BACKGROUND FIGURES | FIGURE 3



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ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 07/16/2021

LOCAL WETLAND INVENTORY MAP
PARK PLACE CROSSING GENERAL DEVELOPMENT NROD ANALYSIS

FIGURE 4

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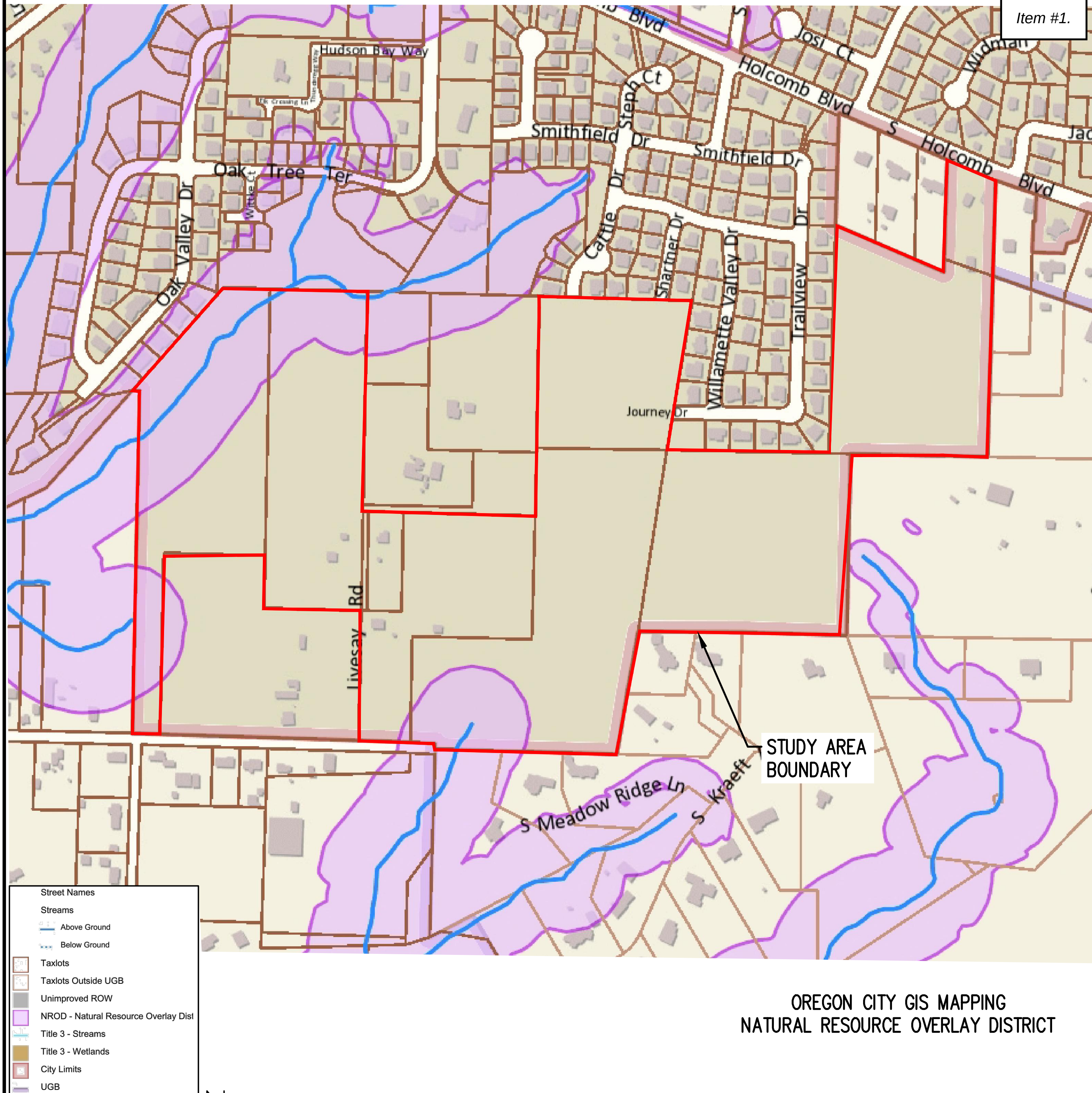
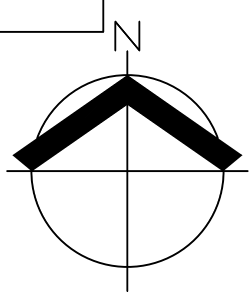
7404

DWG: 7404 BACKGROUND FIGURES | FIGURE 4

Item #1.



OREGON CITY GIS MAPPING
NATURAL RESOURCE OVERLAY DISTRICT



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ORIGINAL PAGE SIZE: 8.5" x 11"

DATE: 07/16/2021

NROD MAP
PARK PLACE CROSSING GENERAL DEVELOPMENT NROD ANALYSIS

FIGURE 5

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503.563.6151 WWW.AKS-ENG.COM

DRWN: SKT
CHKD: SAR

7404

DWG: 7404 BACKGROUND FIGURES | FIGURE 5

NOTE:
TAXLOTS 200, 300, 301, 303, AND 502 WERE EXCLUDED FROM THIS NROD ANALYSIS. A FULL WETLAND AND WATER DELINEATION IS REQUIRED PRIOR TO SITE DEVELOPMENT.

LEGEND:

TOTAL WETLAND AREA ON-SITE: 17,716 SF± (0.41 ACRES±)

WETLAND A: 362 SF± (0.01 ACRES±)
WETLAND B: 5,560 SF± (0.13 ACRES±)
WETLAND C: 7,345 SF± (0.17 ACRES±)
WETLAND D: 4,449 SF± (0.10 ACRES±)

TOTAL ON-SITE WATERS: 4,481 SF± / 1,434 LF± (0.10 ACRES±)

WATER 1: 3,493 SF± / 960 LF± (0.08 ACRES±)
WATER 2: 988 SF± / 474 LF± (0.02 ACRES±)

APPROXIMATE NROD AREA

WETLAND AND WATER BOUNDARIES SHOWN WERE DELINEATED BY AKS ENGINEERING & FORESTRY (AKS) ON MAY 28/29 AND JUNE 2, 2020 AND WERE PROFESSIONALLY LAND SURVEYED BY AKS FROM MAY 29–JUNE 15, 2020.

DATE: 07/19/2021

NROD EXISTING CONDITIONS MAP

PARK PLACE CROSSING - OREGON CITY

FIGURE 6

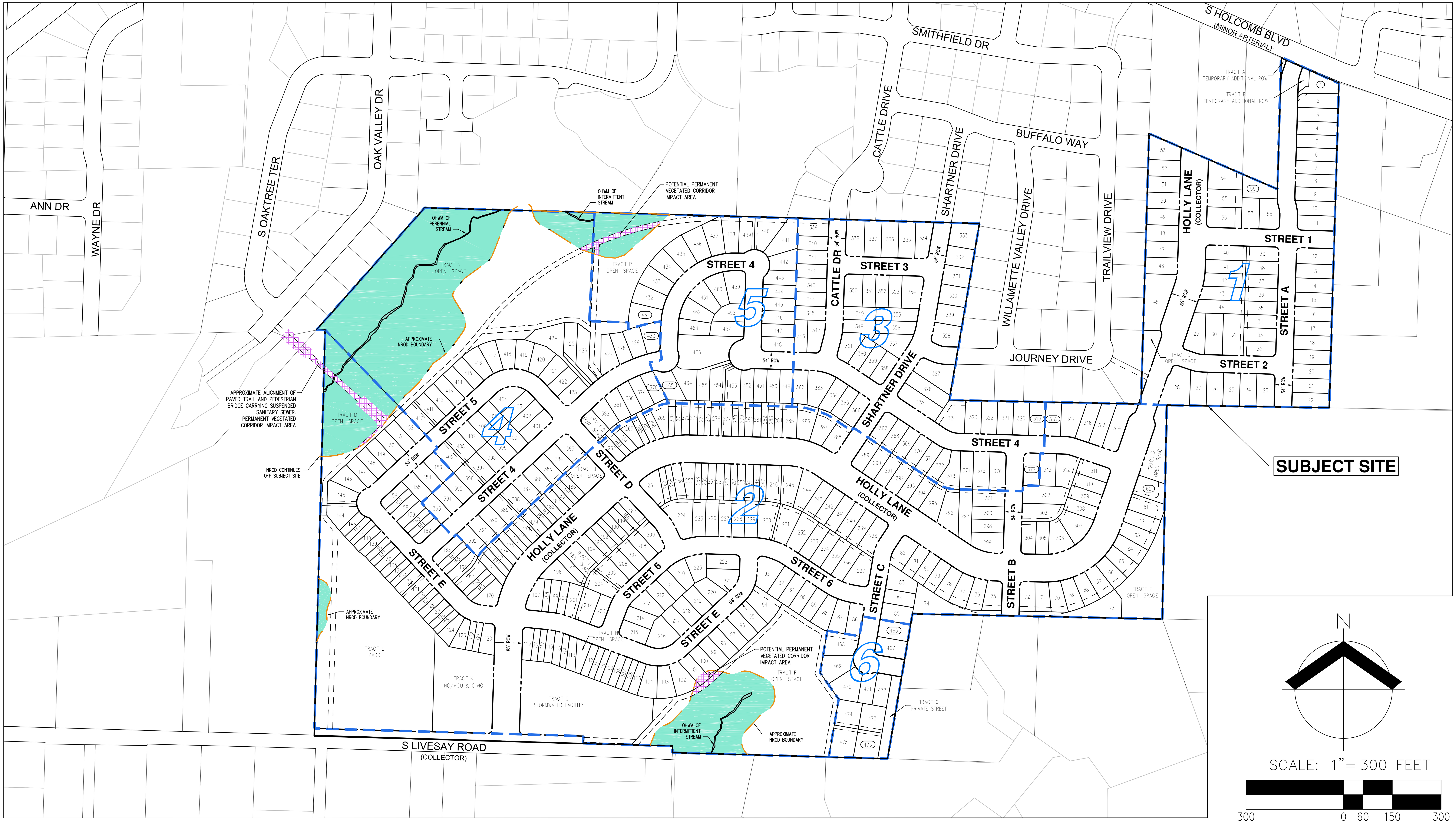
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

AKS

DRWN: NRA
CHKD: CMS
AKS JOB: 7404

DWG: 7404 EXISTING CONDITIONS NROD EXHIBIT | 1

Item #1.



NOTE:
TAXLOTS 200, 300, 301, 303, AND 502 WERE EXCLUDED FROM THIS NROD ANALYSIS. A FULL WETLAND AND WATER DELINEATION IS REQUIRED PRIOR TO SITE DEVELOPMENT.

LEGEND:

APPROXIMATE NROD AREA

POTENTIAL NROD IMPACT AREA

WETLAND AND WATER BOUNDARIES SHOWN WERE DELINEATED BY AKS ENGINEERING & FORESTRY (AKS) ON MAY 28/29 AND JUNE 2, 2020 AND WERE PROFESSIONALLY LAND SURVEYED BY AKS FROM MAY 29-JUNE 15, 2020.

DATE: 01/03/2022

SITE PLAN NROD IMPACT MAP	FIGURE
PARK PLACE CROSSING - OREGON CITY	7
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD, STE 100 TUALATIN, OR 97062 503.563.6151 WWW.AKS-ENG.COM	DRWN: NRA CHKD: CMS AKS JOB: 7404

DWG: 7404 SITE PLAN NROD EXHIBIT | 2

Park Place Crossing
Oregon City, Oregon

General Development Plan/Master Plan Stormwater Report

Date: Updated January 2022

Client: Icon Construction & Development, LLC

Engineering Contacts: Monty Hurley, PE

Prepared By: Vu Nguyen, PE

Engineering Firm: AKS Engineering & Forestry, LLC
12965 SW Herman Road Suite 100
Tualatin, OR 97062

AKS Job Number: 7404

REGISTERED PROFESSIONAL ENGINEER
58542PE
OREGON
JULY 9, 2002
MONTGOMERY B. HURLEY

RENEWAL DATE: 06/30/2023

AKS ENGINEERING & FORESTRY

Contents

Appendices

Park Place Crossing General Development Plan/Master Plan Stormwater Report
OREGON CITY, OREGON

1.0 Purpose of Report
The purpose of this report is to analyze the effect development of Park Place Crossing will have on the downstream stormwater conveyance system, document the criteria the proposed stormwater system was designed to meet, identify the sources of information on which the analysis was based, detail the design methodology, and document the results of the analysis. This report is prepared for a General Development Plan, required by the City Commission as a condition of approval of the site's annexation, and does not involve any physical site alterations. Information provided as part of this report is preliminary in nature and will be further refined as part of future Detailed Development Plan applications, where changes or modifications may occur.

2.0 Project Location/Description
The development is located on Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 500, 502, 3700, and 3701 of Clackamas County Assessor's Map 2 2E 28D and Tax Lots 1000 and 2000 of Clackamas County Assessor's Map 2 2E 27BC. The subject site is located north and east of S Livesay Road and south of S Holcomb Road in Oregon City, Oregon. The total site area is ±91.7 acres. Upon completion of the development, stormwater runoff from this development's lots and transportation infrastructure will be collected and routed to a new low impact development (LID) stormwater facility for treatment and detention, prior to release into an existing drainage channel on the south side of the site. A temporary stormwater facility will detain and treat runoff from Park Place Phase 1 until the permanent stormwater facility is constructed with Phase 2. Due to topographic constraints, stormwater runoff from part of Phase 6, park, and civic area cannot be collected and routed to the permanent LID stormwater facility. However, these areas will have their own LID stormwater facilities.

3.0 Regulatory Design Criteria
3.1. Stormwater Quantity Management Criteria
The stormwater quantity management criteria required by the Oregon City Public Works *Stormwater and Grading Design Standards* (March 2020) are summarized below:

> *Flow control facilities shall be designed so that the duration of peak flow rates from post-development conditions shall be less than or equal to the duration of peak flow rates from pre-development conditions for all peak flows between 42 percent of the 2-year peak flow rate up to the 10-year peak flow rate. […] The BMP Sizing Tool addresses these flow control requirements to size stormwater management facilities.*

Clackamas County Water Environment Services (WES) BMP Sizing Tool software was used to size the permanent stormwater quantity management facility for this project. The permanent LID stormwater facility was designed to meet the above criteria for detention, conveyance, and overflow. Slopes in the facility that are below the top of the water surface elevation will be no steeper than 3:1. Beyond the top of the water surface elevation, the ground will rise to meet the existing ground surface at a slope of 2:1, or retaining walls will be installed.

3.2. Stormwater Quality Management Criteria

The stormwater quality management criteria required by the *Stormwater and Grading Design Standards* are summarized below:

> *Water quality facilities shall be designed to capture and treat 80 percent of the average annual runoff volume to the MEP with the goal of 70 percent total suspended solids removal. […] The BMP Sizing Tool addresses these water quality requirements to size stormwater management facilities.*

The BMP Sizing Tool was used to size stormwater facility for stormwater quality management.

3.3. Stormwater Infiltration Criteria

Per the infiltration test result prepared by GeoPacific Engineering, Inc. dated July 14, 2021, falling-head infiltration testing conducted on the project site demonstrated a measured infiltration rate of 0.0 inches per hour.

4.0 Design Methodology

The BMP Sizing Tool was used to design all the LID stormwater facilities. The Santa Barbara Urban Hydrograph (SBUH) method will be used for the stormwater conveyance system analysis of the subject site. The SBUH method uses the Soil Conservation Service (SCS) Type 1A 24-hour storm. HydroCAD computer software aided in the analysis.

5.0 Design Parameters

5.1. Design Storm

5.1.1. On-Site Inlet and Conduit Sizing

Stormwater inlets (curb inlet catch basins) for the site will be placed in streets at all low points in grade and other necessary locations, and will be adequately sized to manage the stormwater for the site. The distance between curb inlet catch basins along streets will generally be 400 feet or less.

The stormwater pipes will be sized using the SBUH method to adequately convey the 25-year (4.0-inch) storm event (gravity flow).

5.1.2. Upstream and Off-site Basin

The existing stormwater outfall from Trail View subdivision's stormwater facility will be connected and routed through new stormwater pipes, which will be installed under this project.

5.2. Predeveloped Site Topography and Land Use

5.2.1. Site Topography

The site area generally slopes toward the existing drainage channels in the south and northwest corner of the site. Vegetative cover on the site consists of trees and grass.

5.2.2. Land Use

Currently, the site is vacant land.

5.3. Soil Type

According to the Natural Resources Conservation Service (NRCS) Soil Survey for Clackamas County, the soils on-site are classified as Helvetia silt loam, Laurelwood silt loam, Saum silt loam, Woodburn silt loam, and Xerochrepts. Information on this soil type is provided in Appendix E. Final hydrologic soil group will be further evaluated and determined by Geotech Engineering as part of future Detailed Development Plan applications.

5.4. Post-developed Site Topography and Land Use

5.4.1. Site Topography

The post-developed site topography will be altered from the predeveloped site topography to allow the construction of public and private streets, private alleys, single-family homes, and other associated infrastructure and features.

5.4.2. Land Use

The post-developed land use will consist of approximately ±476 lots for single-family homes, public and private streets, private alleys, open space tracts, and stormwater facilities

5.4.3. Post-Developed Input Parameters

Per the Oregon City *Stormwater Master Plan* (July 2019), the following calculation method was used to determine the impervious area of the post-developed site:

- New public rights-of-way areas are assumed to have 90 percent impervious coverage.
- The average impervious coverage for all the lots is 45 percent.

6.0 Calculation Methodology

6.1. Proposed Stormwater Conduit Sizing and Inlet Spacing

The on-site stormwater conduit pipes will be sized using Manning's equation for the 25-year storm event. Stormwater inlets will be placed at locations to adequately capture stormwater runoff from the streets.

6.2. Proposed Stormwater Quantity Control Facility Design

The permanent LID stormwater facility was sized with the BMP Sizing Tool to provide flow control for the stormwater runoff from impervious areas within the new rights-of-way and lots (area of Phase 1, 2, 3, 4, 5, and part of Phase 6). Stormwater quantity facility design parameters were determined from topographic survey information, aerial photographs, hydrologic soil group, contours, design, and analysis. The LID stormwater facility was designed to address the stormwater quantity and detention requirements of the *Stormwater and Grading Design Standards*.

A temporary LID stormwater facility will be constructed with Phase 1 to provide flow control for the stormwater runoff from impervious areas within the new rights-of-way and lots of Phase 1. Stormwater runoff from this temporary LID stormwater facility will be routed and discharged into the existing stormwater line of the Trail View subdivision. This temporary LID stormwater facility will be decommissioned and converted to lots when Park Place Crossing Phase 2 is constructed and the permanent LID stormwater facility is installed. Sizing of the Phase 1 temporary LID stormwater facility is provided in Appendix G.

Due to topographic constraints, stormwater runoff from part of Phase 6, park, and civic area cannot be collected and routed to the permanent LID stormwater facility. However, these areas will have their own LID stormwater facilities to address the stormwater quantity and detention requirements of the *Stormwater and Grading Design Standards*.

6.3. Proposed Stormwater Quality Facility Design

The permanent LID stormwater facility were sized with the BMP Sizing Tool to provide water quality management for the stormwater runoff from future impervious areas of roofs constructed on the lots of Phases 1, 2, 3, 4, and 5, as well as part of Phase 6. LID filtration stormwater planters and swales between the curb and sidewalk of the streets within the development were sized using the BMP Sizing Tool to provide water quality management of stormwater runoff from impervious areas within the new street rights-of-way. Preliminary information regarding these LID filtration stormwater planters and swales is provided per the General Development Plan. Changes or modifications to the LID filtration stormwater planters and swales may occur if the evaluation conducted as part of future Detailed Development Plan applications determines changes are necessary. Stormwater quality facility design parameters were determined from topographic survey information, aerial photographs, hydrologic soil group, contours, design, and analysis. The LID stormwater facilities were designed to address the stormwater quality requirements of the *Stormwater and Grading Design Standards*.

A temporary LID stormwater facility will be constructed with Phase 1 to provide water quality management of the stormwater runoff from impervious (roof) areas on lots of Phase 1. Stormwater runoff from this temporary LID stormwater facility will be routed and discharged into existing stormwater line of the Trail View subdivision. This temporary LID stormwater facility will be decommissioned and converted to lots when Park Place Crossing Phase 2 is constructed and the permanent LID stormwater facility is installed. Sizing of the Phase 1 temporary LID stormwater facility is provided in Appendix G.

Due to topographic constraints, stormwater runoff from part of Phase 6, park, and civic area cannot be collected and routed to the permanent LID stormwater facility. However, these areas will have their own LID stormwater facilities to address the stormwater quality requirements of the *Stormwater and Grading Design Standards*.

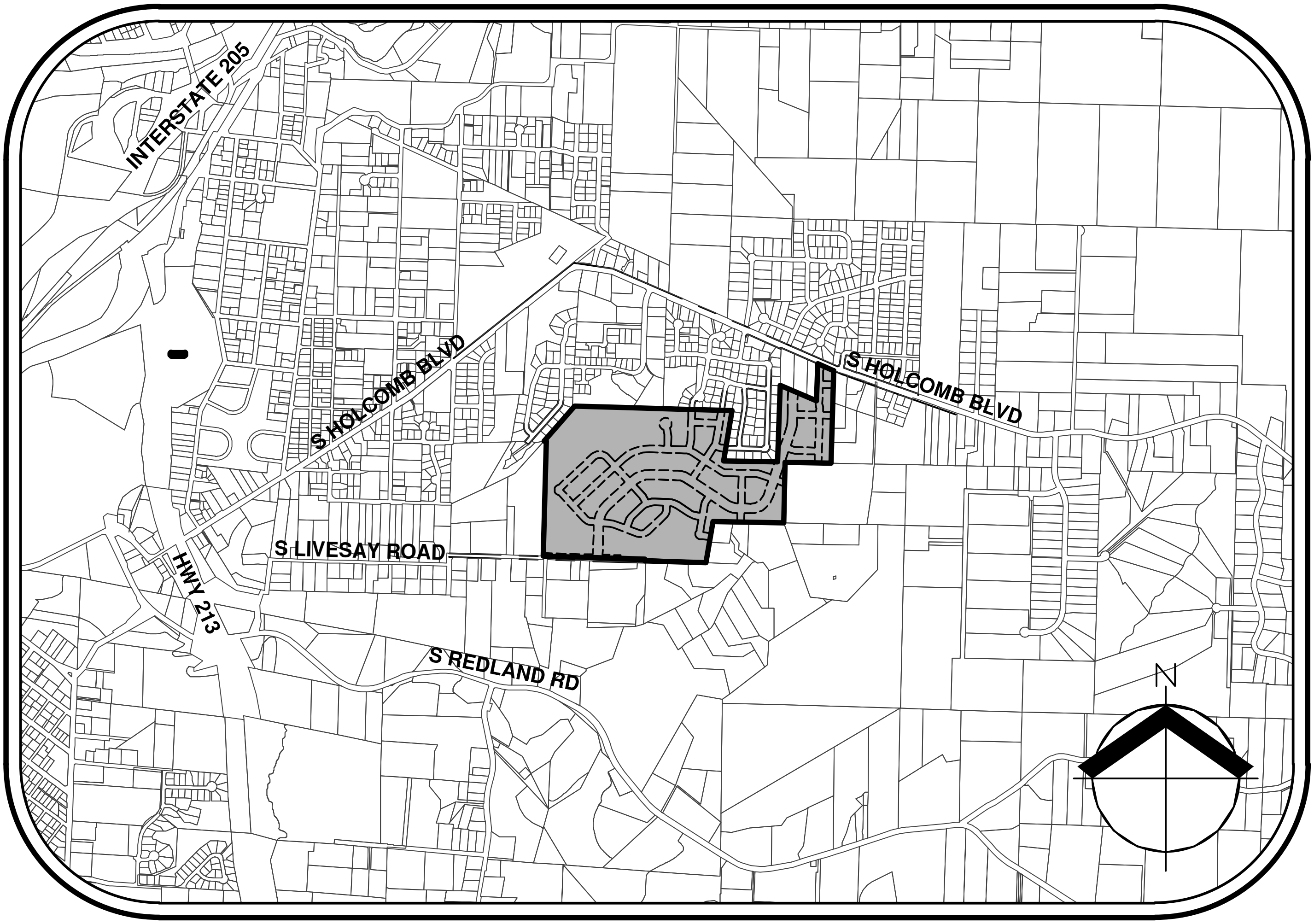
6.4. Emergency Overflow Calculations

The emergency overflow weir for the permanent LID stormwater facility was sized to convey the 100-year storm event. Calculations are included in Appendix D. If the permanent stormwater facility's outlet structures become plugged and cannot convey runoff from the site, the stormwater will overflow through the emergency overflow and to the downstream drainage.

6.5. Downstream Analysis

Peak flow discharges from the stormwater facilities will be detained and metered out at or below the predevelopment runoff condition for all peak flows between 42 percent of the 2-year storm up to the 10-year storm event. Therefore, this project will not negatively impact downstream capacity.

Appendix A: Vicinity Map

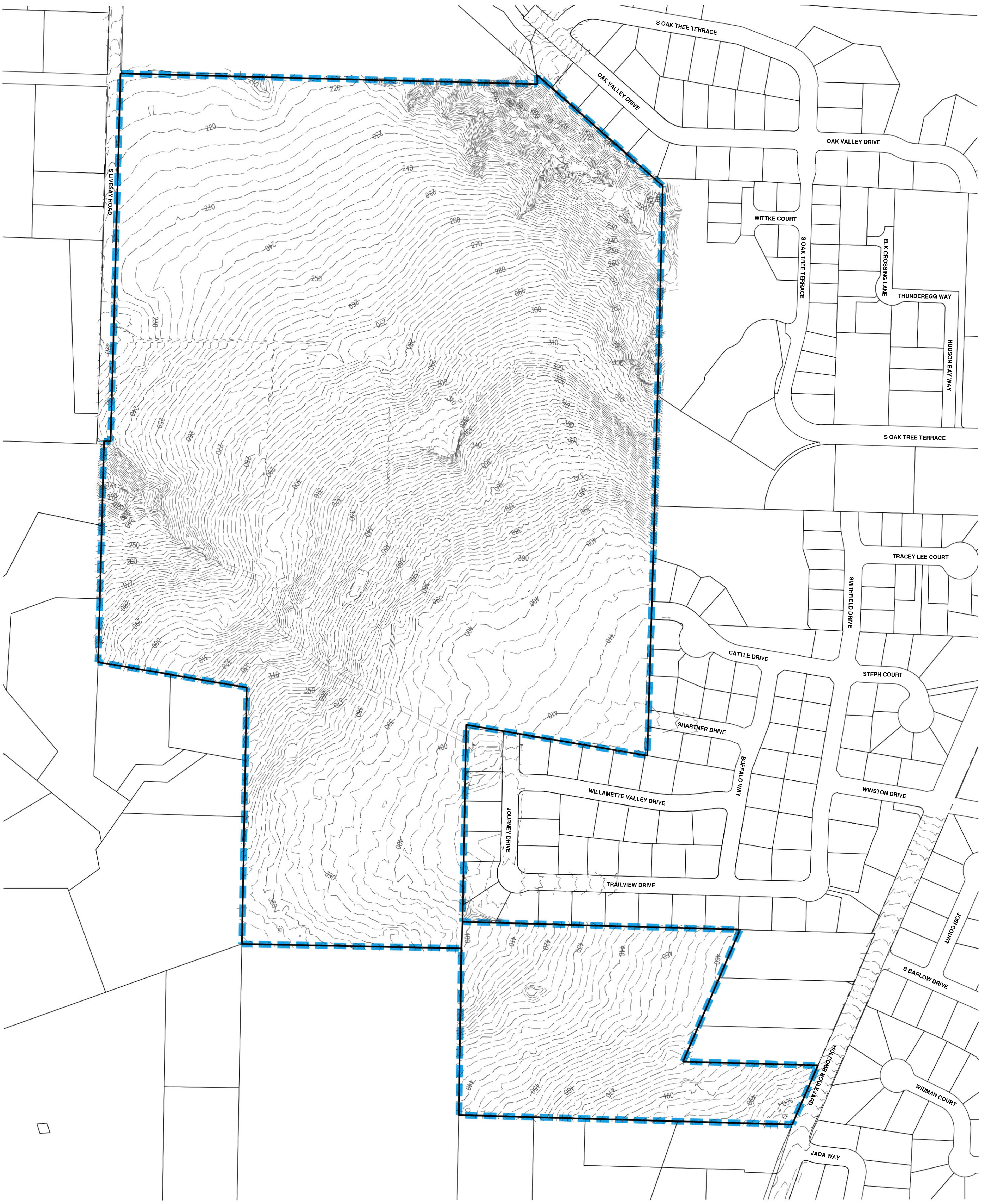


VICINITY MAP

NOT TO SCALE

Appendix B: Pre-developed Catchment Map and Detail

AKS DRAWING FILE: 7404 PRE-MAP.DWG | LAYOUT: 1



SCALE: 1"=150 FEET

ORIGINAL PAGE SIZE: 22" x 34"

JOB NUMBER:	7404
DATE:	07/15/2021
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

PRELIMINARY NOT FOR CONSTRUCTION

EXISTING CONDITIONS PLAN
PARK PLACE CROSSING
ICON CONSTRUCTION & DEVELOPMENT, LLC
OREGON CITY, OR

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

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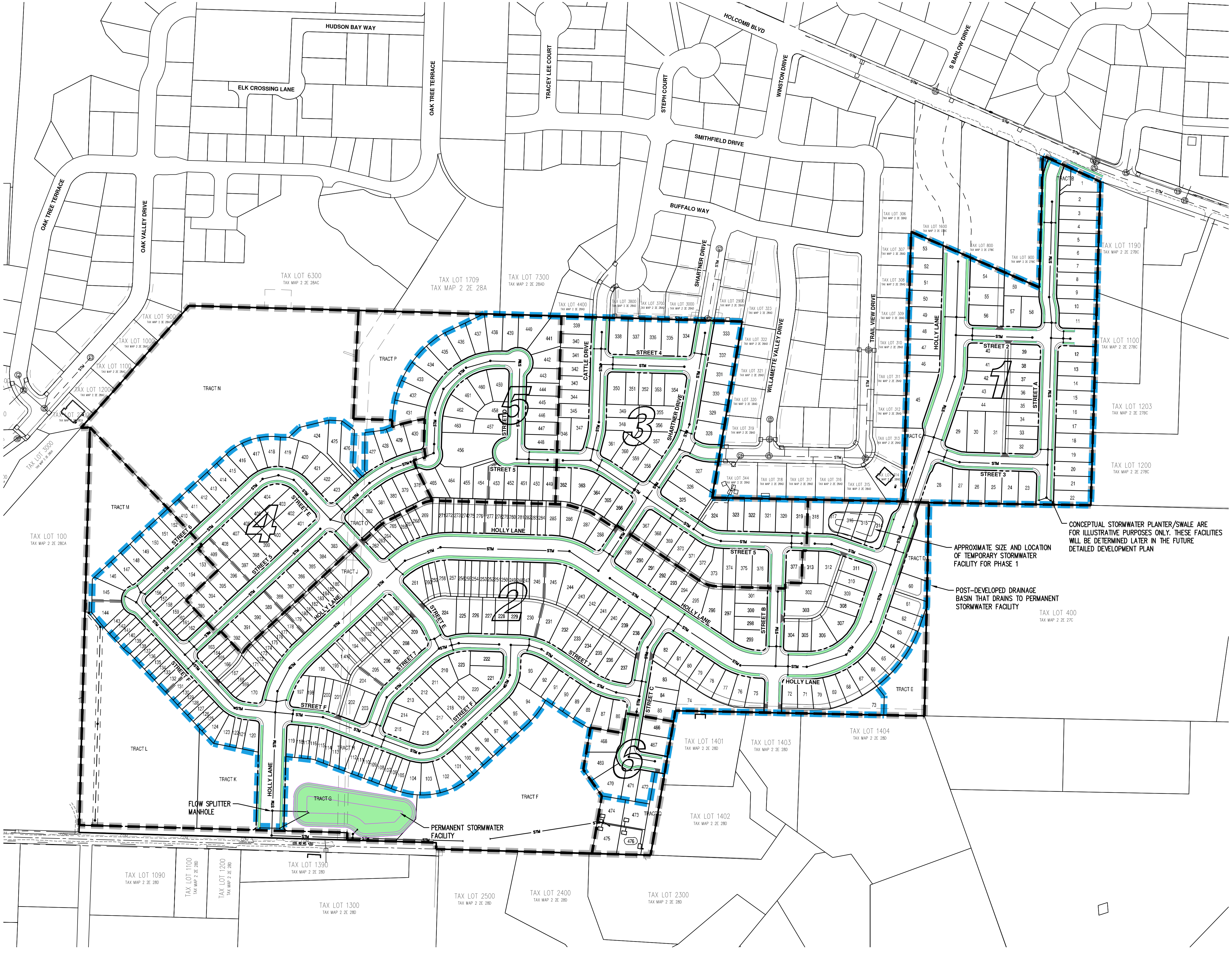
Item #1.

Appendix C.1: Post-developed Catchment Map and Detail

Item #1.



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POST-DEVELOPED BASIN MAP
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER:	7404
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DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

AKS DRAWING FILE: 7404 POST-MAP UPDATED.DWG | LAYOUT: POST-MAP

Appendix C.2: BMP Sizing Tool Report

WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Park Place Crossing Master Plan
Project Type	Subdivision
Location	
Stormwater Management Area	35500
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
Impervious in ROW (C soil)	718,660	Forested	ConventionalConcrete	C	LID Stormwater Planter/Swale in ROW
Impervious in ROW (B soil)	98,000	Forested	ConventionalConcrete	B	LID Stormwater Planter/Swale in ROW
Pervious in ROW (C soil)	79,852	Forested	Grass	C	LID Stormwater Planter/Swale in ROW
Pervious in ROW (B soil)	10,888	Forested	Grass	B	LID Stormwater Planter/Swale in ROW
Pervious in Lots (C soil)	978,455	Forested	Grass	C	LID Stormwater Planter/Swale in ROW
Pervious in Lots (B soil)	133,426	Forested	Grass	B	LID Stormwater Planter/Swale in ROW
Impervious in Lots (C soil)	800,553	Forested	Roofs	C	LID Stormwater Pond
Impervious in Lots (B soil)	109,166	Forested	Roofs	B	LID Stormwater Pond
Impervious Alley (C soil)	77,615	Forested	ConventionalConcrete	C	LID Stormwater Pond
Impervious Alley (B soil)	10,585	Forested	ConventionalConcrete	B	LID Stormwater Pond

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
LID Stormwater Planter/Swale in ROW	WaterQuality	Stormwater Planter - Filtration	D1	17,481.3	17,500.0	6.0

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
LID Storm water Pond	FCWQT	Lined	13.00	35,029.0	3	291,960.5	266,780.5	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only
2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).
3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.
4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: LID Stormwater Pond
Design: FlowControlAndTreatment

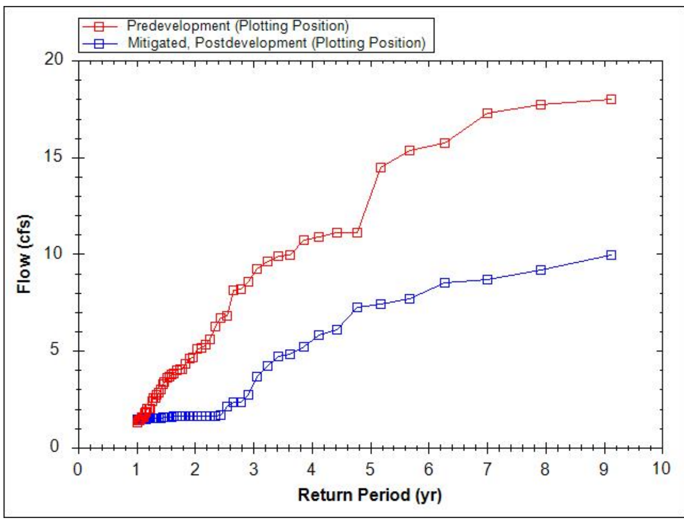
Shape Curve

Depth (ft)	Area (sq ft)
13.0	35,029.0

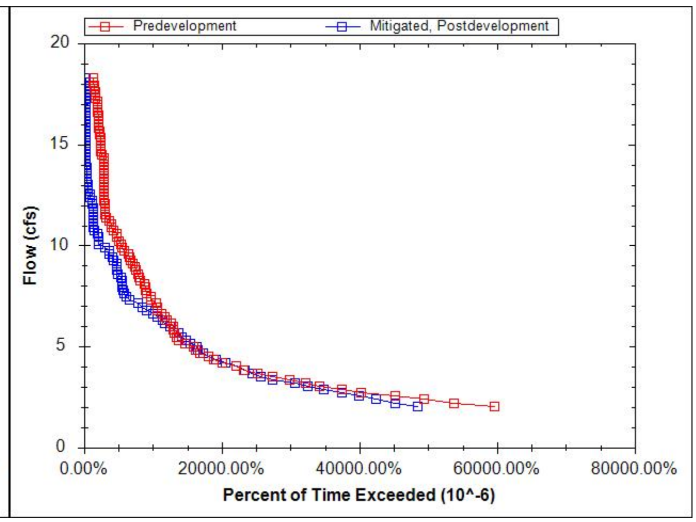
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	4.6
Upper Orifice Invert(ft)	8.7
Upper Orifice Dia (in)	17.4
Overflow Weir Invert(ft)	12.0
Overflow Weir Length (ft)	6.3

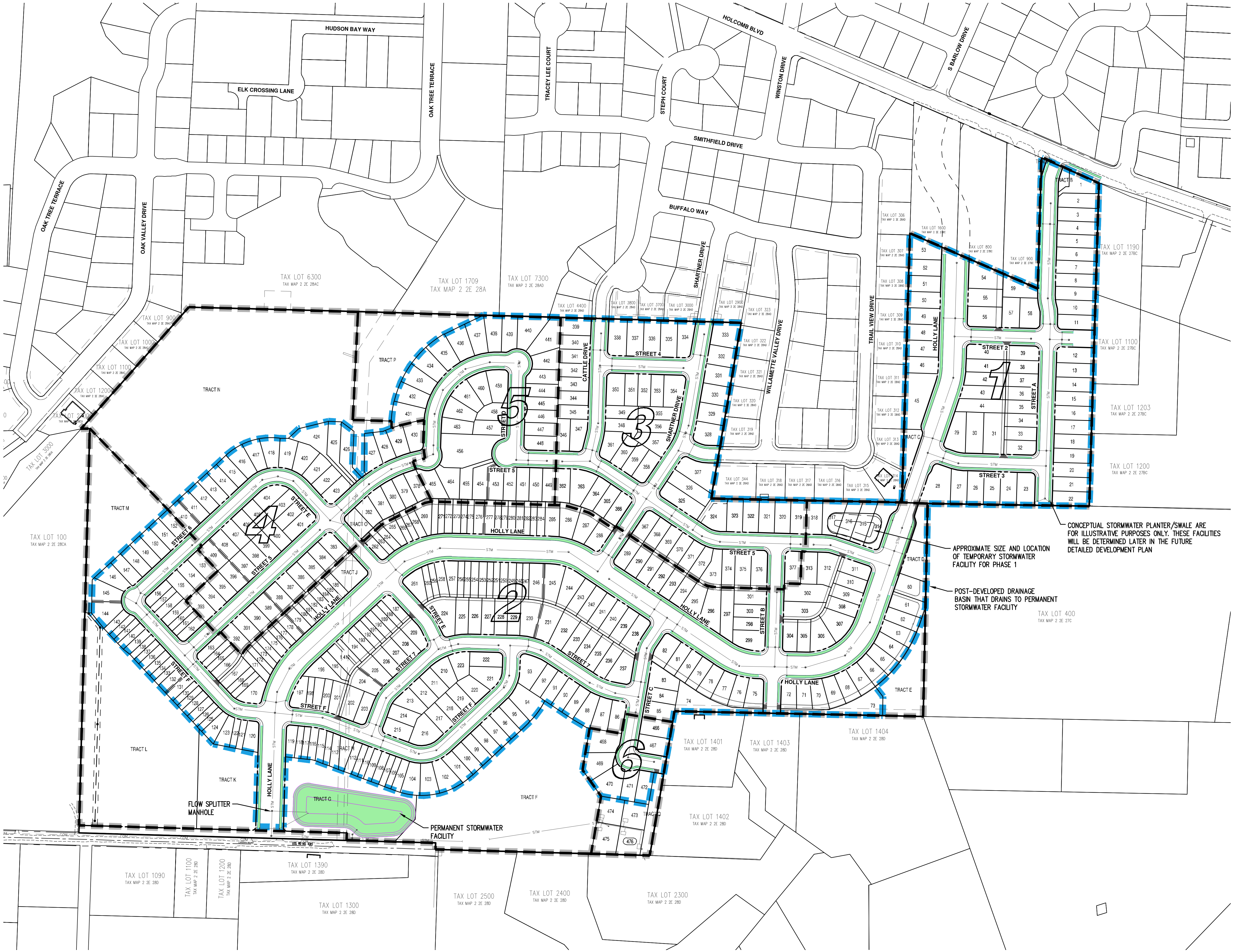
Flow Frequency Chart



Flow Duration Chart



Appendix C.3: Stormwater Facilities Location and Detail



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STORMWATER FACILITIES LOCATION
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER:	7404
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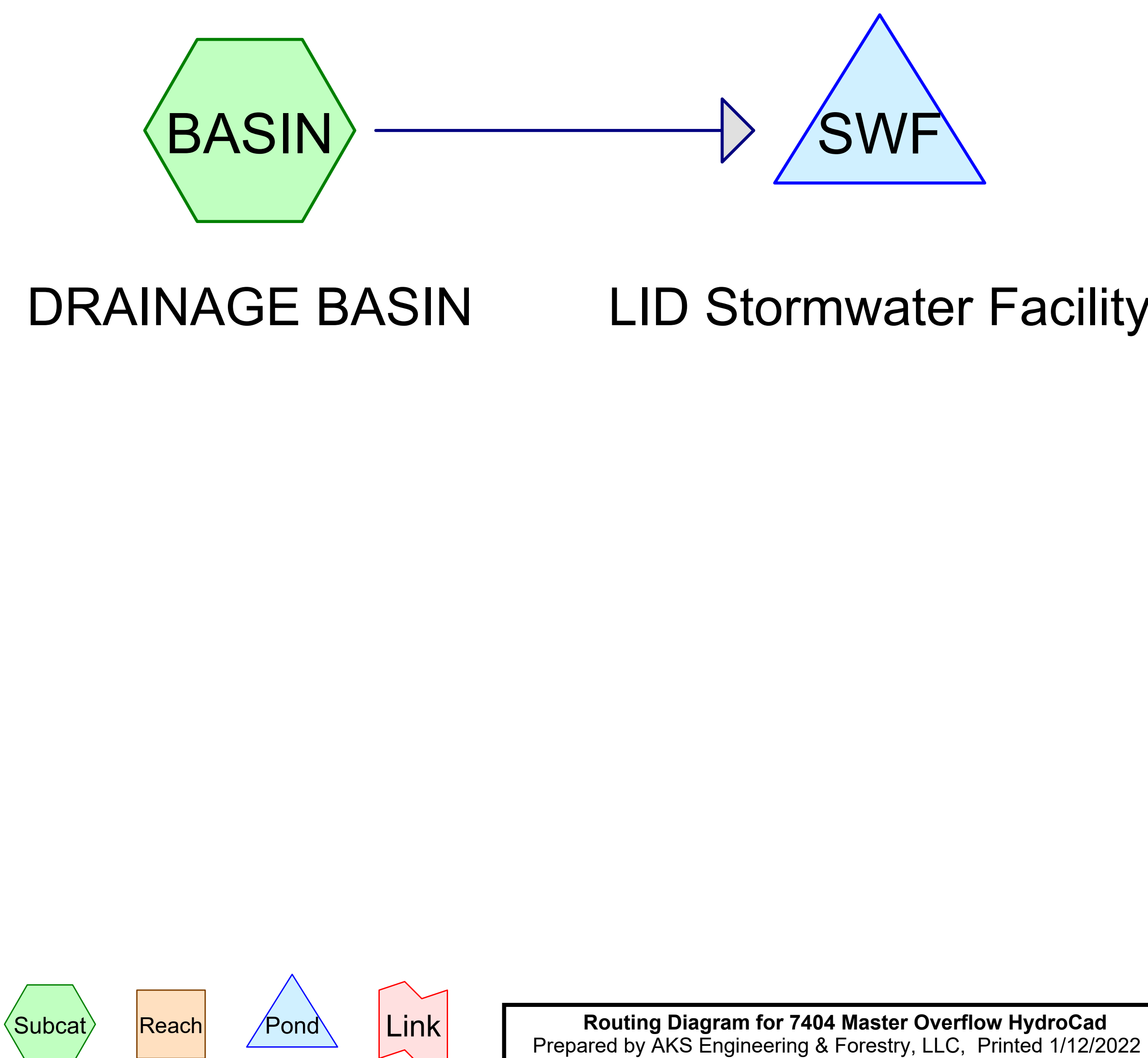
DRAWN BY:	NRA
CHECKED BY:	CMS

AKS DRAWING FILE: 7404 POST-MAP UPDATED.DWG | LAYOUT: LOCATION

Appendix D: Emergency Overflow Calculations



Routing Diagram for 7404 Master Overflow HydroCad
Prepared by AKS Engineering & Forestry, LLC, Printed 1/12/2022
HydroCAD® 10.00-22 s/n 01338 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
22.910	98	Impervious (BASIN)
18.750	98	Impervious in ROW (BASIN)
3.310	61	Lawn - B Soil (BASIN)
24.290	74	Lawn - C Soil (BASIN)

Time span=0.00-24.00 hrs, dt=0.15 hrs, 161 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment BASIN: DRAINAGE BASIN Runoff Area=69.260 ac 60.15% Impervious Runoff Depth>3.28"
Tc=10.0 min CN=72/98 Runoff=50.52 cfs 18.916 af

Pond SWF: LID Stormwater Facility Peak Elev=223.33' Storage=299,123 cf Inflow=50.52 cfs 18.916 af
Outflow=26.52 cfs 12.238 af

Summary for Subcatchment BASIN: DRAINAGE BASIN

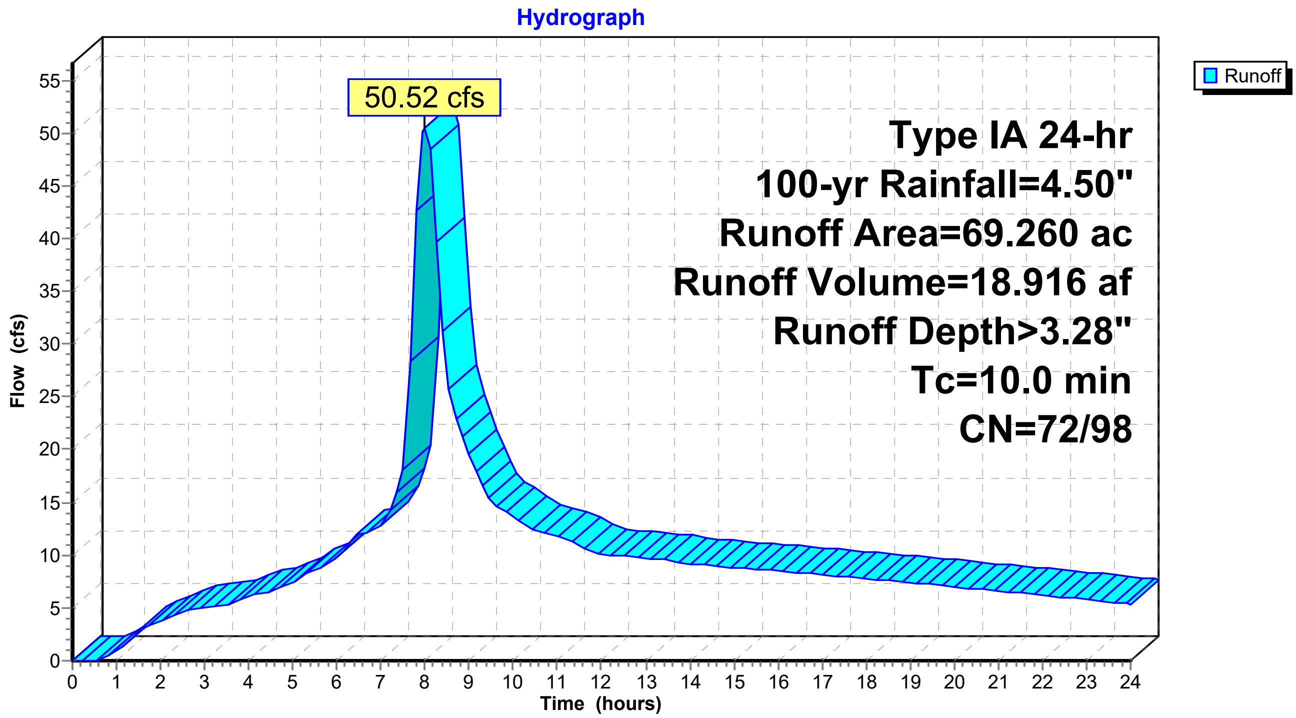
Runoff = 50.52 cfs @ 8.00 hrs, Volume= 18.916 af, Depth> 3.28"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.15 hrs
Type IA 24-hr 100-yr Rainfall=4.50"

	Area (ac)	CN	Description
*	18.750	98	Impervious in ROW
*	22.910	98	Impervious
*	24.290	74	Lawn - C Soil
*	3.310	61	Lawn - B Soil
	69.260	88	Weighted Average
	27.600		39.85% Pervious Area
	41.660		60.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment BASIN: DRAINAGE BASIN



Summary for Pond SWF: LID Stormwater Facility

Inflow Area = 69.260 ac, 60.15% Impervious, Inflow Depth > 3.28" for 100-yr event
Inflow = 50.52 cfs @ 8.00 hrs, Volume= 18.916 af
Outflow = 26.52 cfs @ 8.62 hrs, Volume= 12.238 af, Atten= 47%, Lag= 37.2 min
Primary = 26.52 cfs @ 8.62 hrs, Volume= 12.238 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.15 hrs
Peak Elev= 223.33' @ 8.55 hrs Surf.Area= 39,084 sf Storage= 299,123 cf

Plug-Flow detention time= 388.4 min calculated for 12.162 af (64% of inflow)
Center-of-Mass det. time= 179.3 min (881.2 - 701.9)

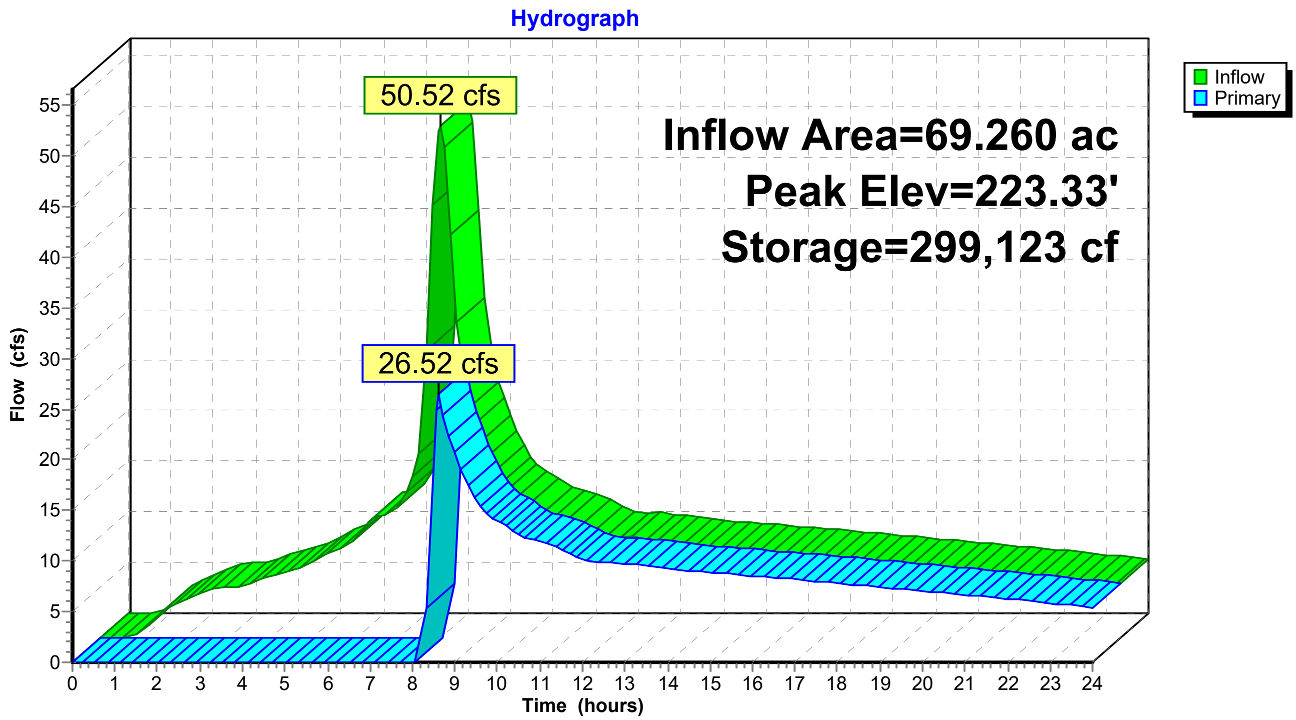
Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	326,019 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.00	12,700	0.0	0	0
211.90	12,700	30.0	11,049	11,049
212.00	12,700	100.0	1,270	12,319
213.00	14,800	100.0	13,750	26,069
214.00	16,900	100.0	15,850	41,919
215.00	19,000	100.0	17,950	59,869
216.00	21,200	100.0	20,100	79,969
217.00	23,500	100.0	22,350	102,319
218.00	25,800	100.0	24,650	126,969
219.00	28,200	100.0	27,000	153,969
220.00	30,600	100.0	29,400	183,369
221.00	33,100	100.0	31,850	215,219
222.00	35,600	100.0	34,350	249,569
223.00	38,200	100.0	36,900	286,469
224.00	40,900	100.0	39,550	326,019

Device	Routing	Invert	Outlet Devices
#1	Primary	223.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=24.19 cfs @ 8.62 hrs HW=223.32' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 24.19 cfs @ 1.86 fps)

Pond SWF: LID Stormwater Facility



Appendix E: Soils Information from the USDA Soil Survey of Clackamas County, Oregon

United States Department of Agriculture

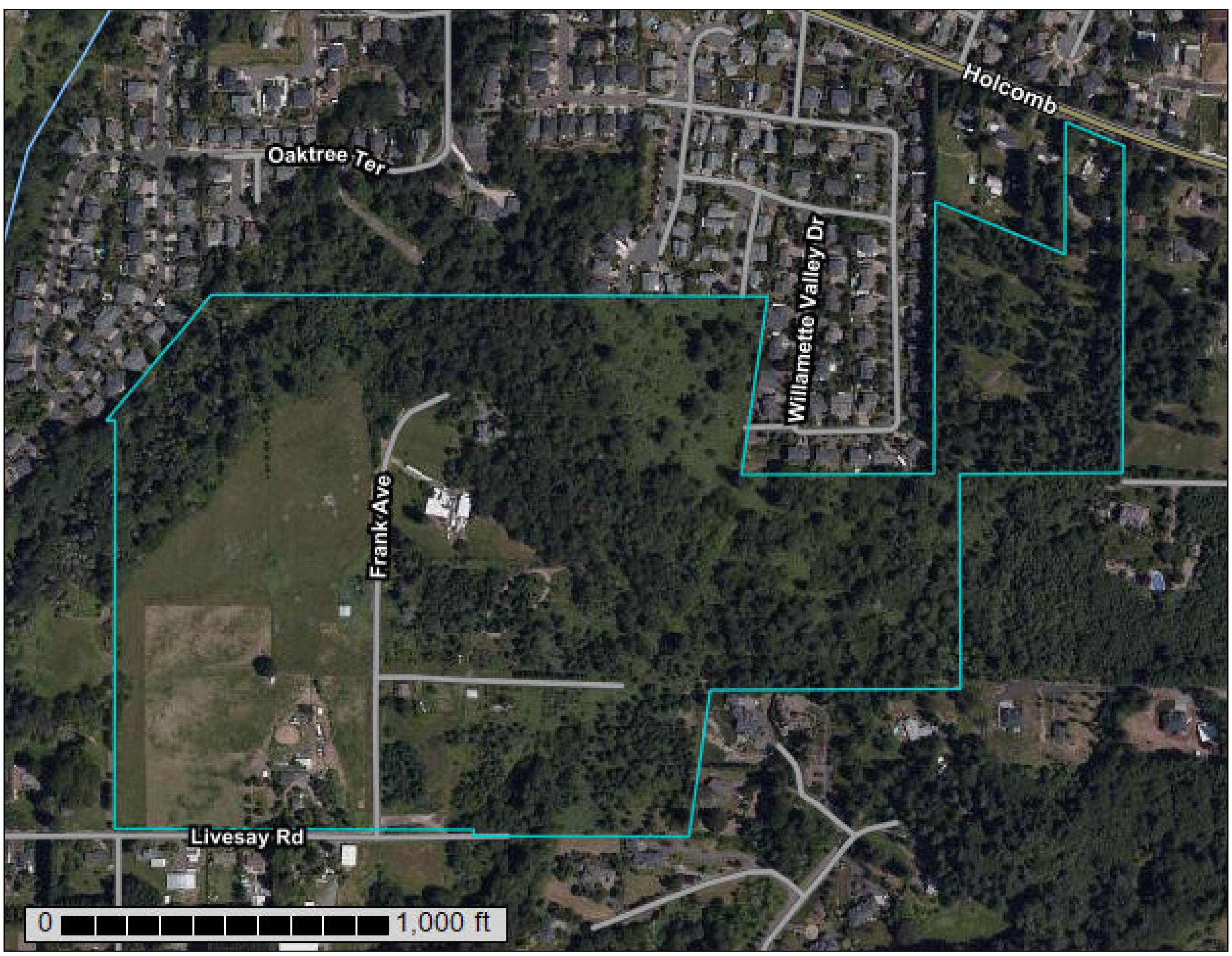
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Clackamas County Area, Oregon



May

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

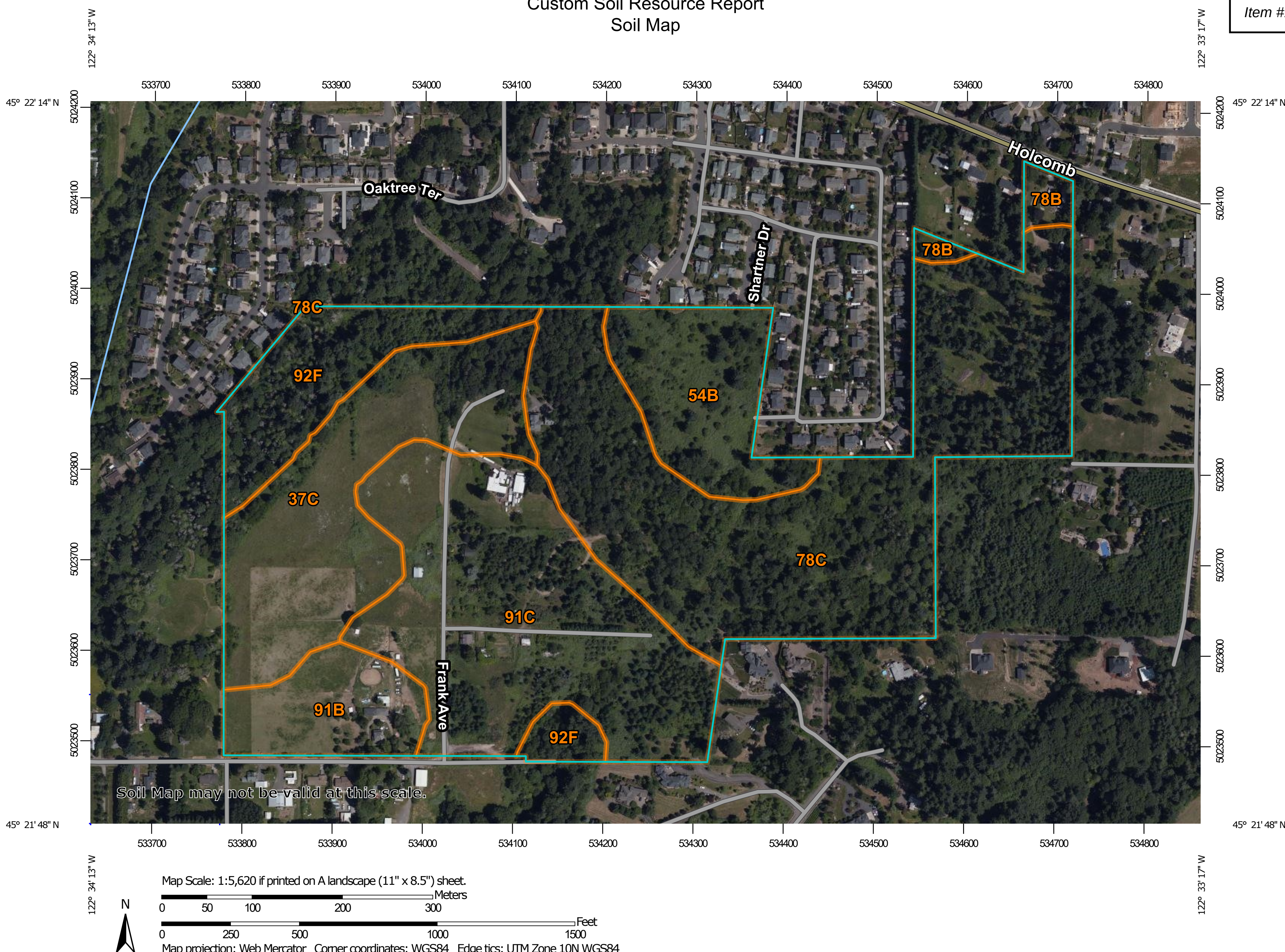
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Item #1.



Item #1.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2019—Jul 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
37C	Helvetia silt loam, 8 to 15 percent slopes	15.1	16.5%
54B	Laurelwood silt loam, 3 to 8 percent slopes	7.8	8.5%
78B	Saum silt loam, 3 to 8 percent slopes	1.2	1.3%
78C	Saum silt loam, 8 to 15 percent slopes	31.6	34.5%
91B	Woodburn silt loam, 3 to 8 percent slopes	5.4	5.9%
91C	Woodburn silt loam, 8 to 15 percent slopes	22.3	24.3%
92F	Xerochrepts and Haploxerolls, very steep	8.2	8.9%
Totals for Area of Interest		**91.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clackamas County Area, Oregon

37C—Helvetia silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 224m
Elevation: 250 to 1,400 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Helvetia and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helvetia

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed old alluvium

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 21 inches: silty clay loam
H3 - 21 to 40 inches: silty clay
H4 - 40 to 60 inches: silty clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Delena

Percent of map unit: 2 percent

Landform: Terraces, hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

54B—Laurelwood silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 225n
Elevation: 200 to 1,500 feet
Mean annual precipitation: 45 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Laurelwood and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Laurelwood

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty material over older clayey material

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 18 inches: silty clay loam
H3 - 18 to 46 inches: silty clay loam
H4 - 46 to 60 inches: silty clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

Minor Components

Aqualfs

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

78B—Saum silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2271
Elevation: 250 to 800 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Saum and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saum

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Material silty and colluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silty clay loam
H3 - 26 to 50 inches: gravelly silty clay loam
H4 - 50 to 54 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

78C—Saum silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2272
Elevation: 250 to 800 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Saum and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saum

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Material silty and colluvium

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silty clay loam
H3 - 26 to 50 inches: gravelly silty clay loam
H4 - 50 to 54 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

91B—Woodburn silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 227z
Elevation: 150 to 400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodburn and similar soils: 90 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified glaciolacustrine deposits

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 38 inches: silty clay loam
H3 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 25 to 32 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Huberly

Percent of map unit: 2 percent
Landform: Swales on terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Dayton

Percent of map unit: 1 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Aquolls

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

91C—Woodburn silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2280
Elevation: 150 to 400 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Woodburn and similar soils: 90 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodburn

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified glaciolacustrine deposits

Typical profile

H1 - 0 to 16 inches: silt loam
H2 - 16 to 38 inches: silty clay loam
H3 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 25 to 32 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Dayton

Percent of map unit: 2 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Aquolls

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

92F—Xerochrepts and Haploxerolls, very steep

Map Unit Setting

National map unit symbol: 2281
Elevation: 50 to 1,000 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerochrepts and similar soils: 50 percent
Haploxerolls and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerochrepts

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Colluvium derived from igneous rock

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 48 inches: gravelly clay loam
H3 - 48 to 60 inches: very cobbly clay loam

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Haploxerolls

Setting

Landform: Terraces

Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Colluvium derived from igneous rock

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 60 inches: very gravelly loam

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 36 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

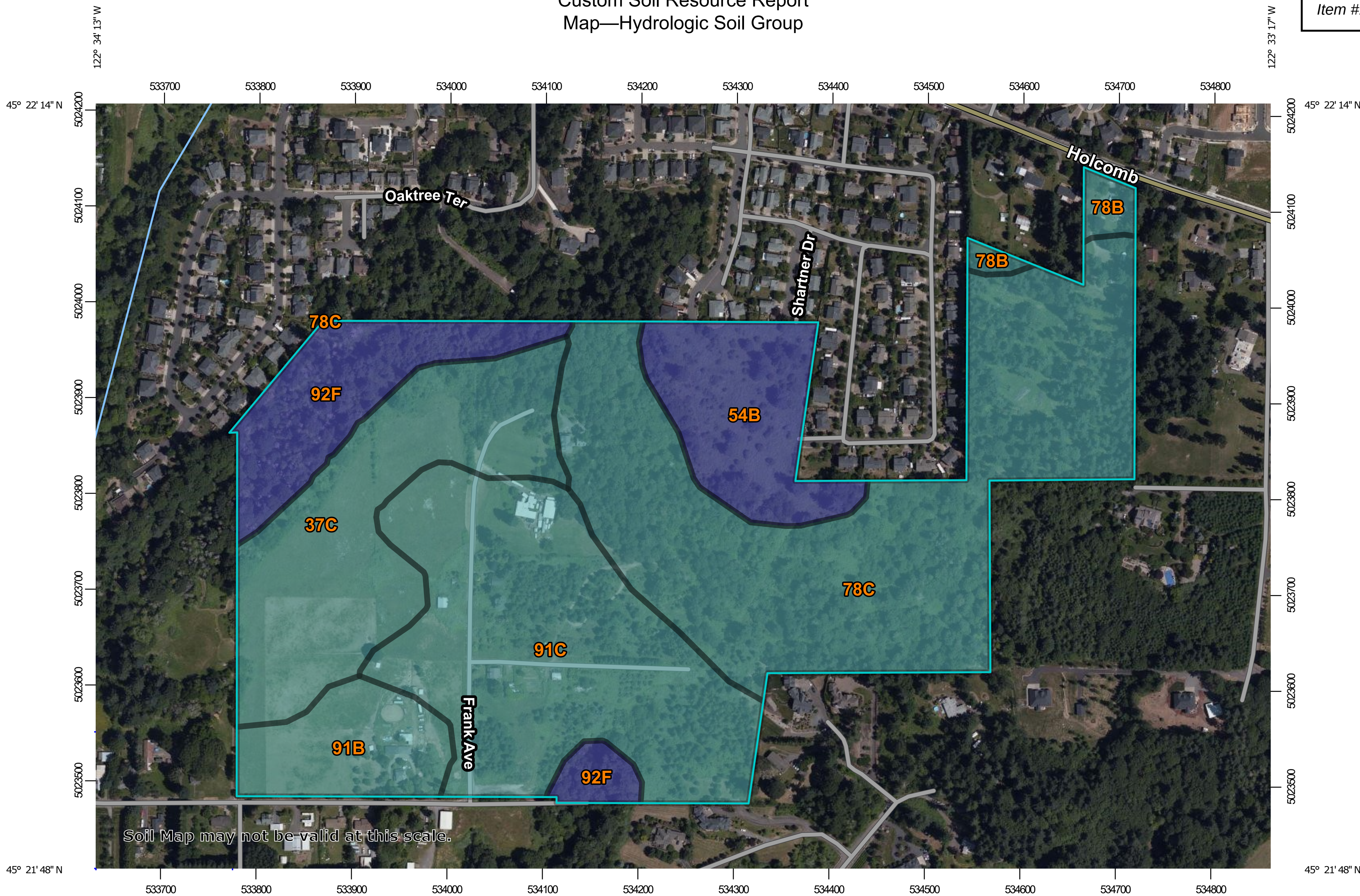
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:5,620 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Item #1.

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2019—Jul 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
37C	Helvetia silt loam, 8 to 15 percent slopes	C	15.1	16.5%
54B	Laurelwood silt loam, 3 to 8 percent slopes	B	7.8	8.5%
78B	Saum silt loam, 3 to 8 percent slopes	C	1.2	1.3%
78C	Saum silt loam, 8 to 15 percent slopes	C	31.6	34.5%
91B	Woodburn silt loam, 3 to 8 percent slopes	C	5.4	5.9%
91C	Woodburn silt loam, 8 to 15 percent slopes	C	22.3	24.3%
92F	Xerochrepts and Haploxerolls, very steep	B	8.2	8.9%
Totals for Area of Interest			**91.7**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix F: Relevant Information from the City

Brown AND Caldwell

FINAL REPORT | Prepared for
The City of Oregon City

Stormwater Master Plan

OREGON CITY

July 2019

2.3 Existing Conditions Land Use

During development of the 2015 *Pollutant Load Reduction Evaluation* the City generated an updated GIS layer to represent existing land use coverage (City 2015b). The land use coverage is based on the City's *Oregon City Comprehensive Plan* land use data and also incorporated vacant land data from Metro, which is based on 2013 aerial photos (City 2004). The land use categories from the *Oregon City Comprehensive Plan* were grouped into the land use modeling categories as shown in Figure 3. These updated GIS layers formed the basis of the existing condition land use analysis.

2.4 Future Conditions Land Use

For future conditions land use, it is assumed all vacant lands under existing conditions land use will be developed to match the City's comprehensive plan zoning. An additional shapefile was provided by the City for future land use, which is shown in Figure 4.

2.5 Impervious Coverage

The City calculated the impervious cover percentage for each modeled land use category in 2015. Each parcel in the city was assigned an impervious area percentage based on either Metro impervious area coverages or Clackamas County Assessor's data. Roads were assumed to have a 90 percent impervious coverage. The average impervious coverage for all parcels within each modeled land use category was then calculated as shown in Table 1.

Table 1. Modeled Land Use Categories

Comprehensive plan land use category	Modeled land use category	2015 modeled impervious percentage
Low-density residential (LR)	Single-family residential	45
Medium-density residential (MR)	Single-family residential	
High-density residential (HR)	Multi-family residential	57
Commercial (COM)	Commercial	74
Mixed-use corridor (MUC)	Commercial	
Mixed-use downtown (MUD)	Commercial	
Industrial (IND)	Industrial	63
Mixed-use employment (MUE)	Industrial	
Quasi-public	Public facility	34
Parks	Parks and open space	19
Future urban holding (FUH)	Agriculture [a]	48
All vacant	Vacant [b]	21

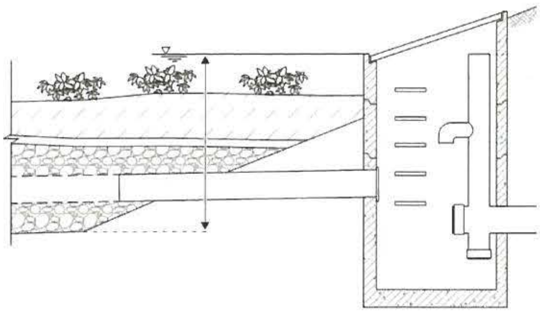
a. *The impervious percentage for agriculture is higher than expected because the only areas designated as agriculture are portions of small farms along Beavercreek Road in the southeast corner of Oregon City. The areas included in Oregon City limits are typically driveways and houses, which include the bulk of the impervious area for those properties.*

b. *Vacant lands include areas of all land use categories that are not currently developed or are not developed to the density indicated in the comprehensive plan (City 2004). Vacant land includes unused COM and IND land along the Oregon Highway 205 corridor.*

Stormwater and Grading Design Standards

March 2020

OREGON CITY



ance system being designed. The design events for conveyance system sizing are listed in **Table 5-1**. Design rainfall intensities and 24-hour storm events are included in **Section 5.3.3 and 5.3.4**.

Table 5-1. Conveyance System Design Storms

Contributing drainage area	Design storm for conveyance system sizing		
	Storm sewer, culverts, and outfall pipes[a]	Creek or stream channels	Bridges
Less than 40 acres	10-year, 24-hour storm	10-year, 24-hour storm	100-year, 24-hour storm
40 to 640 acres	25-year, 24-hour storm	25-year, 24-hour storm	
640 acres or greater	50-year, 24-hour storm	50-year, 24-hour storm	

[a] *When a backwater condition exists, the storm drain system shall be designed to convey and contain at least the peak runoff for the 25-year design storm as described in* ***Section 5.3.6.***

5.3.2 Design Methodology

The following are general design considerations for conveyance sizing requirements:

A. Conveyance systems shall be designed and constructed to carry the design storm flowing full with no pressure flow. Flow conditions in existing pipe systems will be evaluated on a case-by-case basis for adequacy.

B. Conveyance systems in the public right-of-way (ROW) shall be designed as gravity systems, without the use of stormwater pumps. Privately-owned and maintained stormwater pumps may be allowed with City approval as described in **Section 5.13**.

C. The Rational Method for computing peak discharge is preferred by the City. The Rational Method shall be used for all existing and proposed conveyance systems that receive drainage from contributing areas of 25 acres or less and that have a time of concentration (Tc) of less than 100 minutes. For all other conditions, an approved hydrograph method (ex. Santa Barbara Urban Hydrograph (SBUH), Natural Resources Conservation Service (NRCS) Method, or Technical Release 55 (TR-55)), stormwater management model (SWMM), or other standard method as approved by the City shall be used.

D. Manning's equation generally shall be acceptable for determining pipe or open channel capacity for drainageways with a contributing area of 50 acres or less. For larger drainage areas, backwater effects shall be included in determining capacity for a drainageway, typically using HEC RAS or equivalent computer modeling software.

5.3.3 Rational Method

The Rational Method is most applicable for runoff estimates from small drainages with large amounts of impervious area, as is typical within Oregon City. When using the Rational Method, refer to the Oregon Department of Transportation (ODOT) *Hydraulics Manual* for calculation formulas and tables of coefficients.

APPENDIX H. HYDROGRAPH METHOD GUIDELINES

The Santa Barbara Urban Hydrograph (SBUH) method was developed by the Santa Barbara County Flood Control and Water Conservation District to determine a runoff hydrograph for an urbanized area. It is a simpler method than some other approaches, as it computes a hydrograph directly without going through intermediate steps (i.e., a unit hydrograph) to determine the runoff hydrograph.

The SBUH method is a popular method for calculating runoff, since it can be done with a spreadsheet or by hand relatively easily. The SBUH method can be used to calculate peak flows and runoff volumes for sizing conveyance systems or stormwater management facilities when flow-duration matching is not required.

Elements of the SBUH Method

The SBUH method depends on several variables:

- Design storm
- Pervious (A_p) and impervious (A_{imp}) land areas
- Time of concentration (Tc) calculations
- Runoff curve numbers (CN) applicable to the site

These elements shall all be presented as part of the submittal process. In addition, maps showing the pre-development and post-development conditions shall be presented to help in the review.

Design Storm

The SBUH method also requires a design storm to perform the runoff calculations. Oregon City uses a NRCS Type 1A 24-hour storm distribution. This storm is shown in **Figure H-1** at the end of this appendix. The depth of rainfall for the water quality design storm shall be 1.0 inches[1] in 24 hours. The depth of rainfall for the 2 through 100-year 24-hour storm events is shown below in **Table H-1.**

Table H-1. 24-hour Rainfall Depths in Oregon City

Recurrence Interval, Years	24-Hour Depth, Inches
2	2.8
10	3.5
25	4.0
50	4.4
100	4.5

Source: NOAA Atlas 2, Volume X

[1] The water quality design storm rainfall depth as documented in a technical memorandum: *Selection of Representative Rainfall Volume and Rainfall Intensities to result in Capture and Treatment of 80% of the Average Annual Runoff Volume*, Brown and Caldwell, May 11, 2010.

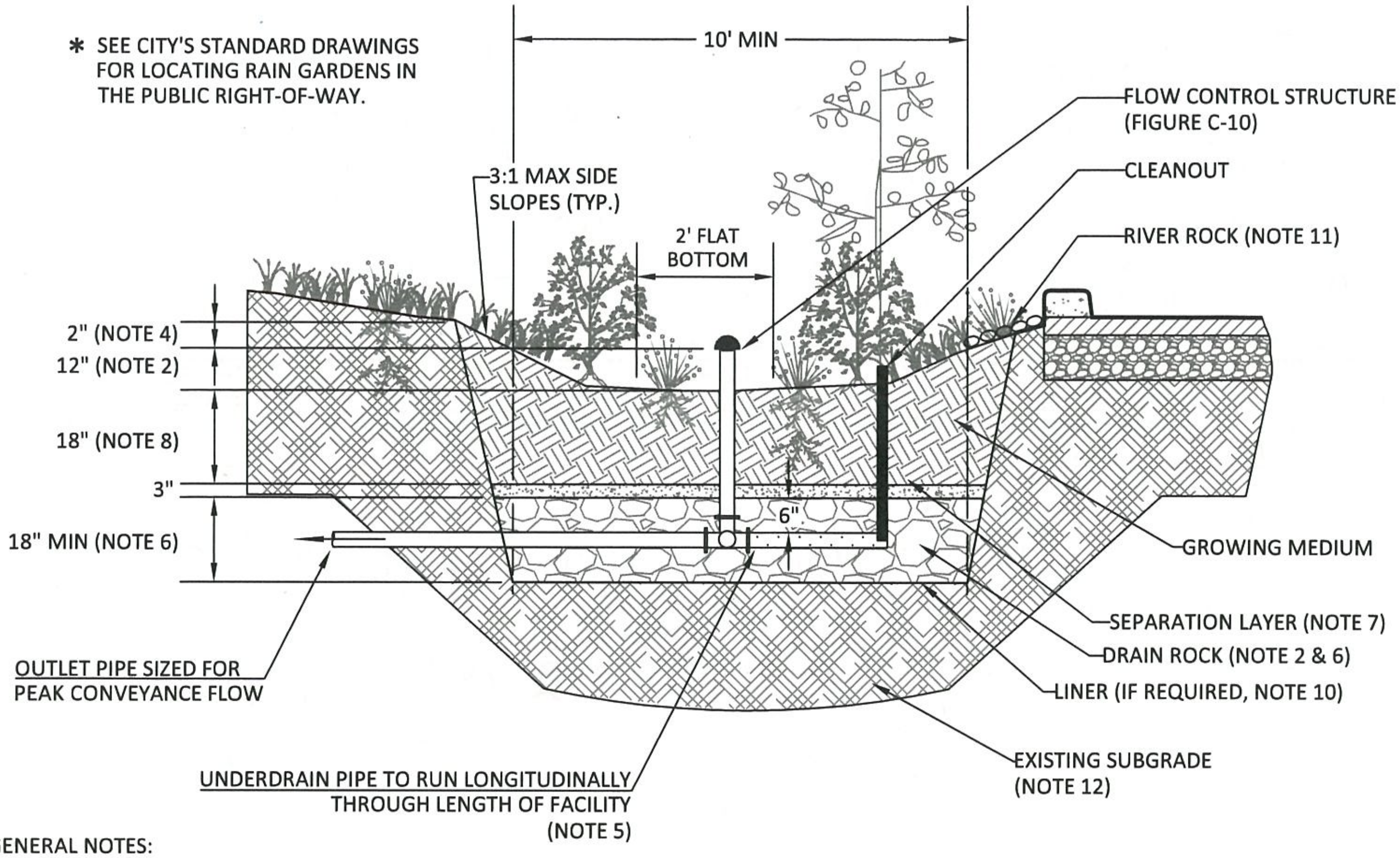
The curve numbers presented in **Tables H-2 and H-3** are for wet antecedent moisture conditions. Wet conditions assume previous rainstorms have reduced the capacity of soil to absorb water. Given the frequency of rainstorms in the Portland area, wet conditions are most likely, and give conservative hydrographic values.

Hydrologic Soil Group descriptions, critical to determining the appropriate curve numbers are included in **Table H-4**.

Table H-2. Runoff Curve Numbers for Urban Areas*

Cover Descriptions	Average Percent Impervious Area	Curve Numbers for Hydrologic Soil Group			
Cover Type and Hydrologic Condition		A	B	C	D
Open space (lawns, parks, golf courses, cemeteries, etc.)					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads					
Paved: curbs and stone sewers (excluding right-of-way)		98	98	98	98
Paved: open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Urban districts					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82

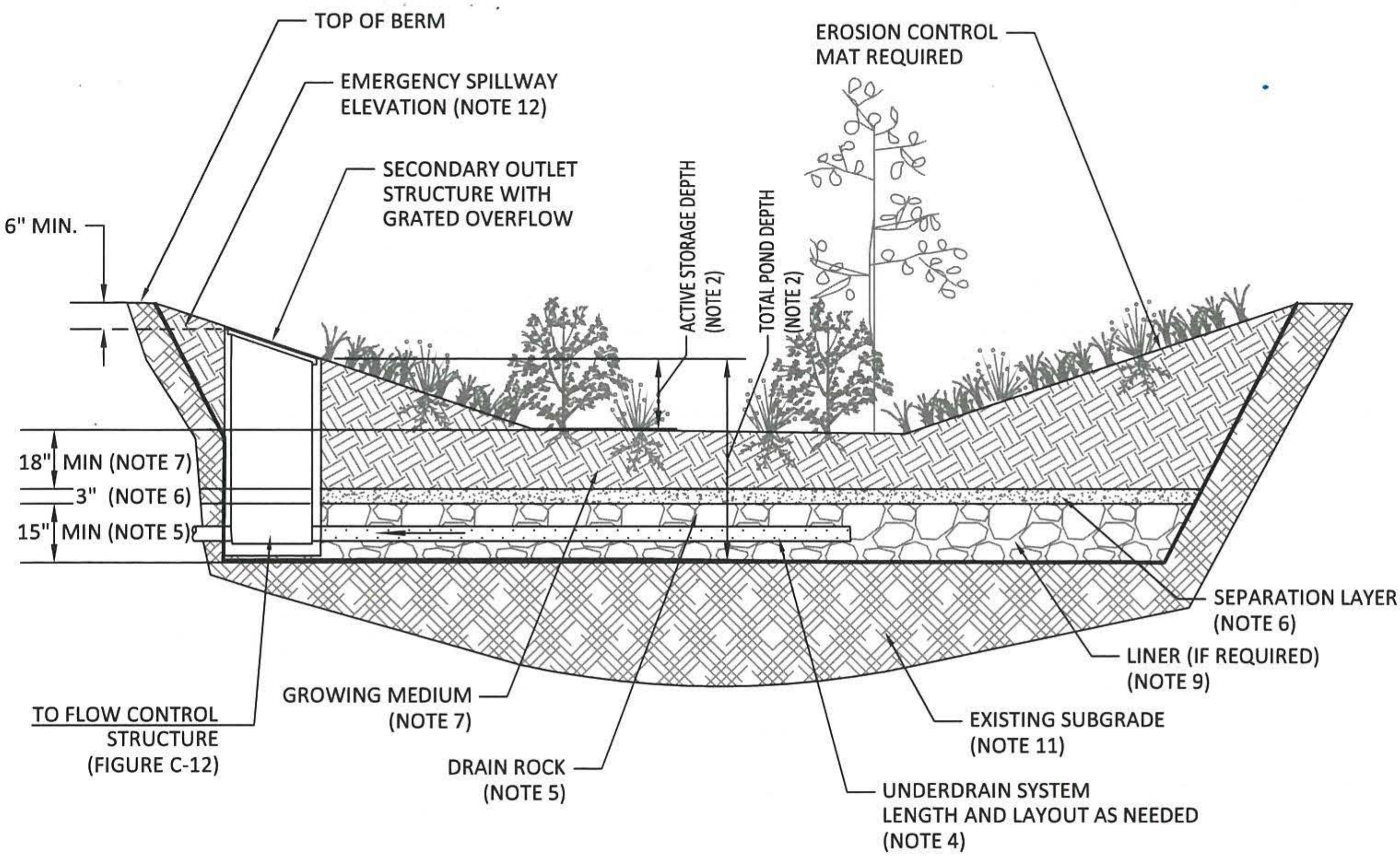
**Soil Conservation Service, Urban Hydrology for Small Watersheds, Technical Release 55, pp. 2.5-2.8, June 1986.*



GENERAL NOTES:

1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED SWALES ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. **DIMENSIONS:**
   -DEPTH OF SWALE (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
   -LONGITUDINAL SLOPE OF SWALE: 6.0% OR LESS
   -FLAT BOTTOM WIDTH: 2' MINIMUM
   -SIDE SLOPES OF SWALE: 3:1 MAXIMUM
   -FACILITY AREA SHALL BE MEASURED AT THE DEEPEST SECTION (DRAIN ROCK) OF FACILITY
3. **SETBACKS:**
   -FILTRATION SWALES MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. **OVERFLOW:**
   -INLET ELEVATION MUST ALLOW FOR 2" OF FREEBOARD, MINIMUM. PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
   -IDENTIFY EMERGENCY OVERFLOW ROUTE ON THE STORMWATER MANAGEMENT PLAN.
5. **PIPING:**
   -PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
   -OVERFLOW PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH. 40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
   -SIZE: 1 1/2" - 3/4" WASHED
   -DEPTH: 12"
7. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
   -18" MINIMUM
   -SEE APPENDIX A FOR SPECIFICATION OR USE SAND/LOAM/COMPOST 3-WAY MIX.
   -FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
10. **WATERPROOF LINER (IF REQUIRED):** SHALL BE 30 MIL PVC OR EQUIVALENT.
11. **INSTALL RIVER ROCK** OR SPLASH PAD TO TRANSITION FROM INLETS TO GROWING MEDIUM. SIZE OF ROCK SHALL BE 1" TO 3".
12. **SEASONAL HIGH GROUNDWATER SEPARATION:**
    -SEPARATION DISTANCE AS REQUIRED BY CITY.
13. **CHECK DAMS:** SHALL BE PLACED ACCORDING TO FACILITY DESIGN.

Vegetated Swale - Filtration
Figure C-7



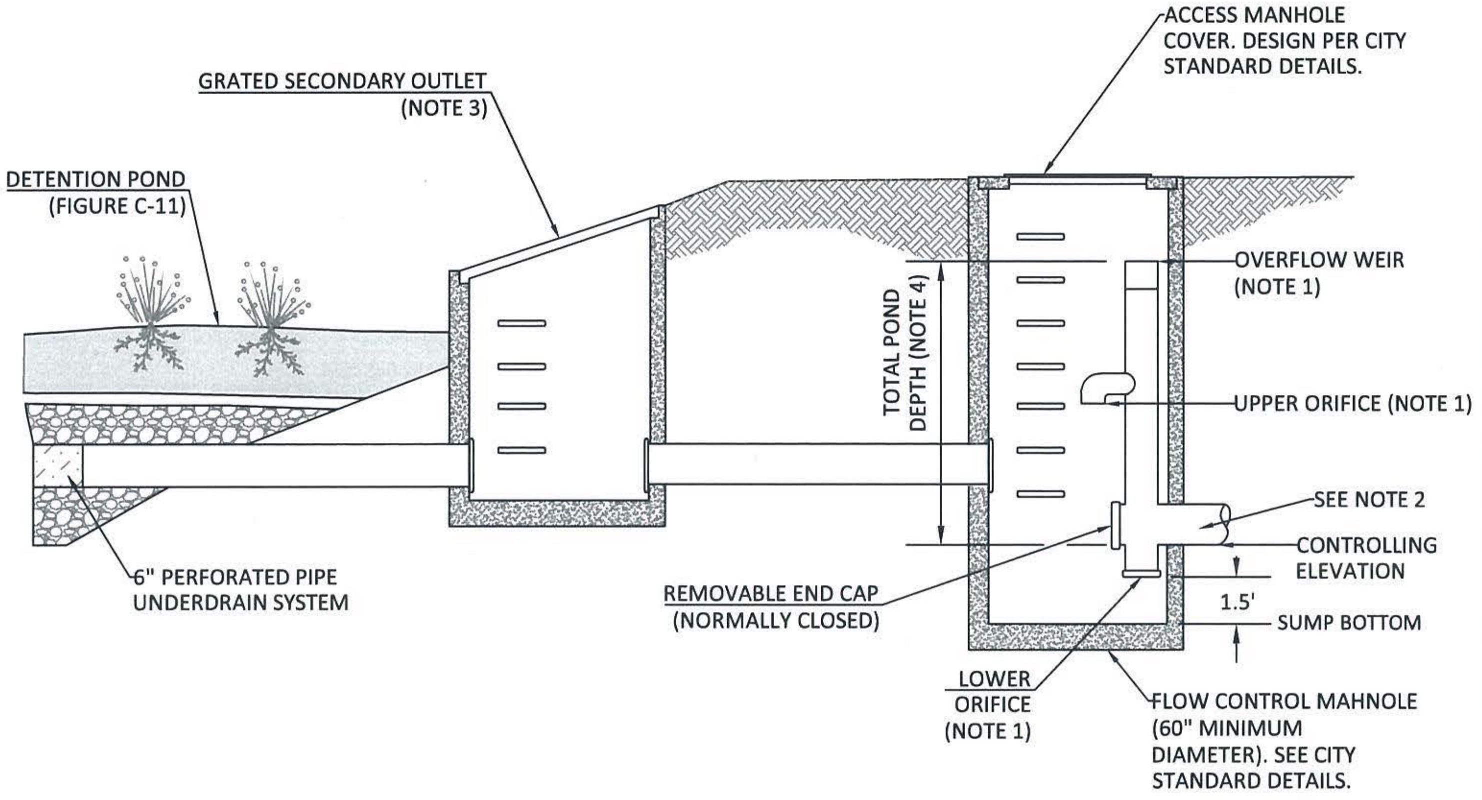
GENERAL NOTES:

1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED PONDS ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. **DIMENSIONS:**
   -ACTIVE STORAGE DEPTH (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): PER FACILITY SIZING MODEL
   -FACILITY AREA SHALL BE MEASURED AT THE DEEPEST SECTION (DRAIN ROCK) OF FACILITY.
   -TOTAL POND DEPTH: 4' MINIMUM, PER FACILITY SIZING MODEL
   -BOTTOM SLOPE: 2.0% OR LESS
   -SIDE SLOPES OF DETENTION POND: 3:1 MAXIMUM
3. **SETBACKS:**
   -DETENTION POND MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. **PIPING:**
   -PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON OR PVC SCH. 40. 6" MINIMUM DIAMETER. PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
5. **DRAIN ROCK:**
   -SIZE: 1 1/2" - 3/4" WASHED
   -DEPTH: 15" MINIMUM
6. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
   -18" MINIMUM
   -SEE APPENDIX A FOR SPECIFICATION OR USE SAND/LOAM/COMPOST 3-WAY MIX.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
9. **WATERPROOF LINER (IF REQUIRED):** SHALL BE 30 MIL PVC OR EQUIVALENT FOR DETENTION POND.
10. **INSTALL RIVER ROCK** OR SPLASH PAD TO TRANSITION FROM INLETS TO GROWING MEDIUM. SIZE OF ROCK SHALL BE 1" TO 3".
11. **SEASONAL HIGH GROUNDWATER SEPARATION:**
    -SEPARATION DISTANCE AS REQUIRED BY CITY.
12. **EMERGENCY SPILLWAY** SIZED TO CONVEY THE 100 - YEAR DESIGN STORM. PROVIDE 6" MINIMUM FREEBOARD ABOVE THE 100 - YEAR DESIGN STORM.

Detention Pond
Figure C-11

OREGON CITY
STORMWATER AND GRADING DESIGN STANDARDS

DETENTION POND FLOW CONTROL STRUCTURE



NOTES:
1. ORIFICE AND WEIR DIMENSIONS AND ELEVATION DETERMINED THROUGH FACILITY SIZING MODEL.
2. PIPE SIZING DETERMINED BY ENGINEER.
3. SECONDARY OUTLET SIZED FOR PEAK DESIGN STORM.
4. TOTAL POND DEPTH, PER FACILITY SIZING MODEL, INCLUDES GROWING MEDIA, SEPARATION LAYER, AND DRAIN ROCK AS SHOWN ON FIGURE C-11.

Detention Pond Flow Control Structure
Figure C-12

Detention Pond
Operations & Maintenance Plan

Detention Ponds remove pollutants through several processes: sedimentation, filtration, and biological processes. The facility owner must keep a log, recording all inspection dates, observations, and maintenance activities. The following items shall be inspected and maintained as stated:

What to Look For	What to Do
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
Clogged inlets or outlets	-Remove sediment and debris from catch basins, trench drains, curb inlets and pipes to maintain at least 50% conveyance capacity at all times.
Cracked Drain Pipes	-Repair/seal cracks. Replace when repair is insufficient.
Clogged Control Structures	-Remove accumulated sediment and debris.
Vegetation shall cover 90% of the facility.	
Dead or strained vegetation	-Replant per original planting plan, or substitute from Appendix A. -Irrigate as needed. Mulch banks annually. DO NOT apply fertilizers, herbicides, or pesticides.
Tall Grass and Vegetation	-Cut back grass and prune overgrowth 1-2 times per year. Remove cuttings.
Weeds	-Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours.	
Gullies	-Fill, lightly compact, and plant vegetation to disperse flow.
Erosion	-Replace splash blocks or inlet gravel/rock.
Slope Slippage	-Stabilize 3:1 Slopes/banks with plantings from Appendix A.
Ponding	-Rake, till, or amend to restore infiltration rate.

Annual Maintenance Schedule:

All facility components, vegetation, and source controls shall be inspected for proper operations and structural stability. These inspections shall occur, at a minimum, quarterly for the first 2 years from the date of installation, and 2 times per year thereafter, and within 48 hours after each major storm event.

Access: Maintain ingress/egress to design standards.

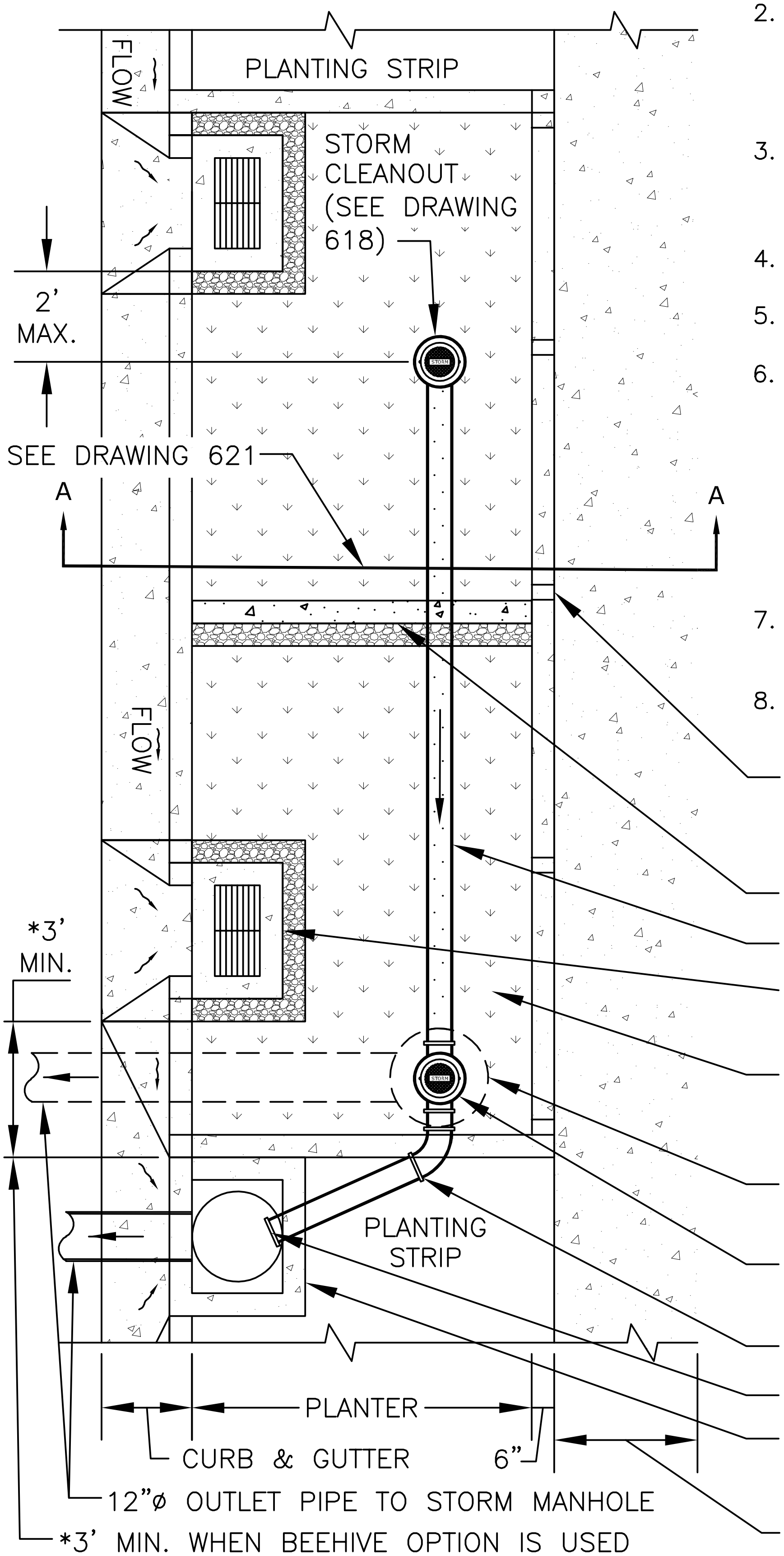
Infiltration/Flow Control: All facilities shall drain within 72 hours. Record time/date, weather, and site conditions when ponding occurs.

Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact emergency response agencies for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Clackamas County Vector Control for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

Item #1.

PLAN VIEW

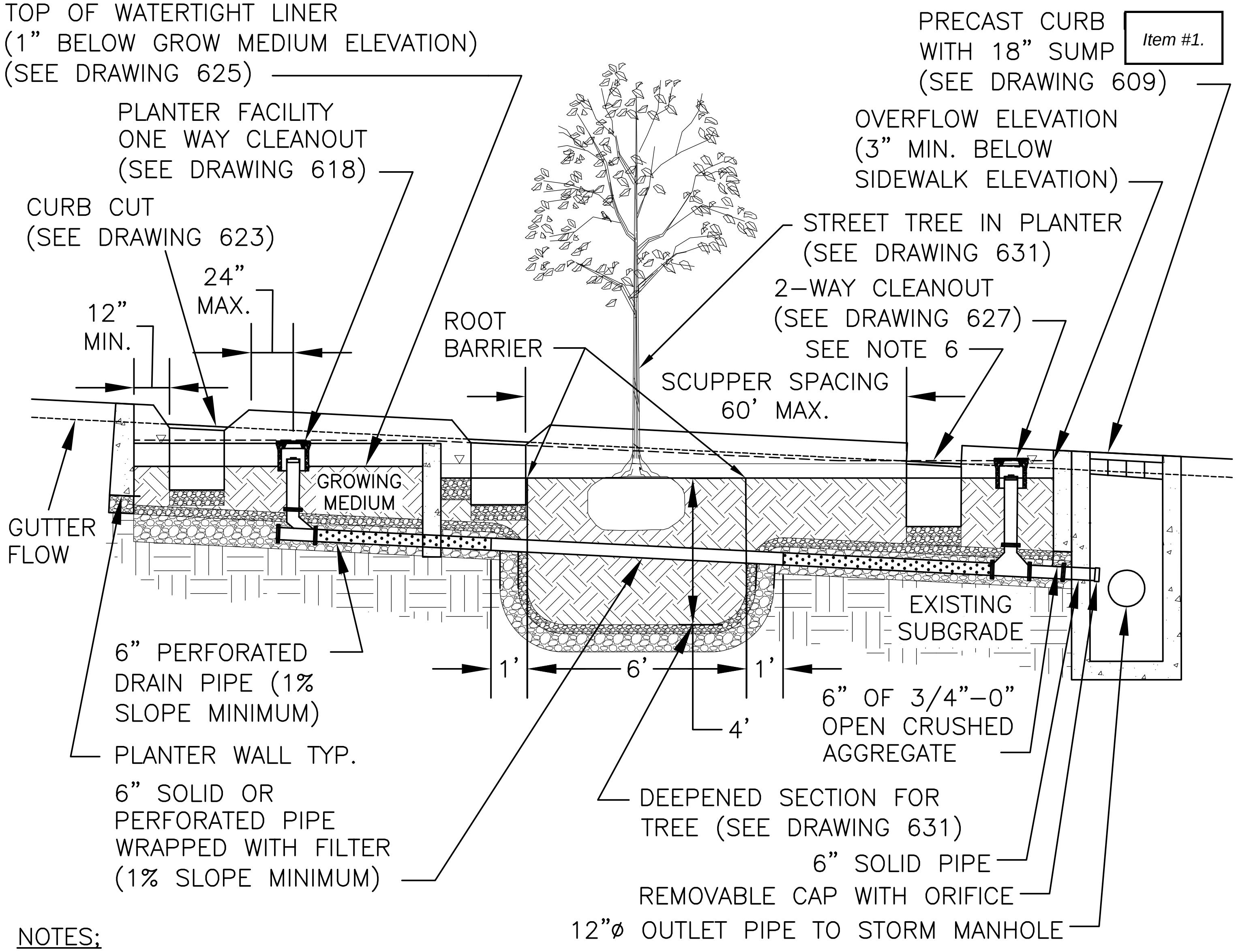


NOTES:

1. THIS PLAN VIEW IS ONLY AN EXAMPLE TO GUIDE ENGINEERED DESIGN.
2. PROVIDE BEGINNING AND ENDING STATIONS FOR EACH FACILITY. PROVIDE STATIONING AND/OR DIMENSIONS AND ELEVATIONS AT EACH INLET, OUTLET, CHECK DAM, PLANTER CORNER.
3. SIDEWALK ELEVATION MUST BE SET ABOVE CHECK DAM AND INLET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET BEFORE SIDEWALK.
4. PROPOSED UTILITY LINES TO BE LOCATED OUT OF FACILITY.
5. 4" WIDE NOTCH AT LOW POINT(S) OF SIDEWALK AND/OR EVERY 6FT.
6. BEEHIVE STRUCTURE TO BE UTILIZED WHEN OVERFLOW CANNOT BE CONVEYED TO AN APPROVED STORM INLET STRUCTURE IN LIEU OF DRAIN PIPE CONNECTING TO AN APPROVED STORM INLET STRUCTURE. BEEHIVE STRUCTURE TO HAVE 12"ø OUTLET PIPE CONNECTING TO AN APPROVED OUTLET STRUCTURE SUCH AS A STORM MANHOLE, SEE DRAWING 626.
7. STORMWATER FACILITY GROWING MEDIUM SHALL MEET REQUIREMENTS OF APPENDIX A OF CITY STORMWATER MANUAL.
8. SEE DRAWING 620 FOR ROADSIDE STORMWATER PLANTER ELEVATION.

DRAWN SP			City of Oregon City Public Works Standard Drawings	SCALE N.T.S.
ENGR. A.F.G.				DATE JUNE 2017
REV.	DATE	APPR.	ROADSIDE STORMWATER PLANTER PLAN VIEW	APPR. A.F.G.
				DWG. NO. 619

Item #1.



NOTES;

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC PRIOR TO, DURING AND AFTER CONSTRUCTION.

2. SCUPPERS SHALL BE SPACED NO MORE THAN 60 FEET APART AND ONE AT EACH END OF A PLANTER.

3. SLOPE OF PLANTER TO NOT EXCEED 0.5%.

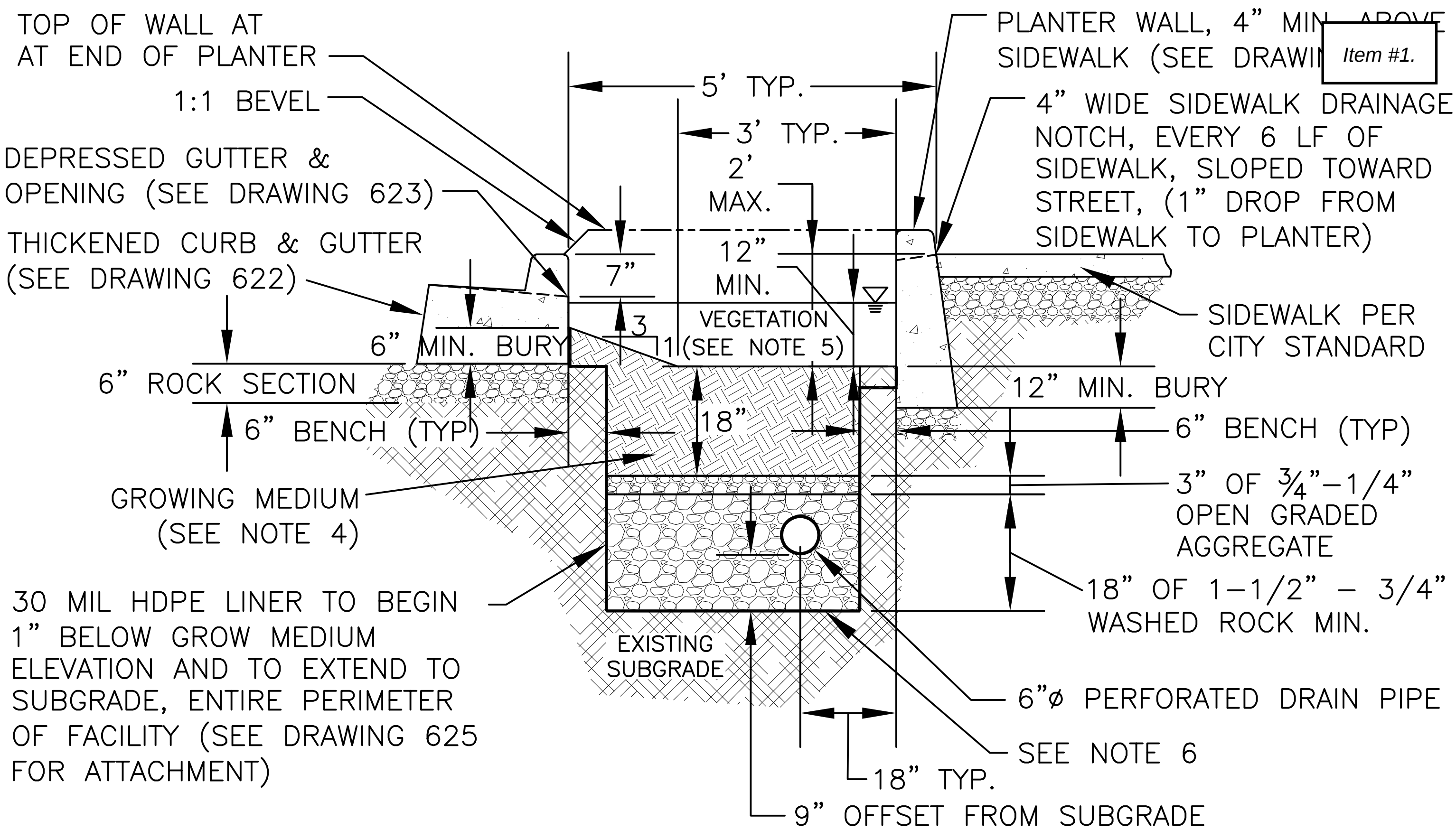
4. PIPE SHALL BE PVC D3034 SDR 35, 6" MINIMUM DIAMETER. PIPING MUST HAVE 1% SLOPE MINIMUM, BOTTOM OF PIPE SHALL BE SET AT 9" ABOVE EXISTING SUBGRADE.

5. ALL PIPE TO HAVE GASKET JOINTS AND GASKETED JOINT FITTINGS.

6. OVERFLOW
   - MUST FLOW TO APPROVED OUTLET STRUCTURE PER OREGON CITY STORMWATER MANUAL
   - BEEHIVE STRUCTURE TO BE UTILIZED WHEN OVERFLOW CANNOT BE CONVEYED TO CURB INLET OR AN APPROVED STORM INLET STRUCTURE. SEE DRAWING 619 AND 626.

7. THIS ELEVATION VIEW IS ONLY AN EXAMPLE, TO GUIDE ENGINEERED DESIGN.

DRAWN SP			City of Oregon City Public Works Standard Drawings	SCALE	N.T.S.
ENGR. A.F.G.				DATE	JUNE 2017
REV.	DATE	APPR.	ROADSIDE STORMWATER PLANTER ELEVATION	APPR.	A.F.G
1	06/20	DW		DWG. NO.	620

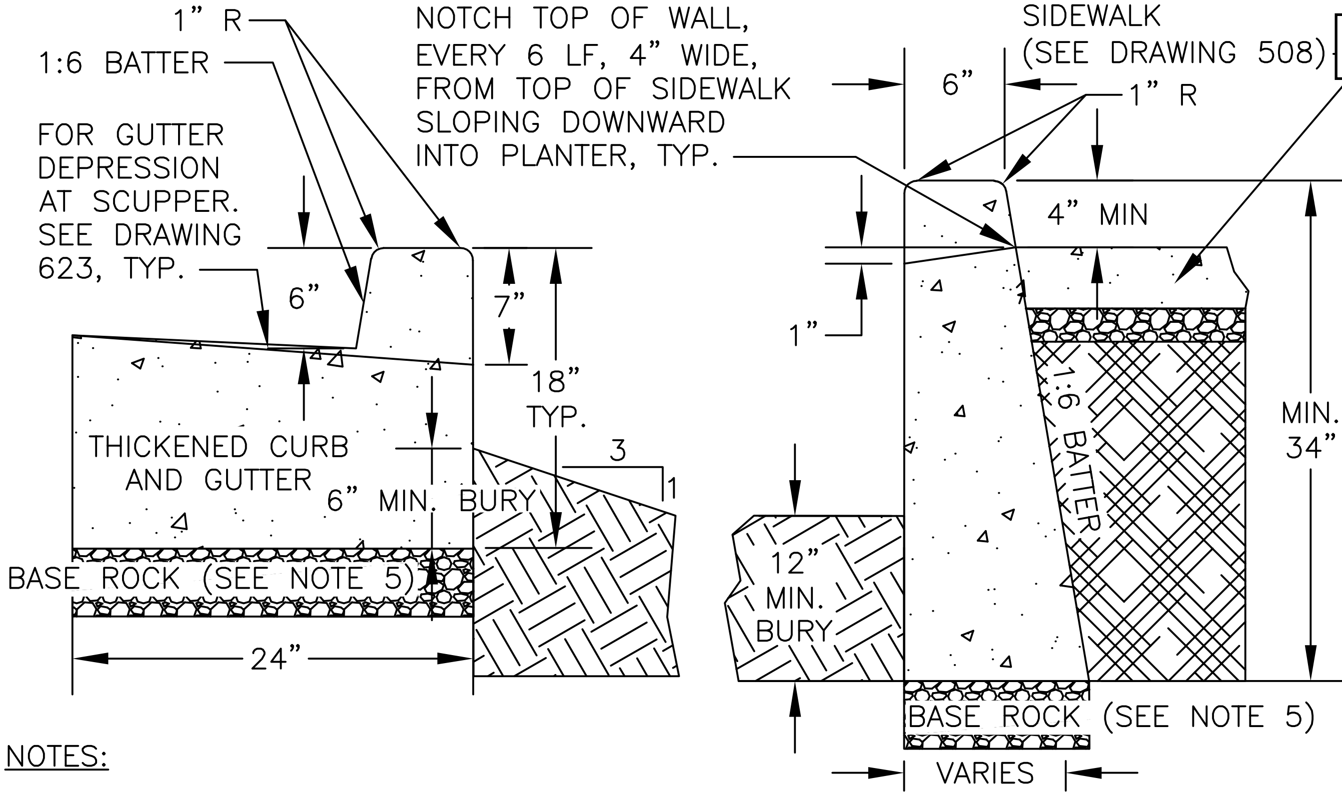


SECTION A-A
PLANTER

NOTES:

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. DIMENSIONS:
   - –TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION SHALL BE A MINIMUM OF 12”.
   - –TOP OF SIDEWALK ELEVATION ADJACENT TO PLANTER SHALL BE NO LESS THAN 3” ABOVE GUTTER ELEVATION.
   - –TOP OF SIDEWALK ELEVATION ADJACENT TO PLANTER SHALL BE NO GREATER THAN 24” FROM TOP OF PLANTER GROWTH MEDIUM.
3. PIPING:
   - –PIPE SHALL BE PVC D3034 SDR 35, 6” MINIMUM DIAMETER WITHIN PLANTER. PIPING MUST HAVE 1% SLOPE, BOTTOM OF PIPE SHALL BE SET AT 9” ABOVE EXISTING SUBGRADE.
   - –OVERFLOW SHALL BE PIPED TO A STANDARD CURB INLET/CATCH BASIN STRUCTURE OR STORM MANHOLE, SEE DRAWING 619.
4. GROWING MEDIUM: SEE APPENDIX A OF STORMWATER MANUAL FOR SPECIFICATION.
5. VEGETATION: REFER TO PLANTING REQUIREMENTS IN APPENDIX A OF STORMWATER MANUAL, SEE DRAWING 630 FOR PLANT SPACING REQUIREMENTS.
6. WATERTIGHT LINER (SEE DRAWING 625 FOR LINER ATTACHMENT REQUIREMENTS):
   - –WHEN WITHIN CONTAMINATED SOIL OR 10’ OF STRUCTURE FOUNDATION OR PAVED STRUCTURAL SECTION OR UNDERGROUND STRUCTURES, BOTTOM OF FACILITY MUST BE LINED WITH A WATERTIGHT LINER.
   - –LINER SHALL BE 30 MIL HDPE OR APPROVED EQUAL.
   - –LINER SHALL BE PLACED AROUND ENTIRE PERIMETER OF FACILITY.
   - –LINER REQUIRED UNLESS FACILITY’S BOTTOM AND SIDES ARE MONOLITHIC CONCRETE.
7. CHECK DAMS:
   - –REINFORCED CONCRETE CHECK DAMS SHALL BE PLACED AT LEAST EVERY 30 FEET.
8. MINIMUM PLANTER WALL HEIGHT OF 34”.

DRAWN	SP		City of Oregon City Public Works Standard Drawings	SCALE	N.T.S.
ENGR.	A.F.G.			DATE	JUNE 2017
REV.	DATE	APPR.	ROADSIDE STORMWATER PLANTER SECTION	APPR.	A.F.G
1 2	08/17 06/20	AFG DW		DWG. NO.	621



NOTES:

1. CONCRETE SHALL BE AIR–ENTRAINED MINIMUM 4.5% AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AFTER 28 DAYS.
2. ALL CONCRETE SURFACES SHALL BE SMOOTH AND FREE FROM DEFECTS AND SHALL HAVE A LIGHT BROOM TEXTURED FINISH.
3. EXPANSION JOINTS (CURB AND SIDEWALK ONLY):
   A. TO BE PROVIDED:
      1) AT EACH COLD JOINT.
      2) AT EACH END OF DRIVEWAYS.
      3) AT EACH POINT OF TANGENCY OF THE CURB.
      4) AT LOCATIONS NECESSARY TO LIMIT SPACING TO 45 FEET.
   B. MATERIAL TO BE USED IS "REFLEX RUBBER JOINT EXPANSION" JOINT MATERIAL, OR CITY APPROVED EQUAL, WITH A THICKNESS OF 1/2 INCH.
4. CONTRACTION JOINTS (CURB AND SIDEWALK ONLY):
   A. SPACING TO BE NOT MORE THAN 10 FEET REGARDLESS OF LOCATION OF DRAINAGE NOTCH
   B. THE DEPTH OF THE JOINT SHALL BE AT LEAST 1–1/2 INCHES WITH 1/2–INCH MAXIMUM RADIUS TROWEL JOINT.
   C. PLACE JOINT ON EACH SIDE OF SCUPPER INLET (SEE DRAWING 623)
5. BASE ROCK TO BE 3/4"–0", 95% COMPACTION PER AASHTO T 180. BASE ROCK SHALL BE 6" MINIMUM IN DEPTH.
6. SIDEWALK CONTRACTION JOINTS SHALL BE PLACED IN LINE WITH ONE OF THE DRAINAGE NOTCH CORNERS.
7. SIDEWALK ELEVATION MUST BE SET ABOVE STREET INLET/OULET ELEVATIONS TO ALLOW OVERFLOW TO DRAIN TO STREET OR PIPED OVERFLOW SYSTEM AS APPLICABLE.
8. CHECK DAMS:
   –REINFORCED CONCRETE CHECK DAMS SHALL BE PLACED EVERY 30 FEET STARTING FROM UPPER END WALL
   –CHECK DAMS SPACING MAY BE DECREASED TO KEEP LONGITUDINAL SLOPE OF PLANTER FROM EXCEEDING .05%

DRAWN	SP		City of Oregon City Public Works Standard Drawings	SCALE	N.T.S.
ENGR.	A.F.G.			DATE	JUNE 2017
REV.	DATE	APPR.	ROADSIDE STORMWATER PLANTER WALL DETAIL	APPR.	A.F.G
1 2 3	8/18 6/19 6/20	AFG DW DW		DWG. NO.	622

Stormwater Planters
Operations & Maintenance Plan

What to Look For	What to Do
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
Clogged inlets or outlets	-Remove sediment and debris from catch basins, trench drains and curb inlets and pipes to maintain at least 50% conveyance capacity at all times.
Cracked Drain Pipes	-Repair/seal cracks. Replace when repair is insufficient.
Check Dams	-Maintain 4 to 10 inch deep rock check dams at design intervals.
Vegetation	
Dead or strained vegetation	-Replant per original planting plan, or substitute from Appendix A. -Irrigate as needed. Mulch banks annually. DO NOT apply fertilizers, herbicides, or pesticides.
Tall Grass and Vegetation	-Cut back grass and prune overgrowth 1-2 times per year. Remove cuttings.
Weeds	-Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours.	
Gullies	-Fill, lightly compact, and plant vegetation to disperse flow.
Erosion	-Replace splash blocks or inlet gravel/rock.
Slope Slippage	-Stabilize 3:1 slopes/banks with plantings from Appendix A.
Ponding	-Rake, till, or amend to restore infiltration rate.

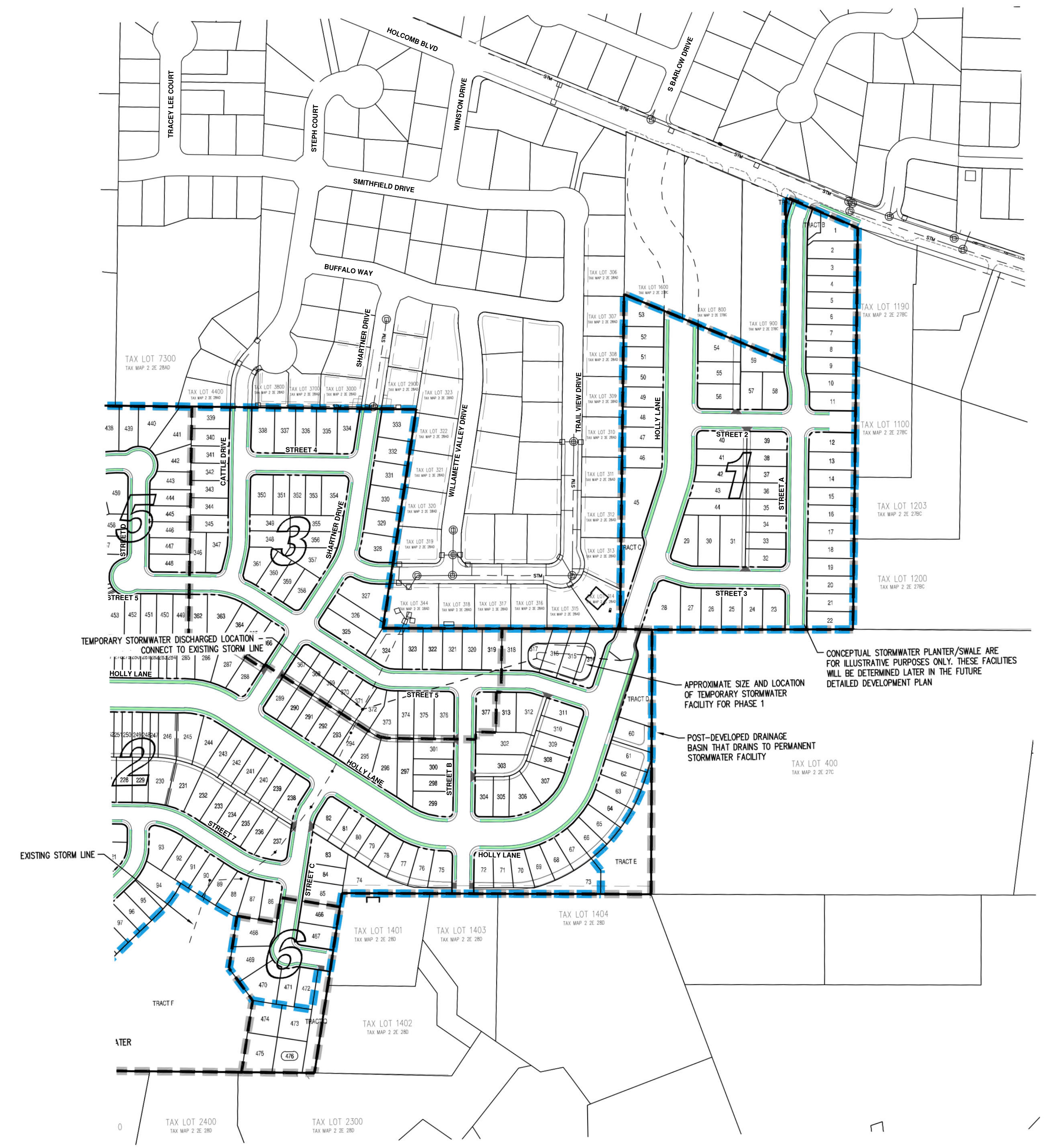
Annual Maintenance Schedule:

Summer. Make any structural repairs. Improve filter medium as needed. Clear drain. Irrigate as needed.
Fall. Replant exposed soil and replace dead plants. Remove sediment and plant debris.
Winter. Monitor infiltration/flow-through rates. Clear inlets and outlets/overflows to maintain conveyance.
Spring. Remove sediment and plant debris. Replant exposed soil and replace dead plants. Mulch.
All seasons. Weed as necessary. Clean scuppers or curb inlets as needed.
Maintenance Records: Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the inspector.
Access: Maintain ingress/egress to design standards.
Infiltration/Flow Control: All facilities shall drain within 72 hours. Record time/date, weather, and site conditions when ponding occurs.
Pollution Prevention: All sites shall implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Contact emergency response agencies for immediate assistance responding to spills. Record time/date, weather, and site conditions if site activities contaminate stormwater.
Vectors (Mosquitoes & Rodents): Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Clackamas County Vector Control for immediate assistance to eradicate vectors. Record time/date, weather, and site conditions when vector activity observed.

Stormwater Planter O&M Plan
Figure C-3

Appendix G: Phase 1 Temporary Stormwater Facility Sizing

Item #1.



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ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

POST-DEVELOPED BASIN MAP FOR PHASE 1
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER:	7404
DATE:	07/15/2021
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

AKS DRAWING FILE: 7404 POST-MAP UPDATED.DWG | LAYOUT: POST-MAP PHASE 1

WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Park Place Crossing Phase 1 Temporay Stormwater Facility
Project Type	Subdivision
Location	
Stormwater Management Area	8100
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
Impervious in ROW (C soil)	161,730	Forested	ConventionalConcrete	C	LID Stormwater Planter/Swale in ROW
Pervious in ROW (C soil)	17,970	Forested	Grass	C	LID Stormwater Planter/Swale in ROW
Pervious in Lots (C soil)	175,318	Forested	Grass	C	LID Stormwater Planter/Swale in ROW
Impervious in Lots (C soil)	143,442	Forested	Roofs	C	LID Stormwater Pond
Impervious Alley (C soil)	9,200	Forested	ConventionalConcrete	C	LID Stormwater Planter/Swale in ROW

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
LID Stormwater Planter/Swale in ROW	WaterQuality	Stormwater Planter - Filtration	Lined	3,404.8	3,410.0	2.7

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
LID Storm water Pond	FCWQT	Lined	8.00	8,024.0	3	35,940.6	31,286.9	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: LID Stormwater Pond
Design: FlowControlAndTreatment

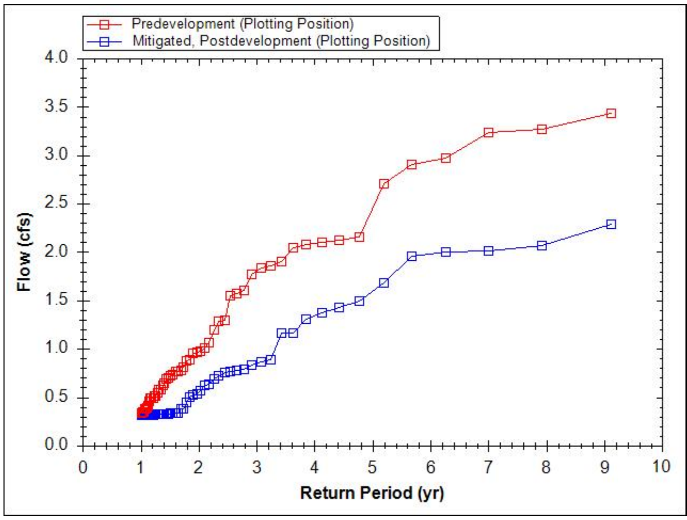
Shape Curve

Depth (ft)	Area (sq ft)
8.0	8,024.0

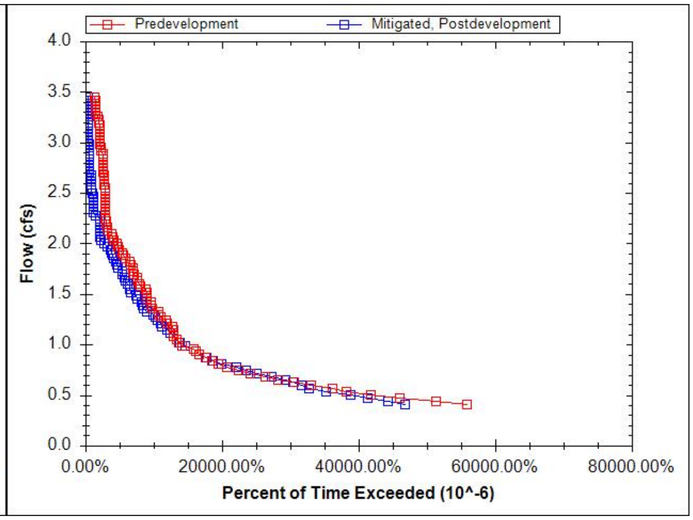
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	2.3
Upper Orifice Invert(ft)	5.4
Upper Orifice Dia (in)	8.5
Overflow Weir Invert(ft)	7.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



lancaster mobley

Park Place Crossing Master Plan

Transportation Impact Study
Oregon City, Oregon

REGISTERED PROFESSIONAL ENGINEER
88808PE
OREGON
MAR 12, 2019
DANIEL W STUMPF
RENEWS: 6/30/2022

Date:
January 13, 2022

Prepared for:
Harlan Borow
ICON Construction & Development, LLC

Prepared by:
Daniel Stumpf, PE
Todd Mobley, PE

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Executive Summary

1. This transportation impact study supports the General Development Plan for Park Place Crossing. No homes can be constructed, and the project will not generate any traffic impacts until a Detailed Development Plan is submitted, reviewed, and approved in the future.
2. The Park Place Crossing Master Plan project includes the construction of a 477-lot residential subdivision over six phases on multiple properties located at or near 15110 S Holcomb Boulevard in Oregon City, Oregon. Portions of the site near the southern edge of the Master Plan area will be dedicated for future development of retail, civic, and park land area.
3. Access to the site will be provided via the proposed interim Street A and S Winston Drive intersections along S Holcomb Boulevard. Additional emergency vehicle access will be available via Shartner Drive for Phase 1; however, this access will be closed once emergency access to S Livesay Road is opened during Phase 2. Following future development of properties addressed at 15030/15050 S Holcomb Boulevard, the Street A access along S Holcomb Boulevard will close following completion of the new access (S Holly Lane extension) located opposite of S Barlow Drive. The location of the interim Street A and the future alignment of S Holly Lane were recommended by Oregon City staff. Until the S Holly Lane extension is constructed, the interim Street A access will need to be maintained to provide sufficient access and circulation to and within the site.
4. The trip generation calculations show that the site is projected to generate a net additional 290 morning peak hour trips, 390 evening peak hour trips, and 4,064 average weekday trips.
5. No significant trends or crash patterns were identified at any of the study intersections that were indicative of safety concerns.
6. Provided any obstructing foliage near the access locations and along the south side of S Holcomb Boulevard are removed or properly maintained, adequate sight distances can be made available to ensure safe operation of the temporary Street A intersection, while adequate sight distances can be made available at the S Barlow Drive intersection to allow safe and efficient operation of the future S Holly Lane approach. No other sight distance related mitigation is necessary or recommended.
7. Left-turn lane warrants are not projected to be met at any of the study intersections under any analysis scenario.
8. Due to insufficient main and side street traffic volumes, traffic signal warrants are not projected to be met at the access study intersections under any of the analysis scenarios.
9. All access study intersections are currently operating acceptably per Oregon City standards and are projected to continue operating acceptably through the 2030 site buildout year, regardless of whether the S Holly Lane connection to S Holcomb Boulevard is constructed.
10. The intersections of Redland Road at OR-213 and Redland Road at Holcomb Boulevard/Abernethy Road are projected to operate acceptably per jurisdictional standards for all analysis scenarios during the peak hour (1st hour) through year 2030.

11. The following mitigation measures were reviewed for demonstrative purposes only to show the study intersections can operate acceptably per City and ODOT standards. Applicable agencies may consider alternative mitigation as preferential to those described below. If any mitigation is required for either or both of the intersections, a methodology for determining proportionate share fee contributions towards mitigation should be issued to the applicant of the Park Place Crossing Master Plan

    For the intersection of Redland Road at OR-213, the intersection is projected to operate in excess of acceptable per jurisdictional standards during the 2nd evening peak hour under 2026 buildout conditions (Phase 1) and for all succeeding analysis scenarios through year 2030. Additionally, extended queuing beyond available lane storage is expected to occur at some of the turn lanes of the two Redland Road study intersections. Although no specific mitigation is planned at either intersection, the following may potentially be implemented to address these capacity and potential queuing issues:

    a. Redland Road at OR-213
        i. Add an additional eastbound left-turn lane for a total of three left-turn lanes.
        ii. Restripe the north intersection leg to include three receiving lanes.
        iii. Extend the northbound left-turn storage lane to accommodate 95th percentile queues.
    b. Redland Road at Holcomb Boulevard/Abernethy Road
        i. Revise the west intersection leg to include one receiving travel lane, one left-turn lane, one through lane, and one right-turn lane.
        ii. Extend the eastbound left-turn storage into the center two-way left-turn turn to accommodate 95th percentile queues.

    Note the aforementioned mitigation were reviewed for demonstrative purposes to show the study intersections could operate acceptably per City and ODOT standards. Applicable agencies may consider alternative mitigation as preferential to those detailed above. Once appropriate mitigation have been determined for both intersections, a methodology for determining proportionate share fee contributions towards mitigation should be issued to the applicant of the Park Place Crossing Master Plan.

12. Conditions of Approval from the annexation detailed proportional share contributions are to be collected for several transportation facilities requiring mitigation which could be impacted by the Park Place Crossing Master Plan. Oregon City staff have indicated that proportional share contributions were subsequently modified in the Pre-Application notes. In addition, the current trip generation are lower than those anticipated at the time of the annexation, which may further decrease the proportional share amounts associated with the Park Place Crossing Master Plan. As part of each future Detailed Development Plan, proportional share fees will be contributed to the following facilities:

    a. 14th Street and 15th Street, between OR-99E and John Adams Street (TSP Project D7 and D8)
    b. S Redland Road at S Holly Lane (TSP Project D36)
    c. S Holcomb Boulevard at S Holly Lane (TSP Project D43)
    d. I-205 SB Ramps at OR-99E (TSP Project D75)
    e. I-205 NB Ramps at OR-99E (TSP Project D76)
    f. OR-213, near the S Redland Road Undercrossing (TSP Project D79)
    g. S Holcomb Boulevard at S Redland Road
    h. OR-213 at Beavercreek Road

13. The analysis in this Master Plan study does not consider the S Holly Lane connection to S Redland Road as was previously assumed for the Park Place Annexation project. Therefore, some of the proportionate share fees, and particularly additional mitigation at the two Redland Road study intersections, may be reduced or possibly become unnecessary. To address this uncertainty, it is recommended that a trip accounting letter, and if necessary, an updated traffic analysis, be prepared as each phase of the project is constructed. This will enable accurate tracking of projected impacts to the two Redland Road intersections and other transportation projects.

Project Description

Introduction

The Park Place Crossing Master Plan project includes the construction of a 477-lot residential subdivision over six phases on multiple properties located at or near 15110 S Holcomb Boulevard in Oregon City, Oregon. Each phase will include the following:

- Phase 1: 60 single-family detached dwelling units
- Phase 2: 133 single-family detached dwelling units and 126 single-family attached dwelling units
- Phase 3: 59 single-family detached dwelling units
- Phase 4: 53 single-family detached dwelling units
- Phase 5: 35 single-family detached dwelling units
- Phase 6: 11 single-family detached dwelling units

Portions of the site near the southern edge of the Master Plan area will be dedicated for future development of retail, civic, and park land area. Access to the site will be provided via the proposed interim Street A and S Winston Drive intersections along S Holcomb Boulevard. Additional emergency vehicle access will be available via Shartner Drive for Phase 1; however, this access will be closed once emergency access to S Livesay Road is opened during Phase 2 Following future development of properties addressed at 15030/15050 S Holcomb Boulevard, the Street A access along S Holcomb Boulevard will be closed and a new access (S Holly Lane extension) located opposite of S Barlow Drive will be constructed. The location of the interim Street A and the future alignment of Holly Lane were recommended by Oregon City staff. Until the S Holly Lane extension is constructed, the interim Street A access will need to be maintained to provide sufficient access and circulation to and within the site. Following the closure of the Street A access, the 60th lot of Phase 1 will be constructed.

Based on correspondence with Oregon City's transportation consultant, the transportation study includes an analysis of the following:

- An estimate of site trip generation and distribution.
- Tracking of trip impacts at intersections determined as requiring mitigation per the previously prepared *Park Place Annexation Transportation Impact Study* (TIS).
- A review of crash history, sight distances, turn lane warrants, and access spacing standards at proposed access locations.
- Review of the S Holly Lane collector through the site and a review of the future capacity/operation of S Holly Lane's future intersection with S Holcomb Boulevard.

- A capacity/operation analysis at the following intersections:
    1. S Winston Drive at S Holcomb Boulevard
    2. S Barlow Drive at S Holcomb Boulevard
    3. Proposed Street A at S Holcomb Boulevard
    4. Redland Road at OR-213 (Capacity and Queuing Analysis Only)
    5. Redland Road at Holcomb Boulevard/Abernethy Road (Capacity and Queuing Analysis Only)

The purpose of this study is to determine whether the transportation system within the vicinity of the site is capable of safely and efficiently supporting the existing and proposed uses, and to determine any mitigation that may be necessary to do so. Detailed information on traffic counts, trip generation calculations, safety analyses, and level of service calculations is included in the appendix to this report.

Location Description

Project Site Description

The project site is located north of S Livesay Road and south of S Holcomb Boulevard in Oregon City, Oregon. The site consists of 14 tax lots which encompass an approximate total of 92± acres. The site is currently developed with six single-family houses, five of which may be removed in order to accommodate redevelopment of the site.

Access to the site will be provided via the existing intersection of S Winston Drive at S Holcomb Boulevard, after the Phase 3 street connections are constructed, and the proposed interim Street A intersection at S Holcomb Boulevard. Prior to construction of Phase 3, Phases 1 and 2 will be served by the Street A connection and an emergency vehicle access in the form of a gravel road to Shartner Drive (closed once emergency access to S Livesay Road becomes available during construction of Phase 2). All subsequent Phases will take access via S Winston Drive and the interim Street A; however, emergency vehicle access to S Livesay Road will remain available.

Note the location of the interim Street A was selected based on discussions with Oregon City staff. Following future development of properties opposite of S Barlow Drive along S Holcomb Boulevard (tax lots 800 and 1600), the Street A connection to S Holcomb Boulevard will be removed and a new connection (S Holly Lane) will be constructed opposite of S Barlow Drive (see the *S Holly Lane Intersection Location* section of the report for further details). With removal of the Street A connection, the 60th lot of Phase 1 will be constructed.

Figure 1 presents an aerial image of the nearby vicinity with the General Development Plan Area outlined in yellow.

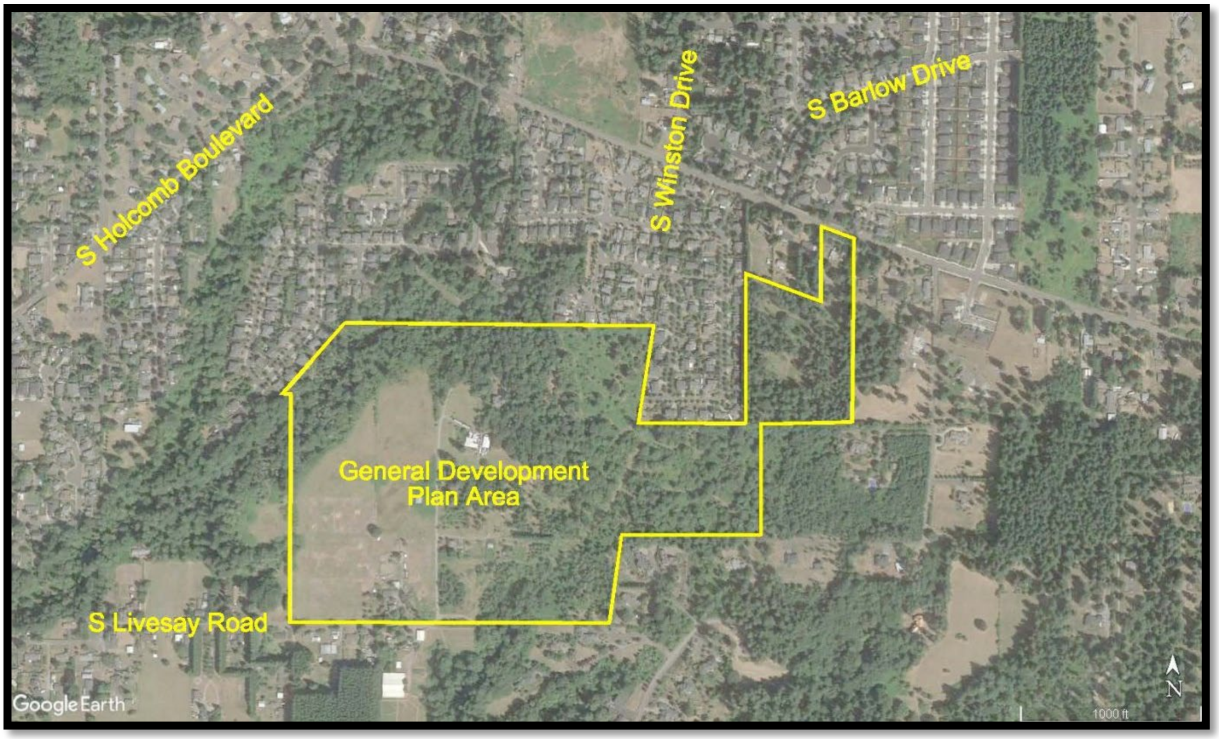


Figure 1: Aerial Photo of Site Vicinity (Image from Google Earth)

Vicinity Roadways

In the future, with Detailed Development Plans, this Master Plan may impact the nearby roadways of S Holcomb Boulevard, S Barlow Drive, and S Winston Drive. Table 1 provides a description of these vicinity roadways.

Table 1: Vicinity Roadway Descriptions

Street Name	Jurisdiction	Functional Classification	Speed (MPH)	Curbs & Sidewalks	On-Street Parking	Bicycle Lanes
OR-213	ODOT	Expressway/ District Hwy	55	None	Not Permitted	Both Sides
Redland Road	Clackamas County/ODOT	Minor Arterial	45	Partial Both Sides	Not Permitted	Both Sides
S Barlow Drive	Oregon City	Local Street	25	Both Sides	Permitted	None
S Winston Drive	Oregon City	Local Street	25	Partial Both Sides	Permitted	None

Table Notes: Functional Classification and Jurisdiction based on Oregon City's TSP and ODOT's Online TransGIS map.

Table 1: Vicinity Roadway Descriptions (Continued)

Street Name	Jurisdiction	Functional Classification	Speed (MPH)	Curbs & Sidewalks	On-Street Parking	Bicycle Lanes
Abernethy Road	Clackamas County	Minor Arterial	35	Partial Both Sides	Not Permitted	Both Sides
S Holcomb Boulevard	Oregon City	Minor Arterial	35	Partial Both Sides	Partially Permitted	Partial Both Sides

Table Notes: Functional Classification and Jurisdiction based on Oregon City's TSP and ODOT's Online TransGIS map.

Study Intersections

Based on coordination with Oregon City's transportation consultant, analysis of site access intersections is required. There are two intersections which currently exist where a summarized description of these study intersections is provided in Table 2.

Table 2: Study Intersection Descriptions

Number	Intersection	Geometry	Traffic Control	Phasing/Stopped Approaches
1	S Winston Drive at S Holcomb Boulevard	Four-Legged	Stop-Controlled	NB/SB Stop-Controlled Approaches
2	S Barlow Drive at S Holcomb Boulevard	Three-Legged	Stop-Controlled	SB Stop-Controlled Approach
4	Redland Road at OR-213	Three-Legged	Signal	Protected NB/EB Left-turns, Permitted/Overlap SB/EB Right-turns
5	Redland Road at Holcomb Boulevard/Abernethy Road	Four-Legged	Signal	Protected Left-turns on All Approaches

Two vicinity maps showing the project site, vicinity streets, and study intersections under their existing/planned configurations are shown in Figure 2 and Figure 3. Specifically, Figure 2 depicts the access intersections along S Holcomb Boulevard while Figure 3 depicts the Redland Road study intersections.

Figure 2
Park Place Crossing Master
1/13/2

VICINITY MAP
Site Access Intersections

lancaster **mobley**

Figure 3

Park Place Crossing Master

1/13/2

VICINITY MAP

Redland Road Intersections

lancaster **mobley**

Site Trips

Trip Generation

The Park Place Crossing Master Plan project will include the construction of 351 single-family detached houses and 126 single-family attached houses over six phases of development, removing and/or maintaining 6 existing single-family detached houses for a net increase of 471 dwelling units. To estimate the number of trips that are currently and will be generated by the existing and proposed uses, trip equations from the *Trip Generation Manual*[1] were used. Specifically, data from land use code 210, *Single-Family Detached Housing*, and 215, *Single-Family Attached Housing*, were used to estimate site trip generation based on the number of dwelling units. For the purposes of simplicity and for maintaining a conservative analysis, it is assumed that all 60 houses in Phase 1 will developed, regardless of whether the Street A connection is maintained or removed pending construction of the S Holly Lane intersection at S Holcomb Boulevard.

The trip generation calculations show that the proposed project will generate an additional 290 morning peak hour trips, 390 evening peak hour trips, and 4,064 average weekday trips. The trip generation estimates are summarized in Table 3. Detailed trip generation calculations are included in the technical appendix.

Table 3: Trip Generation Summary

	ITE Code	Size/ Variable	Morning Peak Hour			Evening Peak Hour			Weekday Total
			Enter	Exit	Total	Enter	Exit	Total	
Phase 1									
SFD[1]	210	59 units	12	34	46	38	23	61	622
Cumulative SFD		59 units	12	34	46	38	23	61	622
Phase 2									
SFD	210	135 units	23	67	90	79	45	124	1,234
Cumulative SFD		194 units	35	101	136	117	68	185	1,856
SFA	215	124 units	18	41	59	40	30	70	894
Total Site Trip Generation			53	142	195	157	98	255	2,750
Phase 3									
SFD[2]	210	55 units	9	26	35	30	19	49	480
Cumulative SFD		249 units	44	127	171	147	87	234	2,336
Total Site Trip Generation			62	168	230	187	117	304	3,230
Phase 4									
SFD	210	53 units	9	24	33	30	17	47	454
Cumulative SFD		302 units	53	151	204	177	104	281	2,790
Total Site Trip Generation			71	192	263	217	134	351	3,684

Table Notes:
[1] *One existing house may be removed or maintained.*
[2] *Four existing houses may be removed or maintained.*
Single-Family Detached Housing denoted as SFD. Single-Family Attached Housing denoted as SFA.

[1] Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 11th Edition, 2021.

Table 3: Trip Generation Summary (Continued)

	ITE Code	Size/ Variable	Morning Peak Hour			Evening Peak Hour			Weekday Total
			Enter	Exit	Total	Enter	Exit	Total	
Phase 5									
SFD[1]	210	34 units	5	15	20	18	11	29	288
Cumulative SFD		336 units	58	166	224	195	115	310	3,078
Total Site Trip Generation			76	207	283	235	145	380	3,972
Phase 6									
SFD	210	11 units	2	5	7	7	3	10	92
Cumulative SFD		347 units	60	171	231	202	118	320	3,170
Total Site Trip Generation			78	212	290	242	148	390	4,064

Table Notes:

[1] *One existing house may be removed or maintained.*

Single-Family Detached Housing denoted as SFD. Single-Family Attached Housing denoted as SFA.

Note that the trip generation estimates for Phase 2 in Table 3 assume the development of two additional single-family detached houses and two fewer single-family attached houses. However, since detached houses generate more trips than attached houses per the *Trip Generation Manual*, the analysis findings above may slightly overestimate site trip generation whereby all succeeding analyses which are based on this trip generation may be considered conservative.

Trip Distribution

The directional distribution of site trips to and from the Park Place Crossing Master Plan was referenced and generally based on the distribution utilized in the *Park Place Annexation TIS* and succeeding addendum. The trip distribution in the TIS was estimated based on locations of likely trip destinations, locations of major transportation facilities in the site vicinity, and existing travel patterns at studied intersections. The following trip distribution is projected:

- Approximately 25 percent of site trips will travel to/from the northeast along I-205;
- Approximately 18 percent of site trips will travel to/from the east along S Holcomb Boulevard;
- Approximately 15 percent of site trips will travel to/from the southwest along I-205;
- Approximately 13 percent of site trips will travel to/from the southwest along Washington Street;
- Approximately 8 percent of site trips will travel to/from the north along OR-99E;
- Approximately 4 percent of site trips will travel to/from the south along OR-213;
- Approximately 3 percent of site trips will travel to/from the southwest along Main Street;
- Approximately 3 percent of site trips will travel to/from the southwest along S Anchor Way;
- Approximately 3 percent of site trips will travel to/from the west along Beavercreek Road;
- Approximately 1 percent of site trips will travel to/from the southwest along OR-99E;

- Approximately 1 percent of site trips will travel to/from the south along S Holly Lane;
- Approximately 1 percent of site trips will travel to/from the east along Beavercreek Road; and
- Approximately 5 percent of site trips will travel to/from locales within the immediate vicinity, including surrounding residential areas, Holcomb Elementary School, and other land-uses.

Master Plan site trips are expected to be distributed between the Street A connection and S Winston Drive as follows:

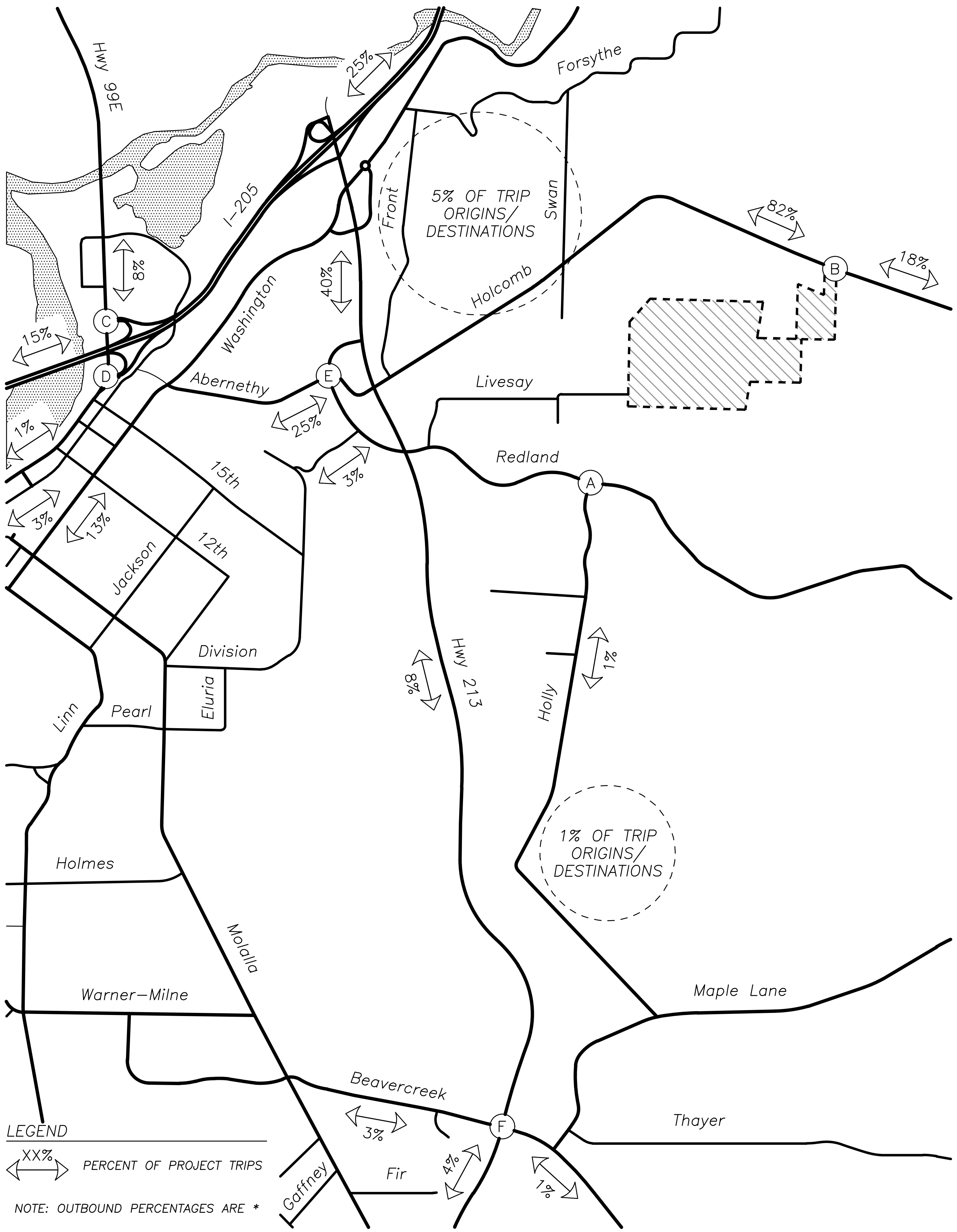
- Phase 1: All site trips will utilize Street A.
- Phase 2: All site trips will utilize Street A.
- Phase 3: All site trips will utilize S Winston Drive. Additionally, approximately 75 percent of site trips generated by Phase 2 will reroute from Street A to S Winston Drive.
- Phase 4: All site trips will utilize S Winston Drive.
- Phase 5: All site trips will utilize S Winston Drive.
- Phase 6: All site trips will utilize Street A.

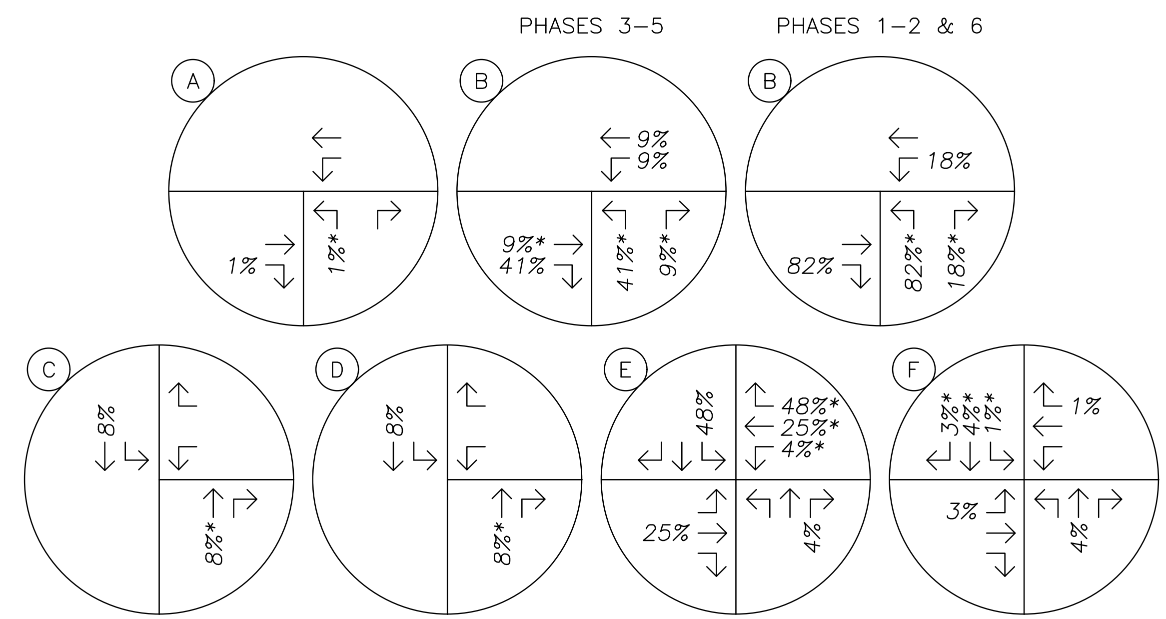
Provided the S Holly Lane connection to S Holcomb Boulevard is constructed following full buildout of the Master Plan and development of tax lots 800 and 1600, the interim Street A connection will be closed, and a majority of trips projected to utilize S Winston Drive are expected to reroute to S Holly Lane. Trips are expected to be redistributed as follows:

- Phase 1: All site trips will utilize S Holly Lane.
- Phase 2: All site trips will utilize S Holly Lane.
- Phase 3: Approximately 50 percent of site trips will utilize S Holly Lane and the other 50 percent will utilize S Winston Drive.
- Phase 4: Approximately 50 percent of site trips will utilize S Holly Lane and the other 50 percent will utilize S Winston Drive.
- Phase 5: Approximately 50 percent of site trips will utilize S Holly Lane and the other 50 percent will utilize S Winston Drive.
- Phase 6: All site trips will utilize S Holly Lane.

Note that in either scenario, with or without the S Holly Lane connection to S Holcomb Boulevard, access to S Livesay Road will be restricted to emergency vehicle access only whereby nominal trip impacts will occur along S Livesay Road until such a time that this connection is fully developed.

The site trip distribution at studied intersections identified for mitigation in the *Park Place Annexation TIS* are shown in Figure 4. The trip assignment for site trips generated during the morning and evening peak hours without the S Holly Lane connection are shown in Figure 5 at the study intersection. The site trip assignment for the morning and evening peak hours with the S Holly Lane connection in place are shown in Figure 6.





No Scale

SITE TRIP DISTRIBUTION
Inbound and Outbound Percentage Impacts
AM & PM Peak Hours

Figure 4
Park Place Crossing Master
1/13/2

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Item #1.

NET TOTAL TRIP GENERATION			
	IN	OUT	TOTAL
AM	78	212	290
PM	242	148	390

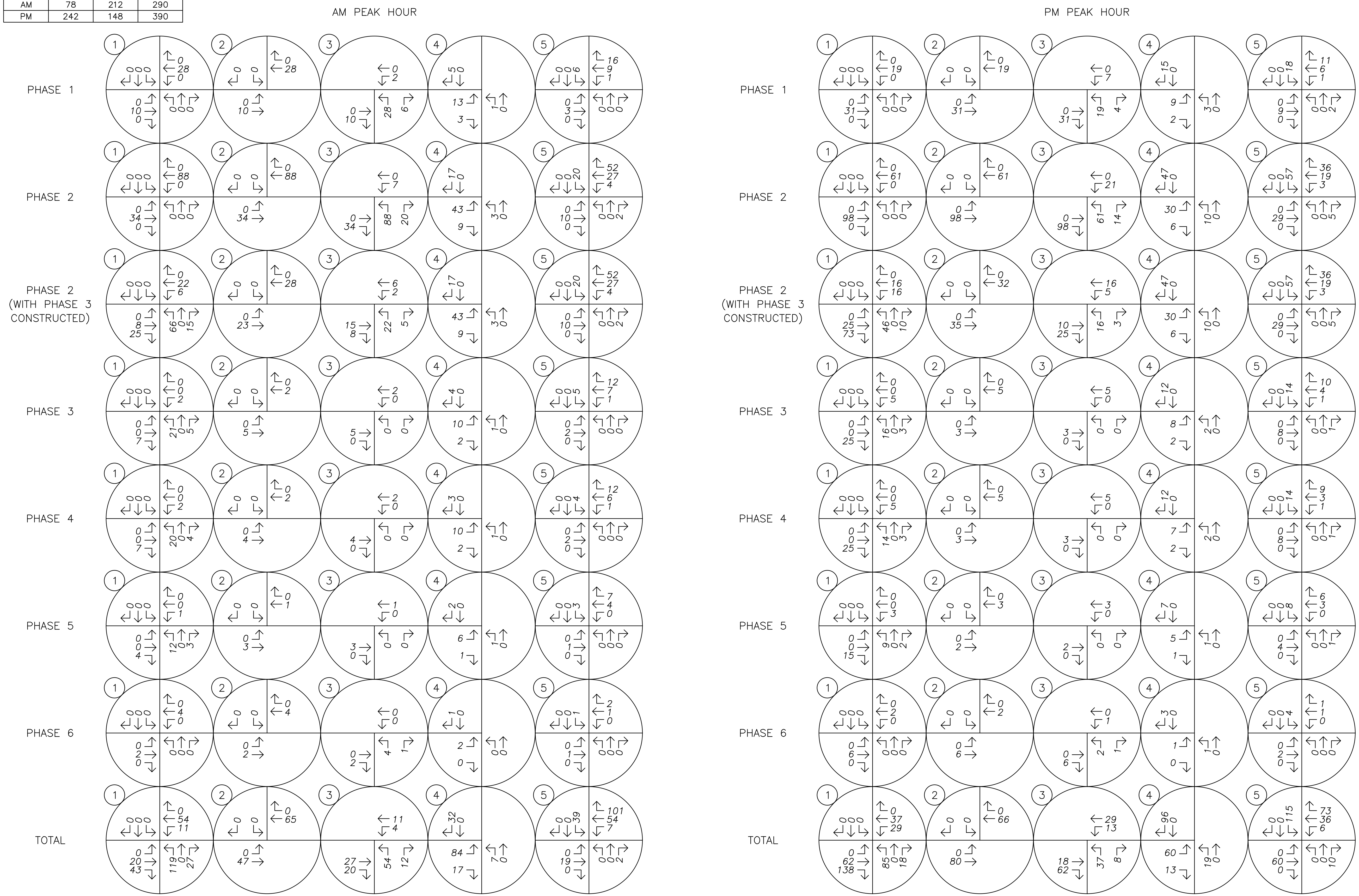

Figure 5

Park Place Crossing Master P

1/13/2

SITE TRIP ASSIGNMENT

Master Plan - Without S Holly Lane Connection

AM & PM Peak Hours

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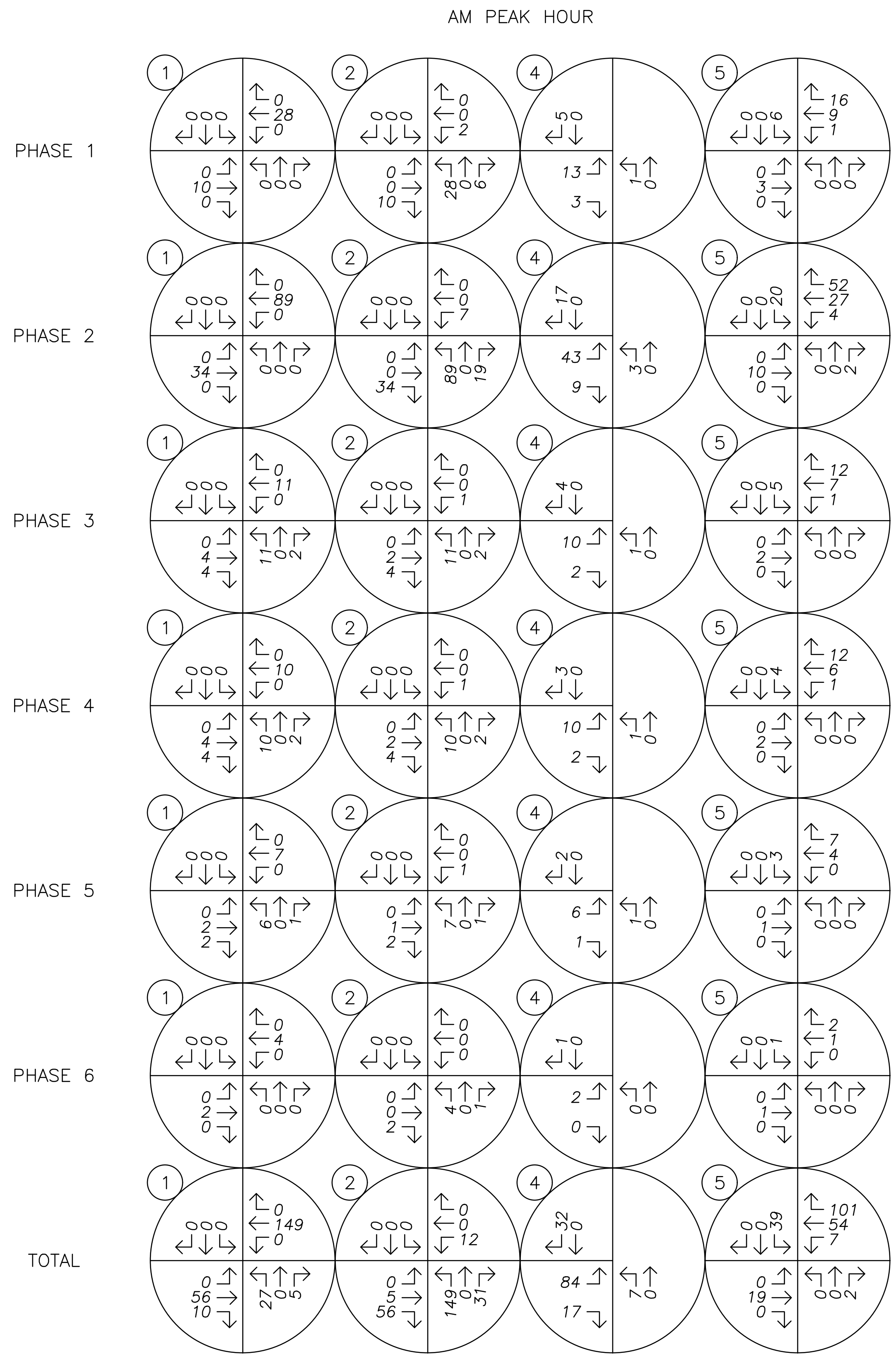
NET TOTAL TRIP GENERATION			
	IN	OUT	TOTAL
AM	78	212	290
PM	242	148	390



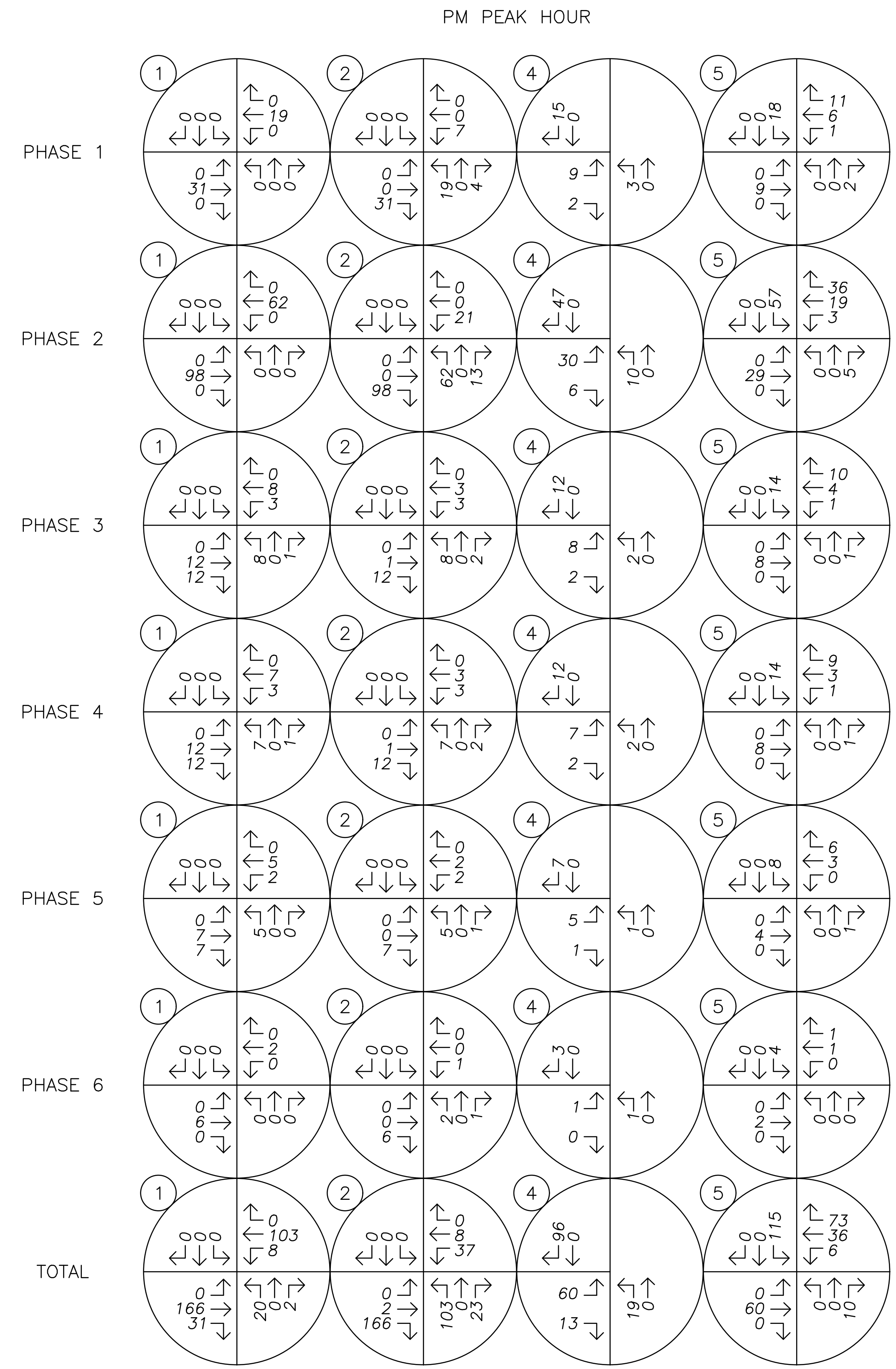


Figure 6

Park Place Crossing Master

1/13/2

SITE TRIP ASSIGNMENT

Master Plan - With S Holly Lane Connection

AM & PM Peak Hours

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Off-Site Trip Impacts

Per the City's final pre-application meeting notes, dated May 5, 2021, Oregon City staff have identified eight improvement projects where proportionate share impact fees are being collected. No specific methodology was outlined in the pre-application notes which identified how these fees were calculated; therefore, evening peak trip impacts at these transportation facilities were reported on a phase-by-phase basis. Table 4 summarizes these evening peak hour trip impacts and compares them to the prior analyzed *Park Place Annexation TIS* evening peak hour trip impacts.

Table 4: Trip Impact Analysis

Transportation Facility		TSP Project	% Impact	Trip Impacts (PM Trips)							Annexation PM Trips
				Ph. 1	Ph. 2	Ph. 3	Ph. 4	Ph. 5	Ph. 6	Total	
A	14th Street and 15th Street (between OR-99E & John Adams Street)	D7, D8	12%	7	23	6	6	3	1	46	82
B	S Redland Road at Holly Lane	D36	1%	1	2	0	0	0	0	3	489
C*	S Holcomb Boulevard at S Holly Lane	D43	59% (100%)	61	194	29	28	17	10	339	190
D	I-205 SB Ramps at OR-99E	D75	8%	5	16	4	4	2	1	32	54
E	I-205 NB Ramps at OR-99E	D76	8%	5	16	4	4	2	1	32	54
F	OR-213 (near the S Redland Road Undercrossing)	D79	8%	5	16	4	4	2	1	32	27
G	S Holcomb Boulevard at S Redland Road	N/A	77%	47	149	38	36	22	8	300	469
H	OR-213 at Beavercreek Road	N/A	8%	5	16	4	4	2	1	32	27

Table Notes: 59% applied to Phases 3, 4, and 5. 100% applied to all other Phases.

** Assumes trip impacts to S Holly Lane intersection at S Holcomb Boulevard is constructed.*

Traffic Volumes

Existing Conditions

Due to the ongoing COVID-19 viral pandemic, traffic volumes around Oregon have been depressed relative to normal conditions. A review of available traffic count data yielded 24-hour traffic counts along S Holcomb Boulevard east of S Barlow Drive from November 2, 2017, and year 2019 annual average daily traffic (AADT) along OR-213, just south of Redland Road from ODOT's Transportation Volume Tables. Given these available counts, the following methodology for data collection and volume adjustment was utilized:

Site Access Intersections (Intersections 1-3)

- The historical traffic counts from 2017 along S Holcomb Boulevard were grown to reflect 2021 existing conditions by applying a two percent per year compounded growth rate over a four-year period.
- Since recent/historical traffic counts are not available at the study intersections, current year 2021 morning and evening peak hour counts were collected. These counts were collected on Thursday, April 15, 2021, from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. Additionally, 24-hour roadway volumes were collected on S Winston Drive on the same day.
- The 2017 historical count data (grown to reflect 2021 conditions) were compared to the traffic volumes at the intersection of S Barlow Drive at S Holcomb Boulevard, specifically traffic traveling to/from the east of the intersection. Based on the difference in the morning and evening peak period volumes, the following adjustment factors were calculated:
  - Morning Peak Hour: 1.20.
  - Evening Peak Hour: No reduction in volumes determined.

  These adjustment factors are intended to estimate normal traffic conditions without impacts from the COVID-19 virus (i.e. normal commuter patterns, businesses open, etc).
- The calculated adjustment factors were applied to the traffic counts at all the site access study intersections along S Holcomb Boulevard where 2021 count data was collected.

Data was used from each study intersection's respective morning and evening peak hours.

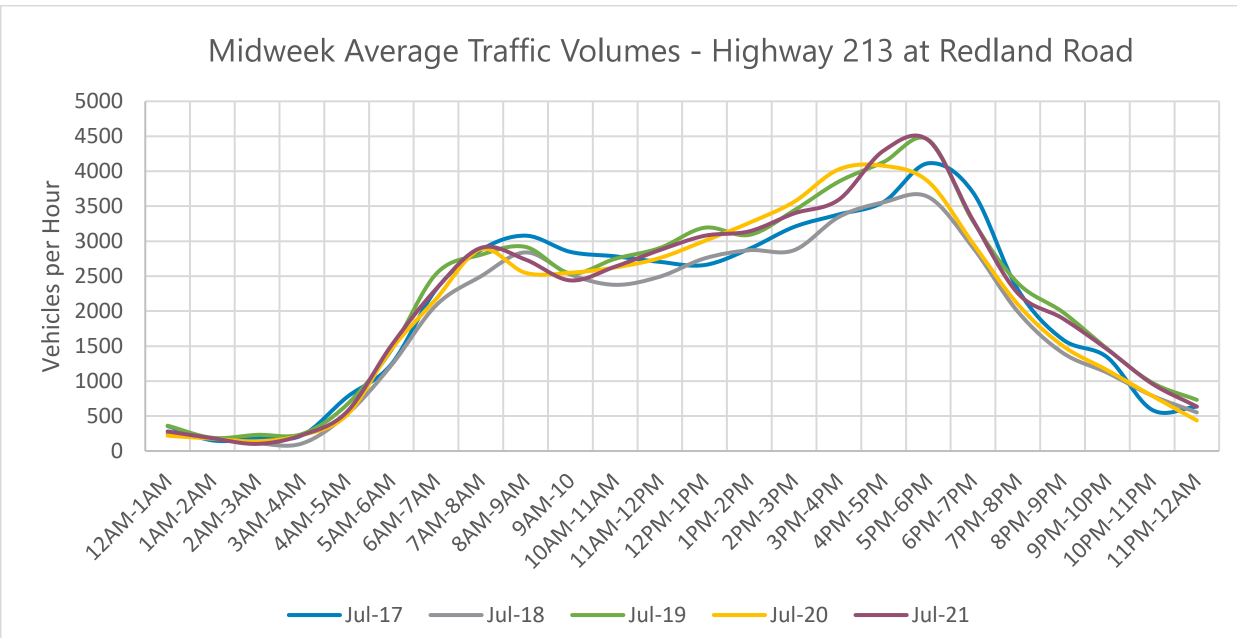
Redland Road Intersections (Intersections 4-5)

- The historical traffic counts from 2019 along OR-213 were grown to reflect 2021 existing conditions by applying a 0.0118 percent per year linear growth rate over a two-year period, calculated in accordance with ODOT's *Future Volumes Table*.
- As requested by the Oregon City's transportation consultant, current year 2021 weekday morning and evening peak hour counts were collected at the study intersections. These counts were collected on Thursday, July 22, 2021, from 7:00 AM to 10:00 AM and from 3:00 PM to 6:00 PM.

- The 2019 historical count data (grown to reflect 2021 conditions) and the recently collected 2021 evening peak hour counts at the intersection of Redland Road at OR-213 were compared. Specifically, it is assumed that the evening peak hour counts represent approximately ten percent of AADT. Based on the difference in traffic volumes traveling between the intersection and ODOT count location, an adjustment factor of 1.0765 was calculated. This adjustment factor is intended to estimate normal traffic conditions without impacts from the COVID-19 virus (i.e. normal commuter patterns, businesses open, etc).
- The calculated adjustment factor was applied to the collected 2021 peak hour intersection traffic counts.

To further investigate the effect of the COVID-19 pandemic on traffic volumes along OR-213 and near the Redland Road study intersections, data was obtained through StreetLight Insight, which is a "big data" company that utilizes primarily cell phone data to derive traffic volumes that are based on millions of data points across a broad range of time, rather than just a single count on a single day over a few hours of time.

Since the traffic counts at the subject intersections were collected in July of 2021, traffic volumes from each July from 2017 through 2021 were compared. In fact, the data set represented below includes every Tuesday, Wednesday, and Thursday in the month of July, which serves to average out any peaks or valleys that may occur on individual days or hours, resulting in a reliable, robust data set. The chart on the following page shows the average daily traffic volume profile for each year.



As shown in the chart above, July traffic volumes have been reasonably consistent with the exception of July 2020 being predictably lower than July of 2019 and 2021, both which are very similar in volume particularly during the evening peak period. Permanent traffic recorder data on OR-213 south of Oregon City shows that July is nearly the peak month, exceeded only slightly by August. July is considerably higher in volume than other months of the year when school is in session.

This data shows us that the July 2021 traffic count data used in this transportation study is reliable and that the influence of COVID-19 near the Redland Road study intersections is at best, very minor. Therefore, the calculated adjustment factor described in the previous section provides a reasonable high-end estimate of evening peak conditions.

Future Conditions

Traffic Growth

To provide analysis of the potential impact of the Master Plan on the nearby transportation facilities, an estimate of future traffic volumes is required. It is anticipated that the entire Master Plan (Phases 1 through 6) could be constructed by year 2030. Intermittently, it is assumed each Phase will be completed by the following years:

- Phase 1: 2023 (2 years growth)
- Phase 2: 2026 (5 years of growth)
- Phase 3: 2027 (6 years of growth)
- Phase 4: 2029 (8 years of growth)
- Phase 5: 2030 (9 years of growth)
- Phase 6: 2030 (9 years of growth)

In order to approximate future year traffic volumes at the study intersections, the following growth rates were applied to the study intersections:

- Site Access Intersections (Intersections 1-3): A compounded growth rate of two percent per year was applied to the adjusted 2021 existing traffic volumes over each Phase's assumed year of completion.
- Redland Road at OR-213 (Intersection 4): In accordance with the *The North End Master Plan Transportation Impact Analysis Report*, dated March 23, 2021, a linear growth rate of 0.31 percent per year was applied to the adjusted 2021 existing traffic volumes over each Phase's assumed year of completion.
- Redland Road at Holcomb Boulevard/Abernethy Road: In accordance with the *The North End Master Plan Transportation Impact Analysis Report*, dated March 23, 2021, a linear growth rate of 1.15 percent per year was applied to the adjusted 2021 existing traffic volumes over each Phase's assumed year of completion.

In-Process Trips

In addition to the traffic growth described above, the nearby Serres Farm Master Plan project and The North End Master Plan will be developing at a similar time as Park Place Crossing. Both in-process development projects are currently not fully contributing trips to the transportation system but may potentially be by the assumed 2030 buildout year of the Park Place Crossing. Additional trips corresponding to the in-process developments were added to the 2021 existing year traffic volumes in addition to the traffic growth at each of the applicable study intersections. In-process trips were added as follows:

- Serres Farm Master Plan: To maintain a conservative analysis of operation at the study intersections, the in-process development was assumed to be fully built-out by year 2023 (actual full buildout is anticipated by year 2025).
- The North End Master Plan: According to the project's revised staff report, dated July 19, 2021, conditions of approval 78.b, "*for development phases with planned occupancy dates before the end of 2022 and for development phases totaling 40 percent or less of the total trips generated by the buildout values in the TIA (both date and volume conditions must be met), the applicant will not be required to undertake additional traffic operations analysis or implement off-site mitigation measures for traffic operations or safety*." Since the North End project can construct a portion of their project to utilize up to 40 percent of the total trip generation without conducting further traffic analysis or providing any off-site mitigation, 40 percent of the North End Master Plan trips were included as in-process trips. Beyond 40 percent, the North End project will be required to conduct additional traffic analysis and/or construct additional off-site improvement.

These in-process development volumes were added to the 2021 existing year traffic volumes in addition to the four years of traffic growth at each of the applicable study intersections.

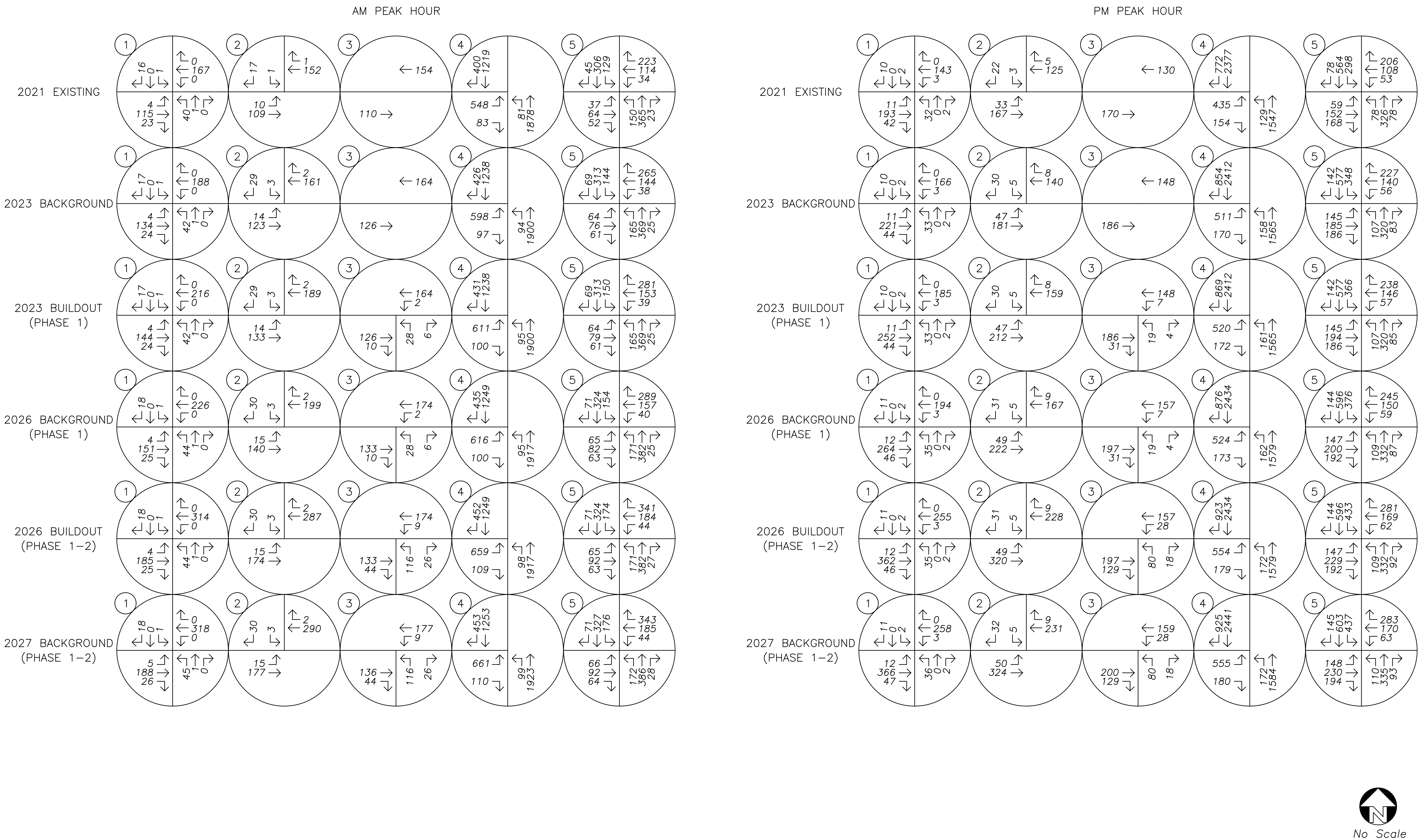
Site Trips

Peak hour trips calculated to be generated by each Phase of the Master Plan, as described earlier within the *Site Trips* section, were added to each Phase's respective projected year background traffic volumes. The following future year analysis scenarios were considered:

- Year 2023 background conditions
- Year 2023 buildout conditions (Phase 1)
- Year 2026 background conditions (Phase 1)
- Year 2026 buildout conditions (Phase 1 & 2)
- Year 2027 background conditions (Phase 1 & 2)
- Year 2027 buildout conditions (Phases 1 through 3)
- Year 2029 background conditions (Phases 1 through 3)
- Year 2029 buildout conditions (Phases 1 through 4)
- Year 2030 background conditions (Phases 1 through 4)
- Year 2030 buildout conditions (Phases 1 through 5)
- Year 2030 buildout conditions (Phases 1 through 6)

Following redevelopment of properties north/west of the project site, south of S Holcomb Boulevard, and near S Barlow Drive (tax lots 800 and 1600), the interim Street A connection will be closed, and future access relocated to the S Holly Lane extension, located opposite of S Barlow Drive (see the *S Holly Lane Intersection Location* section of the report for further details). Assuming this connection occurs by the 2030 buildout year of the entire site (Phases 1 through 6), an estimate of traffic volumes with development of under this scenario was determined.

Figure 7 shows the morning and evening peak hour traffic volumes at the intersections under year 2021 existing conditions and future year traffic conditions through 2027, with Phase 1 and 2, complete. Figure 8 presents the morning and evening peak hour volumes from year 2027, with Phases 1 through 3, complete through year 2030, with Phases 1 through 6 completed. In addition, Figure 8 presents full build volumes under 2030 conditions with the assumed S Holly Lane connection to S Holcomb Boulevard constructed.



TRAFFIC VOLUMES

Existing through 2027 Conditions

AM & PM Peak Hours

Figure 7

Park Place Crossing Master

1/13/2

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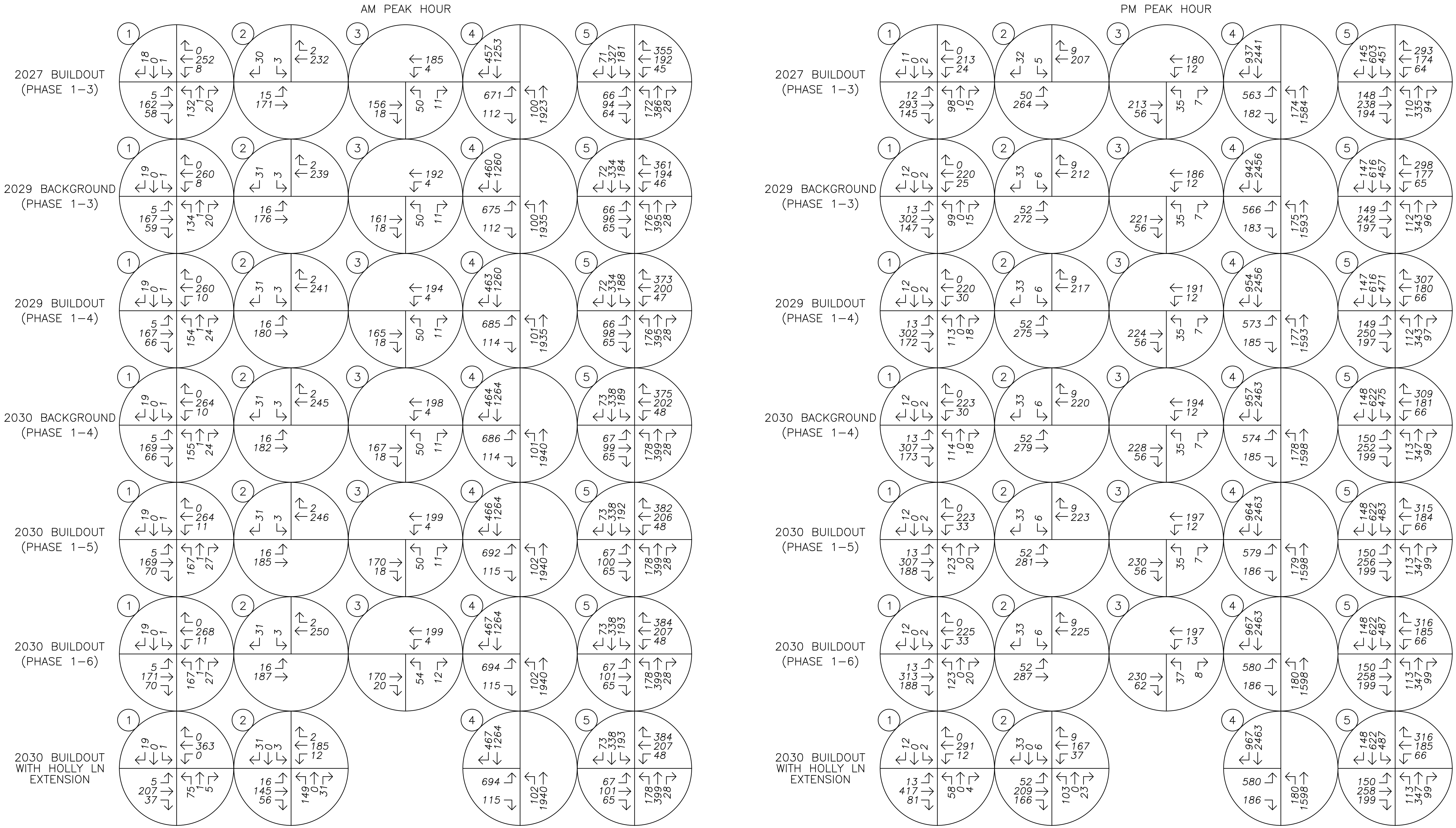

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TRAFFIC VOLUMES
2027 through 2030 Conditions
AM & PM Peak Hours

Figure 8
Park Place Crossing Master
1/13/2

Safety Analysis

Crash History Review

Using data obtained from ODOT's Crash Analysis and Reporting Unit, a review was performed of the most recent five years of available crash data at the study intersections of S Winston Drive at S Holcomb Boulevard and S Barlow Drive at S Holcomb Boulevard (January 2015 through December 2019). The crash data was evaluated based on the number of crashes, the type of collisions, the severity of the collisions, and the resulting crash rate for each intersection.

Following a review of the available data, no crashes were reported to have occurred at either intersection during the analysis period whereby no significant trends or crash patterns could be identified that are indicative of safety concerns. Accordingly, no safety mitigation is recommended per the crash data analysis.

Sight Distance Evaluation

Sight distances were measured at the interim Street A intersection along S Holcomb Boulevard as well as the future S Holly Lane connection along S Holcomb Boulevard (opposite of S Barlow Drive) and evaluated in accordance with the standards established in *A Policy of Geometric Design of Highways and Streets*[2]. According to AASHTO, the driver's eye is assumed to be 15 feet from the near edge of the nearest travel lane of the intersecting street and at a height of 3.5 feet above the minor-street approach pavement. The vehicle driver's eye height along the major-street approach is assumed to be 3.5 feet above the cross-street pavement.

Based on the posted speed of 35 mph along S Holcomb Boulevard, the minimum recommended intersection sight distance is 390 feet to the east and west of each intersection. Provided any obstructing foliage near the access locations (along the south side of S Holcomb Boulevard) are removed or properly maintained, sight distances at the S Barlow Drive intersection were measured to be in excess of 500 feet to the east and west, while at the Street A intersection sight distances were measured to be in excess of 500 feet to the west and approximately 294 feet to the east, limited by a crest vertical curve along S Holcomb Boulevard.

Although the minimum recommended intersection sight distance standard is not met, intersection sight distance is considered an operational measure intended to provide sufficient line of sight along the major-street so that a vehicle can enter the roadway without impeding the flow of through traffic. Conversely, stopping sight distance is considered the minimum requirement to ensure safe operation of the intersection. This distance allows the driver of a vehicle traveling on the major-street to react to a turning vehicle or other object in the roadway and come to a complete stop to avoid a collision. To ensure safe operation of an intersection, the extent of available intersection sight distance must at least equal the minimum required stopping sight distance. Taking into consideration a downhill, westbound approach grade of 4.36 percent, the minimum required stopping sight distance is 265 feet. Therefore, there is sufficient stopping sight distance to accommodate westbound approaching vehicles.

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[2] American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 6th Edition, 2011.

Based on the sight distance measurements and provided any obstructing foliage near the access locations and along the south side of S Holcomb Boulevard are removed or properly maintained, adequate sight distances can be made available at the S Barlow Drive intersection to allow safe and efficient operation of the S Holly Lane approach, while adequate sight distances can be made available to ensure safe operation of the temporary Street A intersection. No other sight distance related mitigation is necessary or recommended.

Warrant Analysis

Left-turn lane and preliminary traffic signal warrants were examined for the study intersections where such treatments would be applicable.

Left-Turn Lane Warrant

A left-turn refuge lane is primarily a safety consideration for the major-street, removing left-turning vehicles from the through traffic stream. The left-turn lane warrants used were developed from the *National Cooperative Highway Research Project's* (NCHRP) *Report 457*. Turn lane warrants were evaluated based on the number of advancing and opposing vehicles as well as the number of turning vehicles, the travel speed, and the number of through lanes.

Based on the analysis, left-turn lane warrants are not projected to be met at any of the study intersections under any analysis scenario. Accordingly, no new turn lanes are necessary or recommended as part of the Master Plan.

Preliminary Traffic Signal Warrant

Preliminary traffic signal warrants were examined for the unsignalized study intersections to determine whether the installation of a new traffic signal will be warranted at the intersections upon completion of the Park Place Crossing Master Plan project, with or without the S Holly Lane connection to S Holcomb Boulevard. Due to insufficient main and side street traffic volumes, traffic signal warrants are not projected to be met at the study intersections under any of the analysis scenarios.

Access Spacing

According to Oregon City's Transportation System Plan (TSP) S Holcomb Boulevard operates under the jurisdiction of Oregon City within the City's urban growth boundary (UGB) and is classified as a Minor Arterial. Subsequently the City's spacing standards apply to this section of S Holcomb Boulevard. Per the TSP, the following spacing standards apply along S Holcomb Boulevard (measured centerline to centerline):

- Maximum Block Size: 530 feet;
- Minimum Block Size: 150 feet; and
- Minimum Driveway Spacing (between other streets and driveways): 175 feet. Note that single and two-family dwellings are exempt from the driveway to driveway spacing standard.

Regarding the maximum block length standard, there is a provision to allow a longer block length given that a mid-block pedestrian/bicycle accessway is provided intermittently at a spacing no greater than 330 feet (unless the connection is impractical due to existing development, topography, or environmental constraints).

For the Street A connection onto S Holcomb Boulevard, the roadway will be spaced approximately 220 feet from Jada Way to the east and 400 feet from S Barlow Drive to the west. Additionally, no private driveways that serve land uses other than one to two-family dwellings are located within 175 feet of the Street A connection. Therefore, spacing standards will be met for the Street A intersection.

For the future planned S Holly Lane connection to S Holcomb Boulevard, opposite of S Barlow Drive, the roadway will be spaced approximately 620 feet from Jada Way to the east and 500 feet from S Winston Drive to the west. There is an intermittent pedestrian/bicycle accessway between S Barlow Drive and Jada Way along the north side of S Holcomb Boulevard approximately 160 feet east of S Barlow Drive; however, with the planned construction of the S Holly Lane connection a pedestrian/bicycle accessway may need to be constructed/maintained (e.g. the Street A connection restricted to pedestrians/bicyclists) along the south side of the road. Additionally, no private driveways that serve land uses other than one to two-family dwellings are located within 175 feet of the future planned S Holly Lane connection. Therefore, spacing standards will be met for the future planned S Holly Lane intersection.

Reduced S Holly Lane Cross-Section

As part of the Park Place Crossing Master Plan project, the S Holly Lane collector will be constructed through the site with future connections between S Livesay Road and S Holcomb Boulevard (note the connection to S Livesay Road as part of this Master Plan will be emergency vehicle access only). Per Oregon City Municipal Code Table 16.12.016 a collector right-of-way width is 85 feet, however within the project site where S Holly Lane crosses between tax lots 2-2E-28D-00190 and 2-2E-27BC-01000 there is not adequate room to accommodate this. Given this restriction, a reduced section is necessary to allow room for roadway construction and grading (retaining walls, daylight slopes etc.).

Table 5 presents the typical cross-section for a Collector roadway compared the narrow section proposed for the segment of S Holly Lane.

Table 5: S Holly Lane Cross-Section

Cross-Section	Road Classification	Zoning	ROW Width	Road Width	Public Access	Side walk	Landscape Strip & Curb	Bike Lane	Street Parking	Travel Lanes	Median
Typical Section	Collector	Residential	85'	59'	0.5'	5'	7.5'	6'	7'	11' (×3)	N/A
Narrow Section	Collector	Residential	57'	45'	0.5'	5'	0.5'	6'	0'	11' (×3)	N/A

Per the above, on-street parking along this segment of S Holly Lane will be prohibited along both sides of the roadway. Figure 8 depicts this reduced cross-section of S Holly Lane.

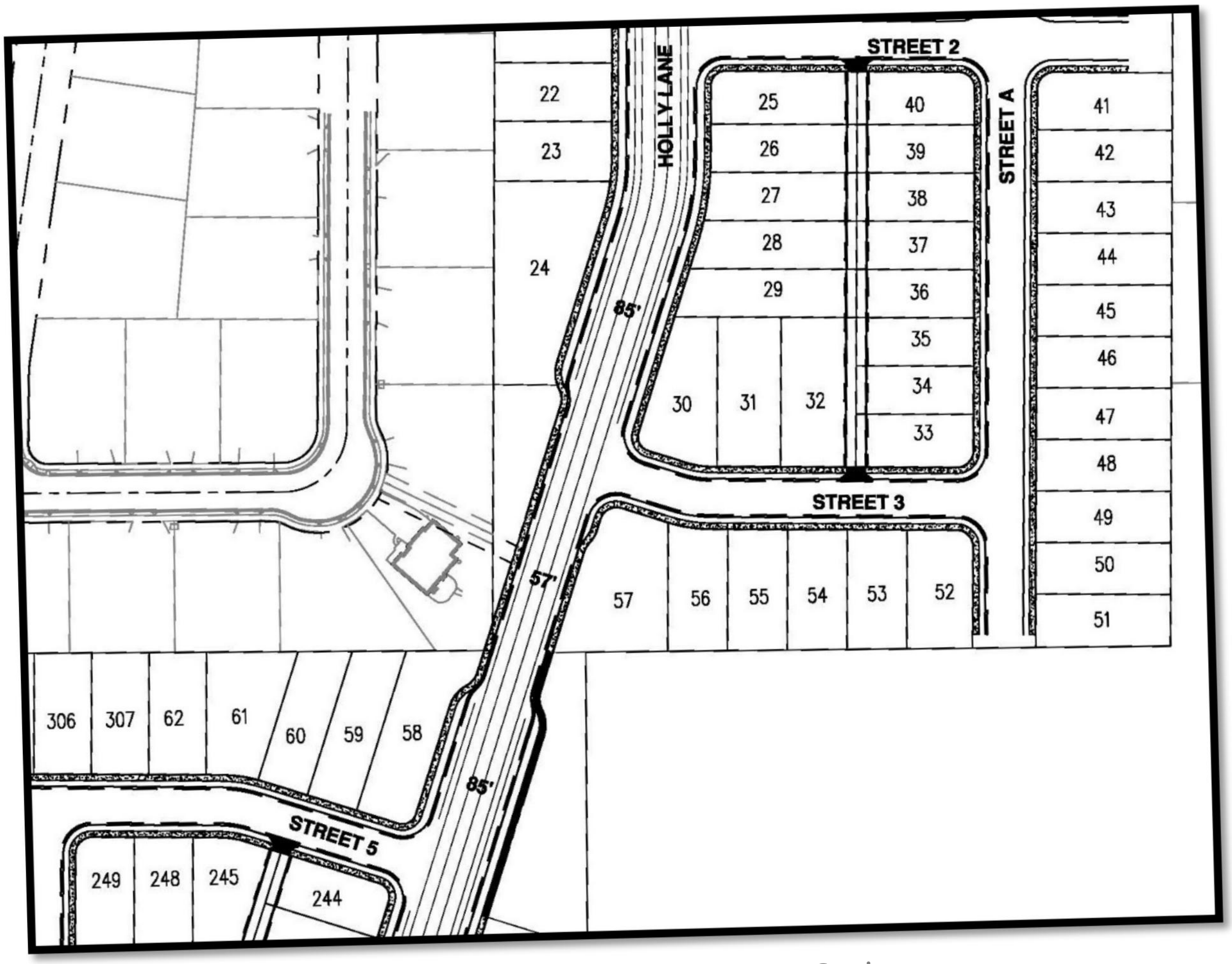


Figure 9: Reduced S Holly Lane Cross-Section

S Holly Lane Intersection Location

A safety and operation review for S Holly Lane connection along S Holcomb Boulevard was conducted where two potential locations for the connection were considered: opposite of S Barlow Drive and opposite of S Jada Way. This analysis is detailed in a technical memorandum from Lancaster Mobley, dated July 24, 2020. Based on the analysis findings and correspondence with Oregon City staff, the location of S Holly Lane opposite of S Barlow Drive was determined as the preferred location by City staff.

For analysis review and consideration for the preferred S Holly Lane location, refer to the detailed technical memorandum which is included in the attached technical appendix.

Operational Analysis

Intersection Capacity Analysis

A capacity and delay analysis were conducted for each of the study intersections per the unsignalized intersection analysis methodologies in the *Highway Capacity Manual* (HCM)[3]. Intersections are generally evaluated based on the average control delay experienced by vehicles and are assigned a grade according to their operation. The level of service (LOS) of an intersection can range from LOS A, which indicates very little or no delay experienced by vehicles, to LOS F, which indicates a high degree of congestion and delay. The volume-to-capacity (v/c) ratio is a measure that compares the traffic volumes (demand) against the available capacity of an intersection.

Performance Standards

Per Oregon City's Transportation System Plan and Metro's online 2018 Regional Transportation Plan (RTP) Network maps, the access study intersections along S Holcomb Boulevard are located outside of the City's regional center and S Holcomb Boulevard is not designated on the arterial and throughway network. Comparatively, the Redland Road study intersections are located within the regional center. Per Section *16.12.033 – Mobility Standards* of the Oregon City Municipal Code, the following minimum acceptable operation standards apply to the study intersections.

- For intersections outside the boundaries of the regional center and not designated on the arterial and throughway network, as defined in the regional transportation plan, the following mobility standards apply:
  - For signalized intersections:
    - During the 1st hour, LOS "D" or better will be required for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of the critical movements.
    - During the 2nd hour, LOS "D" or better will be required for the intersection as a whole and no approach operating at worse than LOS "E" and a v/c ratio not higher than 1.0 for the sum of the critical movements.
  - For unsignalized intersections outside of the boundaries of the regional center:
    - For unsignalized intersections, during the peak hour, all movements serving more than twenty vehicles shall be maintained at LOS "E" or better. LOS "F" will be tolerated at movements serving no more than twenty vehicles during the peak hour.

[3] Transportation Research Board, *Highway Capacity Manual 6th Edition*, 2016.

- For intersections within the regional center, the following mobility standards apply:
    - During the 1st hour, a maximum v/c ratio of 1.10 shall be maintained. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.
    - During the 2nd hour, a maximum v/c ratio of 0.99 shall be maintained at signalized intersections. For signalized intersections, this standard applies to the intersection as a whole. For unsignalized intersections, this standard applies to movements on the major street. There is no performance standard for the minor street approaches.

Delay & Capacity Analysis

Peak Hour Analysis (1st Hour)

The LOS, delay, and v/c results of the capacity analysis are shown in Table 5 for the morning and evening peak hours. The TrafficWare Synchro software utilized for analysis does not report the overall v/c ratio of signalized intersections in the HCM 6th Edition capacity reports. For these intersections, the v/c ratio was calculated based on methods detailed in ODOT's APM *Section 13 Signalized Intersection Analysis*. Detailed calculations as well as tables showing the relationship between delay and LOS are included in the appendix to this report.

Table 6: Intersection Capacity Analysis Summary

	AM Peak Hour			PM Peak Hour		
	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
1. S Winston Drive at S Holcomb Boulevard						
2021 Existing Conditions	B	12	0.08	B	12	0.07
2023 Background Conditions	B	12	0.09	B	13	0.08
2023 Buildout Conditions (Phase 1)	B	13	0.09	B	14	0.08
2026 Background Conditions (Phase 1)	B	13	0.10	B	14	0.09
2026 Buildout Conditions (Phase 1-2)	C	15	0.13	C	17	0.12
2027 Background Conditions (Phase 1-2)	C	16	0.13	C	17	0.12
2027 Buildout Conditions (Phase 1-3)	C	17	0.37	C	20	0.34
2029 Background Conditions (Phase 1-3)	C	18	0.38	C	21	0.35
2029 Buildout Conditions (Phase 1-4)	C	19	0.45	C	24	0.42
2030 Background Conditions (Phase 1-4)	C	20	0.45	C	24	0.43
2030 Buildout Conditions (Phase 1-5)	C	21	0.50	D	26	0.48
2030 Buildout Conditions (Phase 1-6)	C	21	0.50	D	27	0.48
2030 Buildout Conditions (w/ Holly Lane)	C	18	0.25	C	23	0.24

Table 6: Intersection Capacity Analysis Summary (Continued)

	AM Peak Hour			PM Peak Hour		
	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
2. S Barlow Drive at S Holcomb Boulevard						
2021 Existing Conditions	A	9	0.03	A	9	0.04
2023 Background Conditions	A	10	0.05	A	10	0.05
2023 Buildout Conditions (Phase 1)	A	10	0.05	B	10	0.06
2026 Background Conditions (Phase 1)	B	10	0.06	B	10	0.06
2026 Buildout Conditions (Phase 1-2)	B	11	0.06	B	11	0.07
2027 Background Conditions (Phase 1-2)	B	11	0.07	B	11	0.07
2027 Buildout Conditions (Phase 1-3)	B	10	0.06	B	11	0.06
2029 Background Conditions (Phase 1-3)	B	11	0.06	B	11	0.07
2029 Buildout Conditions (Phase 1-4)	B	11	0.06	B	11	0.07
2030 Background Conditions (Phase 1-4)	B	11	0.06	B	11	0.07
2030 Buildout Conditions (Phase 1-5)	B	11	0.06	B	11	0.07
2030 Buildout Conditions (Phase 1-6)	B	11	0.06	B	11	0.07
2030 Buildout Conditions (w/ Holly Lane)*	C	20	0.50	D	27	0.49
3. Street A at S Holcomb Boulevard						
2023 Buildout Conditions (Phase 1)	B	11	0.07	B	11	0.05
2026 Background Conditions (Phase 1)	B	11	0.07	B	11	0.05
2026 Buildout Conditions (Phase 1-2)	B	13	0.30	B	14	0.23
2027 Background Conditions (Phase 1-2)	B	14	0.30	B	14	0.23
2027 Buildout Conditions (Phase 1-3)	B	12	0.13	B	13	0.09
2029 Background Conditions (Phase 1-3)	B	12	0.13	B	13	0.10
2029 Buildout Conditions (Phase 1-4)	B	12	0.13	B	13	0.10
2030 Background Conditions (Phase 1-4)	B	12	0.13	B	13	0.10
2030 Buildout Conditions (Phase 1-5)	B	12	0.14	B	13	0.10
2030 Buildout Conditions (Phase 1-6)	B	12	0.15	B	13	0.11

* *Intersection converted to four-legs.*

Table 6: Intersection Capacity Analysis Summary (Continued)

	LOS	Delay (s)	v/c		LOS	Delay (s)	v/c
4. Redland Road at OR-213 (1st Hour)							
2021 Existing Conditions	B	19	0.911		C	31	0.974
2023 Background Conditions	C	21	0.938		D	42	1.029
2023 Buildout Conditions (Phase 1)	C	21	0.943		D	44	1.034
2026 Background Conditions (Phase 1)	C	21	0.952		D	46	1.042
2026 Buildout Conditions (Phase 1-2)	C	22	0.968		D	50	1.058
2027 Background Conditions (Phase 1-2)	C	22	0.971		D	50	1.061
2027 Buildout Conditions (Phase 1-3)	C	23	0.976		D	50	1.065
2029 Background Conditions (Phase 1-3)	C	24	0.981		D	52	1.071
2029 Buildout Conditions (Phase 1-4)	C	24	0.985		D	52	1.075
2030 Background Conditions (Phase 1-4)	C	24	0.987		D	53	1.079
2030 Buildout Conditions (Phase 1-5)	C	24	0.990		D	53	1.081
2030 Buildout Conditions (Phase 1-6)	C	24	0.991		D	53	1.082
5. Redland Road at Holcomb Boulevard/Abernethy Road							
2021 Existing Conditions	C	21	0.556		D	47	0.705
2023 Background Conditions	C	24	0.624		D	52	0.778
2023 Buildout Conditions (Phase 1)	C	24	0.636		D	53	0.800
2026 Background Conditions (Phase 1)	C	24	0.654		D	54	0.825
2026 Buildout Conditions (Phase 1-2)	C	26	0.695		E	58	0.891
2027 Background Conditions (Phase 1-2)	C	26	0.702		E	59	0.899
2027 Buildout Conditions (Phase 1-3)	C	23	0.713		E	61	0.915
2029 Background Conditions (Phase 1-3)	C	27	0.725		E	62	0.930
2029 Buildout Conditions (Phase 1-4)	C	27	0.734		E	64	0.947
2030 Background Conditions (Phase 1-4)	C	28	0.740		E	64	0.955
2030 Buildout Conditions (Phase 1-5)	C	28	0.746		E	66	0.965
2030 Buildout Conditions (Phase 1-6)	C	28	0.747		E	66	0.969

Based on the results of the operational analysis, all access study intersections along S Holcomb Boulevard are currently operating acceptably per Oregon City standards and are projected to continue operating acceptably through the 2030 site buildout year, regardless of whether the S Holly Lane connection to S Holcomb Boulevard is constructed. No operational mitigation is necessary or recommended at these intersections.

Additionally, the two Redland Road study intersections are projected to operate acceptably during the peak hour (1st hour) per jurisdictional standards through the 2030 site buildout year.

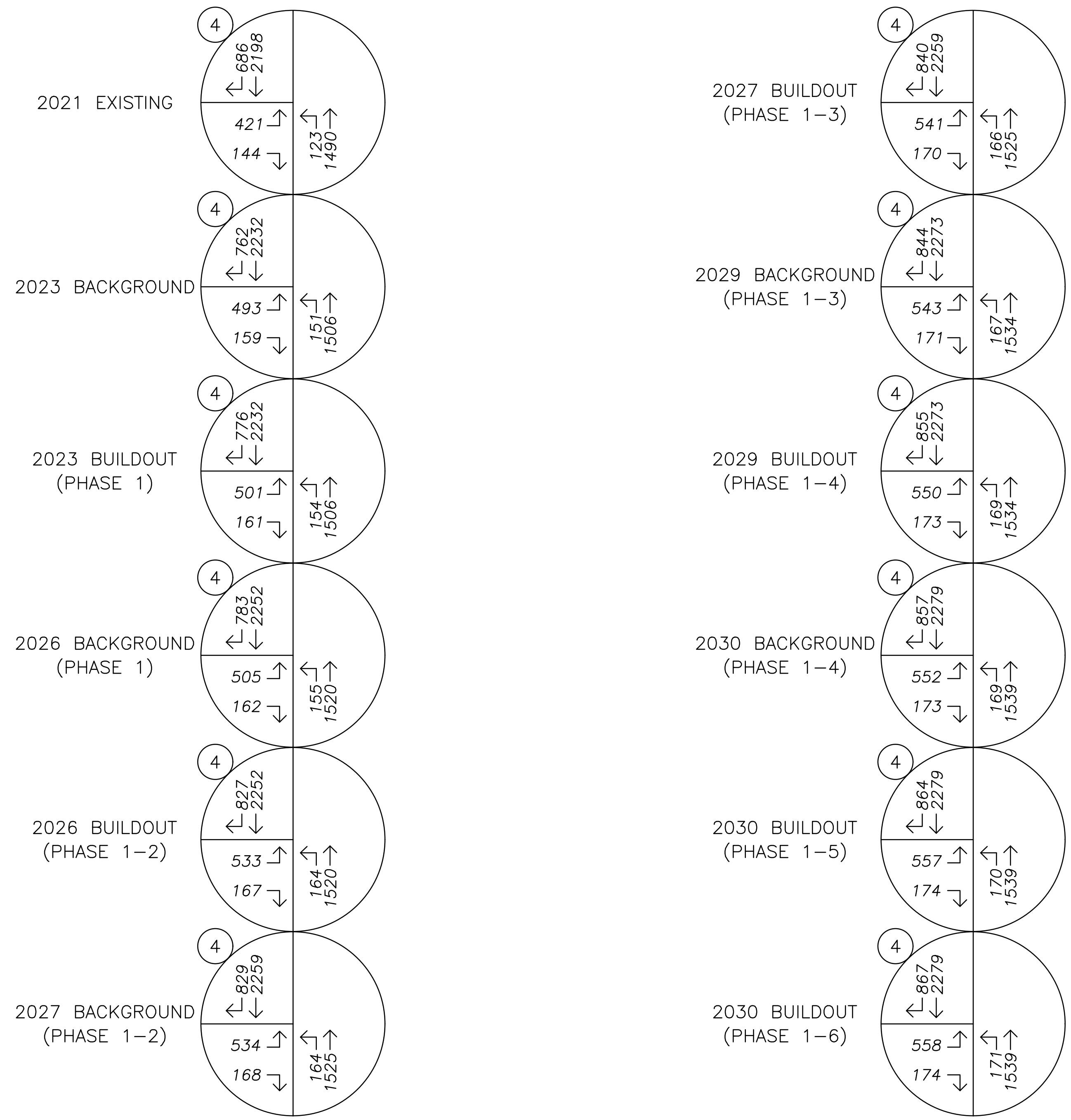
2nd Hour Analysis

Although the intersection of Redland Road at OR-213 operates within acceptable standards during the 1st hour of analysis, since it operates with a v/c ratio greater than 1.00 during the evening peak hour for all future year analysis scenarios, the 2nd hour of analysis was evaluated for these scenarios to determine whether the intersection meets the 0.99 v/c ratio 2nd hour standard.

To develop the 2nd hour of traffic volumes, the hour before and after the peak hour (4:35 PM to 5:35 PM) were considered.

- Based on the collected count data, the peak hour had a measured 5,029 vehicles entering the intersection. For the hour prior to the peak (3:35 PM to 4:35 PM), the total entering volumes were 4,714 vehicles.
- Although a full hour of data was not captured after the intersection's evening peak hour, approximately 25 minutes worth of counts were collected (i.e. 5:35 PM to 6:00 PM). To provide a reasonable estimate of post peak hour volumes, these volumes were increased by multiplying the intersection entering volumes during the available 5:35 PM to 6:00 PM period by a ratio of 60 minutes to 25 minutes (note this would be a conservative estimate of post peak hour volumes since this method doesn't consider a continuous downtrend of entering volumes as time progresses further from the peak hour).
- Based on a comparison of the pre and post peak hour volumes, the intersection volumes between 3:35 PM to 4:35 PM were higher whereby these volumes were utilized to analyze the 2nd hour.
- To estimate what in-process volumes and site trip volumes would be during the 2nd hour, these volumes were decreased by applying a ratio of total entering intersection volumes between the two analysis hours (i.e. a ratio of 4,714 total entering vehicles during the 2nd hour to 5,029 total entering vehicles during the 1st hour).

Figure 10 presents the 2nd evening peak hour volumes at the intersection of Redland Road at OR-213. The LOS, delay, and v/c results of the 2nd hour capacity analysis are shown in Table 7 for the evening peak hour. Note that only the future analysis scenarios where the v/c ratio exceeded 1.00 during the 1st hour were evaluated. Detailed calculations as well as tables showing the relationship between delay and LOS are included in the appendix to this report.



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TRAFFIC VOLUMES

2021 through 2030 Conditions - Redland Road at OR-213

PM 2nd Peak Hour

Figure 10

Park Place Crossing Master P

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Item #1.

Table 7: Intersection Capacity Analysis Summary (2nd Hour)

	PM Peak Hour		
	LOS	Delay (s)	v/c
4. Redland Road at OR-213 (2nd Hour)			
2023 Background Conditions	C	34	0.982
2023 Buildout Conditions (Phase 1)	C	34	0.986
2026 Background Conditions (Phase 1)	D	37	**0.995**
2026 Buildout Conditions (Phase 1-2)	D	39	**1.011**
2027 Background Conditions (Phase 1-2)	D	39	**1.013**
2027 Buildout Conditions (Phase 1-3)	D	41	**1.017**
2029 Background Conditions (Phase 1-3)	D	41	**1.023**
2029 Buildout Conditions (Phase 1-4)	D	43	**1.026**
2030 Background Conditions (Phase 1-4)	D	43	**1.029**
2030 Buildout Conditions (Phase 1-5)	D	43	**1.031**
2030 Buildout Conditions (Phase 1-6)	D	43	**1.032**

*Table Notes: **BOLDED** text indicates interseciton operation above jurisdictional standards.*

Based on the results of the operational analysis, the intersection of Redland Road at OR-213 is projected to operate in excess of acceptable per jurisdictional standards during the 2nd evening peak hour under 2026 buildout conditions (Phase 1) and for all succeeding analysis scenarios through year 2030. A detailed review of potential mitigation at the intersection is discussed in the *Mitigation Analysis* section.

Queuing Analysis

A queuing analysis was conducted at the study intersections to determine whether sufficient storage is available at applicable turning movements to accommodate projected queues. The queue lengths were projected based on the results of a Synchro/SimTraffic simulation, with the reported values representing the 95th percentile queue length. The 95th percentile queue is a statistical measurement which indicate there is a 5 percent chance that the queue may exceed this length during the analysis period; however, given this is a probability, the 95th percentile queue length may theoretically never be met or observed in the field.

The projected 95th percentile queue lengths reported in the simulation are presented in Table 8 for the morning and evening peak hours. Note the reported queue lengths were rounded up to the nearest five feet while the available lane storage was rounded to the nearest five feet. Detailed queuing analysis worksheets are included in the technical appendix to this report.

Table 8: 95th Percentile Intersection Queuing Analysis Summary

		Available Storage (ft)	2021 Existing Conditions	2023 Background Conditions	2023 Buildout Conditions (Phase 1)
1. Redland Road at OR-213					
AM Peak Hour	EB LT Lanes	335/760*	195/210	210/220	225/235
	EB RT Lane	760*	55	65	65
	NB LT Lane	350	110	140	115
	NB Th Lanes	-	300	400	290
	SB Th Lanes	-	225	240	225
	SB RT Lane	-	70	85	85
PM Peak Hour	EB LT Lanes	335/760*	305/320	**460**/470	**385**/405
	EB RT Lane	760*	145	175	155
	NB LT Lane	350	265	**425**	**440**
	NB Th Lanes	-	145	160	160
	SB Th Lanes	-	>1600	>1600	>1600
	SB RT Lane	-	>1600	>1600	>1600
2. Redland Road at Holcomb Boulevard/Abernethy Road					
AM Peak Hour	EB LT Lane	115	65	95	90
	EB Th/RT Lane	-	105	105	105
	WB LT Lane	90	45	60	55
	WB Th Lane	-	100	135	120
	WB RT Lane	90	90	**95**	**95**
	NB LT Lane	130	130	**140**	**135**
	NB Th/RT Lane	-	195	205	215
	SB LT Lane	320	115	130	140
	SB Th Lane	820*	155	185	180
	SB RT Lane	255	40	45	40
PM Peak Hour	EB LT Lane	115	95	**175**	**185**
	EB Th/RT Lane	-	325	340	410
	WB LT Lane	90	85	85	80
	WB Th Lane	-	125	155	180
	WB RT Lane	90	85	85	90
	NB LT Lane	130	130	**165**	**175**
	NB Th/RT Lane	-	340	380	385
	SB LT Lane	320	**325**	**370**	**370**
	SB Th Lane	820*	375	400	380
	SB RT Lane	255	55	55	65

Table Notes: ***BOLDED*** *text indicates queue length exceeds avaialble storage.*

** Available vehicle storage between study intersections.*

Table 8: 95th Percentile Intersection Queuing Analysis Summary (Continued)

		Available Storage (ft)	2026 Background Conditions (Phase 1)	2026 Buildout Conditions (Phase 1-2)	2027 Background Conditions (Phase 1-2)
1. Redland Road at OR-213					
AM Peak Hour	EB LT Lanes	335/760*	215/230	255/260	225/245
	EB RT Lane	760*	65	70	70
	NB LT Lane	350	120	125	125
	NB Th Lanes	-	290	355	345
	SB Th Lanes	-	235	230	245
	SB RT Lane	-	90	85	90
PM Peak Hour	EB LT Lanes	335/760*	**430**/450	**605**/620	**480**/500
	EB RT Lane	760*	155	335	245
	NB LT Lane	350	**405**	**415**	**420**
	NB Th Lanes	-	165	170	170
	SB Th Lanes	-	>1600	>1600	>1600
	SB RT Lane	-	>1600	>1600	>1600
2. Redland Road at Holcomb Boulevard/Abernethy Road					
AM Peak Hour	EB LT Lane	115	95	95	95
	EB Th/RT Lane	-	130	120	125
	WB LT Lane	90	55	55	60
	WB Th Lane	-	140	155	145
	WB RT Lane	90	**105**	**115**	**130**
	NB LT Lane	130	**150**	**150**	**150**
	NB Th/RT Lane	-	220	235	240
	SB LT Lane	320	140	155	155
	SB Th Lane	820*	175	185	185
	SB RT Lane	255	45	45	45
PM Peak Hour	EB LT Lane	115	**185**	**375**	**515**
	EB Th/RT Lane	-	415	740	810
	WB LT Lane	90	**100**	**105**	**95**
	WB Th Lane	-	180	190	185
	WB RT Lane	90	**95**	**100**	**100**
	NB LT Lane	130	**175**	**235**	**155**
	NB Th/RT Lane	-	410	500	440
	SB LT Lane	320	**355**	**405**	**465**
	SB Th Lane	820*	410	400	390
	SB RT Lane	255	70	65	90

*Table Notes: **BOLDED** text indicates queue length exceeds avaialble storage.*

** Available vehicle storage between study intersections.*

Table 8: 95th Percentile Intersection Queuing Analysis Summary (Continued)

		Available Storage (ft)	2027 Buildout Conditions (Phase 1-3)	2029 Background Conditions (Phase 1-3)	2029 Buildout Conditions (Phase 1-4)
1. Redland Road at OR-213					
AM Peak Hour	EB LT Lanes	335/760*	235/250	245/255	255/270
	EB RT Lane	760*	70	75	70
	NB LT Lane	350	165	145	160
	NB Th Lanes	-	460	395	490
	SB Th Lanes	-	275	260	265
	SB RT Lane	-	85	90	85
PM Peak Hour	EB LT Lanes	335/760*	**585**/600	**620**/635	**745**/755
	EB RT Lane	760*	305	300	535
	NB LT Lane	350	**405**	**515**	**365**
	NB Th Lanes	-	170	175	180
	SB Th Lanes	-	>1600	>1600	>1600
	SB RT Lane	-	>1600	>1600	>1600
2. Redland Road at Holcomb Boulevard/Abernethy Road					
AM Peak Hour	EB LT Lane	115	100	90	105
	EB Th/RT Lane	-	125	125	130
	WB LT Lane	90	60	60	60
	WB Th Lane	-	155	150	155
	WB RT Lane	90	**125**	**130**	**130**
	NB LT Lane	130	**150**	**155**	**150**
	NB Th/RT Lane	-	245	270	275
	SB LT Lane	320	155	160	145
	SB Th Lane	820*	170	185	195
	SB RT Lane	255	50	45	45
PM Peak Hour	EB LT Lane	115	**375**	**645**	**805**
	EB Th/RT Lane	-	830	860	945
	WB LT Lane	90	**110**	**105**	**115**
	WB Th Lane	-	205	205	210
	WB RT Lane	90	**100**	**115**	**125**
	NB LT Lane	130	**240**	**210**	**465**
	NB Th/RT Lane	-	585	550	650
	SB LT Lane	320	**490**	**450**	**495**
	SB Th Lane	820*	400	400	425
	SB RT Lane	255	70	70	75

Table Notes: ***BOLDED*** *text indicates queue length exceeds avaialble storage.*

** Available vehicle storage between study intersections.*

Table 8: 95th Percentile Intersection Queuing Analysis Summary (Continued)

		Available Storage (ft)	2030 Background Conditions (Phase 1-4)	2030 Buildout Conditions (Phase 1-5)	2030 Buildout Conditions (Phase 1-6)
1. Redland Road at OR-213					
AM Peak Hour	EB LT Lanes	335/760*	230/245	290/300	265/280
	EB RT Lane	760*	65	70	75
	NB LT Lane	350	115	150	120
	NB Th Lanes	-	525	415	440
	SB Th Lanes	-	260	260	285
	SB RT Lane	-	85	100	100
PM Peak Hour	EB LT Lanes	335/760*	**705**/710	**795/805**	**795/800**
	EB RT Lane	760*	415	620	590
	NB LT Lane	350	**420**	**450**	**560**
	NB Th Lanes	-	260	170	170
	SB Th Lanes	-	>1600	>1600	>1600
	SB RT Lane	-	>1600	>1600	>1600
2. Redland Road at Holcomb Boulevard/Abernethy Road					
AM Peak Hour	EB LT Lane	115	95	90	90
	EB Th/RT Lane	-	145	130	135
	WB LT Lane	90	60	65	65
	WB Th Lane	-	175	170	165
	WB RT Lane	90	**130**	**130**	**130**
	NB LT Lane	130	**185**	**140**	**165**
	NB Th/RT Lane	-	245	245	245
	SB LT Lane	320	160	180	155
	SB Th Lane	820*	180	200	185
	SB RT Lane	255	50	50	50
PM Peak Hour	EB LT Lane	115	**710**	**730**	**780**
	EB Th/RT Lane	-	960	965	935
	WB LT Lane	90	**120**	**120**	**115**
	WB Th Lane	-	190	200	190
	WB RT Lane	90	**120**	**145**	**135**
	NB LT Lane	130	**220**	**515**	**555**
	NB Th/RT Lane	-	645	720	765
	SB LT Lane	320	**550**	**500**	**550**
	SB Th Lane	820*	435	400	445
	SB RT Lane	255	125	65	75

Table Notes: ***BOLDED*** *text indicates queue length exceeds avaialble storage.*

** Available vehicle storage between study intersections.*

Based on the queuing analysis, several turning movements at the study intersections are projected to exceed available lane storages. The following describe where and when this extended queuing occurs:

1. Redland Road at OR-213
    - Northbound left-turn lane under 2023 background conditions through 2030 (evening peak hour).
    - Eastbound left-turns lane under 2023 background conditions through 2030 (evening peak hour).
2. Redland Road at Holcomb Boulevard/Abernethy Road
    - Westbound right-turn lane under 2023 background conditions through 2030 (morning and evening peak hours).
    - Northbound left-turn lane under 2023 background conditions through 2030 (morning and evening peak hours).
    - Eastbound left-turn lane under 2025 background and buildout conditions (evening peak hour).
    - Southbound left-turn lane for all scenarios (evening peak hour).

A detailed review of potential mitigation at the two intersections is discussed in the *Mitigation Analysis* section. All other queues projected at the Redland Road study intersections are not expected to create significant safety concerns or hazards. Accordingly, no other mitigation is necessary or recommended.

Mitigation Analysis

As determined within the *Delay & Capacity Analysis* and *Queuing Analysis* sections, the intersection of Redland Road at OR-213 is projected to exceed capacity standards during the 2nd evening peak hour and both Redland Road intersections are expected to experience extended queuing at some pocket turn lanes during future year conditions; however, this extended queuing at may be attributable to both intersections operating near or above a v/c ratio of 1.00. Although no specific mitigation is planned at either intersection to alleviate these issues, discussions regarding possible improvements were noted in the Park Place Crossing Master Plan's draft pre-application meeting notes (PA 20-12), dated April 7, 2020. For the purposes of this analysis, the following mitigation were considered at both intersections:

1. Redland Road at OR-213
    - Add an additional eastbound left-turn lane for a total of three left-turn lanes. In addition, restripe the north intersection leg to include three receiving lanes.
    - Note that a similar three left-turn lane design is currently implemented along SE Sunnyside Road at the Clackamas Town Center access intersection, located just west of the Interstate 205 interchange.
2. Redland Road at Holcomb Boulevard/Abernethy Road
    - Revise the west intersection leg to include one receiving westbound travel lane, one eastbound left-turn lane, one eastbound through lane, and one eastbound right-turn lane.

- Note that the Park Place Crossing Master Plan's draft pre-application meeting notes indicates an additional eastbound turn lane may be added for potential mitigation; however, no specifics regarding the type of turn lane were discussed.

Note that these analyzed mitigation scenarios are only conducted for demonstrative purposes whereby alternative mitigation may be considered or found preferential to those detailed above. Once appropriate mitigation have been determined for both intersections, a methodology for determining proportionate share fee contributions towards mitigation should be issued to the applicant of the Park Place Crossing Master Plan.

The LOS, delay, and v/c results of the 1st and 2nd hour capacity analysis is shown in Table 9 for the morning and evening peak hour for the 2030 full buildout scenario. Table 10 shows the projected 95th percentile queue lengths for the morning and evening peak hours under year 2030 full buildout conditions.

Table 9: Mitigated Intersection Capacity Analysis Summary (2nd Hour)

	PM Peak Hour			PM Peak Hour		
	LOS	Delay (s)	v/c	LOS	Delay (s)	v/c
4. Redland Road at OR-213 (1st Hour)						
2030 Buildout Conditions (Phase 1-6)	C	24	0.991	D	53	1.082
2030 Buildout Conditions (Phase 1-6)	B	18	0.952	D	46	1.022
5. Redland Road at Holcomb Boulevard/Abernethy Road						
2030 Buildout Conditions (Phase 1-6)	C	28	0.747	E	66	0.969
2030 Buildout Conditions (Phase 1-6)	C	27	0.747	D	40	0.843
4. Redland Road at OR-213 (2nd Hour)						
2030 Buildout Conditions (Phase 1-6)	-	-	-	D	43	**1.032**
2030 Mitigated Conditions (Phase 1-6)	-	-	-	C	34	0.973

*Table Notes: **BOLDED** text indicates interseciton operation above jurisdictional standards.*

Based on the capacity results shown in Table 9, the intersection of Redland Road at OR-213 is projected to operate within acceptable levels of capacity following implementation of the suggested mitigation. Additional, both Redland Road intersections will continue operating acceptable during the 1st hour of analysis with suggested mitigation in place.

Table 10: Mitigated Intersection Queuing Analysis Summary

		Available Storage (ft)	2030 Buildout Conditions (Phase 1-6)	2030 Mitigated Conditions (Phase 1-6)
1. Redland Road at OR-213				
AM Peak Hour	EB LT Lanes	335/760*	265/280	135/175/185
	EB RT Lane	760*	75	80
	NB LT Lane	350	120	120
	NB Th Lanes	-	440	225
	SB Th Lanes	-	285	225
	SB RT Lane	-	100	100
PM Peak Hour	EB LT Lanes	335/760*	**795/800**	175/200/220
	EB RT Lane	760*	590	170
	NB LT Lane	350	**560**	**570**
	NB Th Lanes	-	170	170
	SB Th Lanes	-	>1600	>1600
	SB RT Lane	-	>1600	>1600
2. Redland Road at Holcomb Boulevard/Abernethy Road				
AM Peak Hour	EB LT Lane	115	90	100
	EB Th/RT Lane	-	135	110
	EB RT Lane	-	-	55
	WB LT Lane	90	65	50
	WB Th Lane	-	165	185
	WB RT Lane	90	**130**	**110**
	NB LT Lane	130	**165**	**150**
	NB Th/RT Lane	-	245	240
	SB LT Lane	320	155	165
	SB Th Lane	820*	185	190
	SB RT Lane	255	50	50
PM Peak Hour	EB LT Lane	115	**780**	**225**
	EB Th/RT Lane	-	935	280
	EB RT Lane	-	-	120
	WB LT Lane	90	**115**	90
	WB Th Lane	-	190	235
	WB RT Lane	90	**135**	**95**
	NB LT Lane	130	**555**	**150**
	NB Th/RT Lane	-	765	405
	SB LT Lane	320	**550**	**350**
	SB Th Lane	820*	445	290
	SB RT Lane	255	75	60

Table Notes: ***BOLDED*** *text indicates queue length exceeds avaialble storage.*

** Available vehicle storage between study intersections.*

Based on the queuing analysis results shown in Table 10, both of the study intersections still experience 95th percentile queues at some turn lanes which exceed available lane storage; however, these queues are generally found to be significantly shorter with suggested mitigation in place.

1. Redland Road at OR-213
    - Northbound left-turn lane (evening peak hour).
        - The maximum projected 570-foot-long queue exceeds available lane storage by approximately 220 feet. Note that this extended queuing is likely due to the intersection projected to continue operating above a 1.00 v/c ratio where the standard of operation is a v/c ratio of 1.10; therefore, under these conditions extended queuing is anticipated. If necessary and in conjunction with planned mitigation, the northbound left-turn storage lane may need to be extended to accommodate potential 95th percentile queues.
2. Redland Road at Holcomb Boulevard/Abernethy Road
    - Eastbound left-turn lane (evening peak hour).
        - The 225-foot queue exceeds the available lane storage by 110 feet. However, these extended queues may be stored within the center two-way left-turn turn (TWLTL) whereby no obstructions to the shared through/right-turn travel lane at the intersection will occur.
    - Westbound right-turn lane (morning and evening peak hours).
        - The highest reported queue of 110 feet exceeds the available lane storage by approximately 20 feet. Although this queuing exceeds the available storage striping at this turn lane, there is additional space beyond this striping to accommodate up to approximately 20 feet of additional queuing without these queues creating significant impacts or obstructing the through travel lane at the intersection. Therefore, no queuing related mitigation is necessary.
    - Northbound left-turn lane (morning and evening peak hours).
        - The highest reported queue of 150 feet exceeds the available lane storage by approximately 20 feet. Although this queuing exceeds the available lane storage striping, there is additional space beyond this striping to accommodate up to approximately 80 feet of additional queuing without these queues creating significant impacts or obstructing the shared through/right-turn travel lane at the intersection. Therefore, no queuing related mitigation is necessary.

- Southbound left-turn lane (evening peak hour).
  - The projected 350-foot queue will exceed the available lane storage by approximately 30 feet. There is an additional space beyond the striped storage area to accommodate up to approximately 25 feet of additional queuing without queues potentially disrupting southbound through traffic. In the event queues were to exceed available storage by 30 feet, there is sufficient storage within the southbound through travel lane to accommodate this excess queuing without spillback to the adjacent intersection of Redland Road at OR-213. Therefore, no mitigation is necessary or recommended.

Prior Annexation & Future Connectivity

Regarding the analyzed mitigation at the intersections of Redland Road at OR-213 and Redland Road at Holcomb Boulevard/Abernethy Road, as well as the proportionate share fee contributions being collected at other transportation facilities in Oregon City (refer to the Off-site Trip Impacts section), the impact analysis detailed in this TIS for the Park Place Crossing Master Plan project may be overestimating trip impacts to some of these facilities.

The subject property was annexed into the City of Oregon City in 2018. At that time, a comprehensive transportation impact analysis was conducted that examined build out of the master plan area[4]. Conditions of approval for the annexation require the contribution of proportional share payments for traffic impacts at offsite intersections. However, the annexation TIS assumed the S Holly Lane connection between S Holcomb Boulevard and S Redland Road would have been constructed prior to or concurrent with full buildout of the Park Place Crossing Master Plan project.

Because this application precedes the construction of the S Holly Lane connection, this TIS assumes all site-generated traffic uses S Holcomb Boulevard and the intersections of Redland Road at OR-213 and Redland Road at Holcomb Boulevard/Abernethy Road. Once the S Holly Lane connection is available, which is very likely to occur before the Park Place Crossing Master Plan site reaches full build out, some of the proportionate share fees, and particularly additional mitigation at these two off site intersections, may be reduced or possibly become unnecessary.

To address this uncertainty, it is recommended that a trip accounting letter, and if necessary, an updated traffic analysis, be prepared as each phase of the project is constructed. Appropriate mitigation and proportionate share fee contributions will be evaluated on a phase-by-phase basis and collected at the time of each phase's final plat application. This will enable accurate tracking of projected impacts to the two Redland Road intersections and other transportation projects as well as provide the flexibility to allocate fee contributions based on the re-evaluated traffic analysis by phase.

[4] *Park Place Annexation*, Transportation Impact Study, August 2, 2017 (and addendum) by Lancaster Engineering

Conclusions

No significant trends or crash patterns were identified at any of the study intersections that were indicative of safety concerns.

Provided any obstructing foliage near the access locations and along the south side of S Holcomb Boulevard are removed or properly maintained, adequate sight distances can be made available to ensure safe operation of the temporary Street A intersection, while adequate sight distances can be made available at the S Barlow Drive intersection to allow safe and efficient operation of the future S Holly Lane approach. No other sight distance related mitigation is necessary or recommended.

Left-turn lane warrants are not projected to be met at any of the study intersections under any analysis scenario.

Due to insufficient main and side street traffic volumes, traffic signal warrants are not projected to be met at the access study intersections under any of the analysis scenarios.

All access study intersections are currently operating acceptably per Oregon City standards and are projected to continue operating acceptably through the 2030 site buildout year, regardless of whether the S Holly Lane connection to S Holcomb Boulevard is constructed.

The intersections of Redland Road at OR-213 and Redland Road at Holcomb Boulevard/Abernethy Road are projected to operate acceptably per jurisdictional standards for all analysis scenarios during the peak hour (1st hour) through year 2030.

The following mitigation measures were reviewed for demonstrative purposes only to show the study intersections can operate acceptably per City and ODOT standards. Applicable agencies may consider alternative mitigation as preferential to those described below. If any mitigation is required for either or both of the intersections, a methodology for determining proportionate share fee contributions towards mitigation should be issued to the applicant of the Park Place Crossing Master Plan

For the intersection of Redland Road at OR-213, the intersection is projected to operate in excess of acceptable per jurisdictional standards during the 2nd evening peak hour under 2026 buildout conditions (Phase 1) and for all succeeding analysis scenarios through year 2030. Additionally, extended queuing beyond available lane storage is expected to occur at some of the turn lanes of the two Redland Road study intersections. Although no specific mitigation is planned at either intersection, the following may potentially be implemented to address these capacity and potential queuing issues:

4. Redland Road at OR-213
    - Add an additional eastbound left-turn lane for a total of three left-turn lanes.
    - Restripe the north intersection leg to include three receiving lanes.
    - Extend the northbound left-turn storage lane to accommodate 95th percentile queues.
5. Redland Road at Holcomb Boulevard/Abernethy Road
    - Revise the west intersection leg to include one receiving travel lane, one left-turn lane, one through lane, and one right-turn lane.
    - Extend the eastbound left-turn storage into the center two-way left-turn turn to accommodate 95th percentile queues.

Note the aforementioned mitigation were reviewed for demonstrative purposes to show the study intersections could operate acceptably per City and ODOT standards. Applicable agencies may consider alternative mitigation as preferential to those detailed above. Once appropriate mitigation have been determined for both intersections, a methodology for determining proportionate share fee contributions towards mitigation should be issued to the applicant of the Park Place Crossing Master Plan.

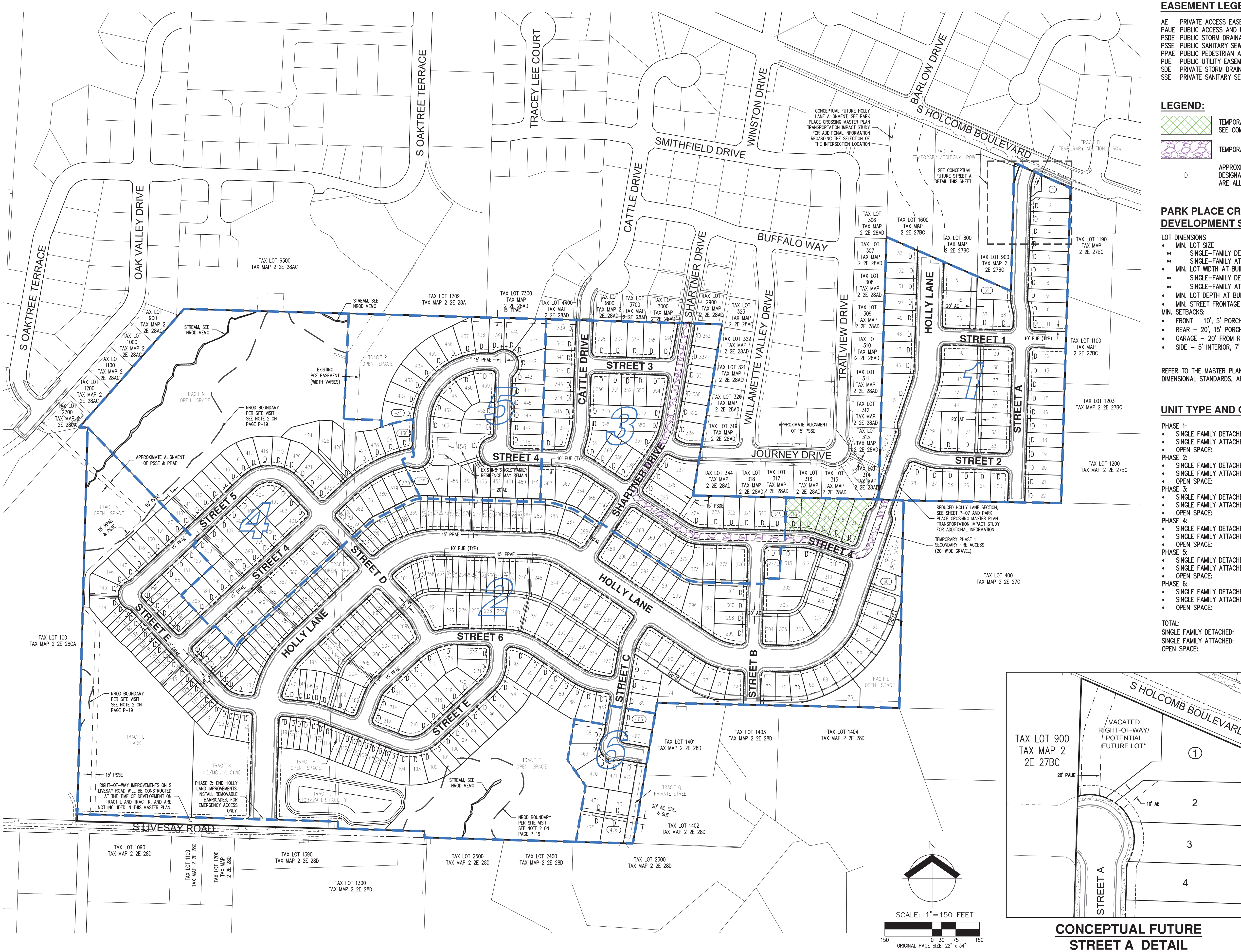
Conditions of Approval from the annexation detailed proportional share contributions are to be collected for several transportation facilities requiring mitigation which could be impacted by the Park Place Crossing Master Plan. Oregon City staff have indicated that proportional share contributions were subsequently modified in the Pre-Application notes. In addition, the current trip generation are lower than those anticipated at the time of the annexation, which may further decrease the proportional share amounts associated with the Park Place Crossing Master Plan. As part of each future Detailed Development Plan, proportional share fees will be contributed to the following facilities:

a. 14th Street and 15th Street, between OR-99E and John Adams Street (TSP Project D7 and D8)
b. S Redland Road at S Holly Lane (TSP Project D36)
c. S Holcomb Boulevard at S Holly Lane (TSP Project D43)
d. I-205 SB Ramps at OR-99E (TSP Project D75)
e. I-205 NB Ramps at OR-99E (TSP Project D76)
f. OR-213, near the S Redland Road Undercrossing (TSP Project D79)
g. S Holcomb Boulevard at S Redland Road
h. OR-213 at Beavercreek Road

The analysis in this Master Plan study does not consider the S Holly Lane connection to S Redland Road as was previously assumed for the Park Place Annexation project. Therefore, some of the proportionate share fees, and particularly additional mitigation at the two Redland Road study intersections, may be reduced or possibly become unnecessary. To address this uncertainty, it is recommended that a trip accounting letter, and if necessary, an updated traffic analysis, be prepared as each phase of the project is constructed. This will enable accurate tracking of projected impacts to the two Redland Road intersections and other transportation projects.

Appendix A

Site Plan



EASEMENT LEGEND:

AE PRIVATE ACCESS EASEMENT (ALLEY)
PAUE PUBLIC ACCESS AND UTILITY EASEMENT
PSDE PUBLIC STORM DRAINAGE EASEMENT
PSSE PUBLIC SANITARY SEWER EASEMENT
PPAE PUBLIC PEDESTRIAN ACCESS EASEMENT
PUE PUBLIC UTILITY EASEMENT
SDE PRIVATE STORM DRAINAGE EASEMENT
SSE PRIVATE SANITARY SEWER EASEMENT

LEGEND:

TEMPORARY PHASE 1 STORM FACILITY SEE COMPOSITE UTILITY PLAN FOR ADDITIONAL INFORMATION

TEMPORARY PHASE 1 SECONDARY FIRE ACCESS

D — APPROXIMATE DRIVEWAY LOCATION. LOTS WITHOUT A 'D' DESIGNATION EITHER SHARE ACCESS WITH AN ADJACENT LOT OR ARE ALLEY ACCESS

PARK PLACE CROSSING MASTER PLAN DEVELOPMENT STANDARDS:

LOT DIMENSIONS
- MIN. LOT SIZE
  - SINGLE-FAMILY DETACHED – 4,000 SF
  - SINGLE-FAMILY ATTACHED – 1,800 SF
- MIN. LOT WIDTH AT BUILDING LINE
  - SINGLE-FAMILY DETACHED – 35'
  - SINGLE-FAMILY ATTACHED – 20'
- MIN. LOT DEPTH AT BUILDING LINE – 70'
- MIN. STREET FRONTAGE – 20' UNLESS FLAG LOT

MIN. SETBACKS:
- FRONT – 10', 5' PORCH
- REAR – 20', 15' PORCH, 10' ADU
- GARAGE – 20' FROM ROW, 5' FROM ALLEY
- SIDE – 5' INTERIOR, 7' CORNER

REFER TO THE MASTER PLAN NARRATIVE FOR INFORMATION REGARDING BASE ZONES, DIMENSIONAL STANDARDS, APPLIED ADJUSTMENTS, VARIANCE, AND EXCEPTIONS.

UNIT TYPE AND OPEN SPACE SUMMARY:

PHASE 1:
- SINGLE FAMILY DETACHED: 59
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 0.1± ACRE

PHASE 2:
- SINGLE FAMILY DETACHED: 133
- SINGLE FAMILY ATTACHED: 126
- OPEN SPACE: 6.5± ACRE

PHASE 3:
- SINGLE FAMILY DETACHED: 59
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 0.0± ACRE

PHASE 4:
- SINGLE FAMILY DETACHED: 53
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 7.6± ACRE

PHASE 5:
- SINGLE FAMILY DETACHED: 35
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 1.5± ACRE

PHASE 6:
- SINGLE FAMILY DETACHED: 11
- SINGLE FAMILY ATTACHED: 0
- OPEN SPACE: 0.0± ACRE

TOTAL:
SINGLE FAMILY DETACHED: 350 (74%)
SINGLE FAMILY ATTACHED: 126 (26%)
OPEN SPACE: 15.7± ACRE

CONCEPTUAL FUTURE STREET A DETAIL

SCALE: 1" = 50'

NOTE:

*STREET A CONNECTION TO S HOLCOMB BOULEVARD IS AN INTERIM ACCESS THAT WILL NO LONGER BE NECESSARY UPON THE CONNECTION OF HOLLY LANE TO HOLCOMB BOULEVARD. WHEN THE INTERSECTION OF HOLLY LANE AND HOLCOMB BOULEVARD IS ESTABLISHED, STREET A WILL BE ABANDONED, VACATED, AND OWNERSHIP RETURNED TO THE DECLARANT WITH APPROPRIATE EASEMENTS REMAINING IN PLACE.

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

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FORESTRY · PLANNING · LANDSCAPE ARCHI

PRELIMINARY SITE AND PHASING PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

PRELIMINARY NOT FOR CONSTRUCTION

RENEWAL DATE: 6/30/23

JOB NUMBER:	7404
DATE:	01/04/2022
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

AKS DRAWING FILE: 7404 PHASING.DWG | LAYOUT: P-08

Appendix B

Trip Generation Calculations

TRIP GENERATION CALCULATIONS
Phase 1

Land Use: Single-Family Detached Housing
Land Use Code: 210
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 59

AM PEAK HOUR

Trip Equation: Ln(T)=0.91Ln(X)+0.12

	Enter	Exit	Total
Directional Distribution	26%	74%	
Trip Ends	12	34	46

PM PEAK HOUR

Trip Equation: Ln(T)=0.94Ln(X)+0.27

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	38	23	61

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.68

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	311	311	622

SATURDAY

Trip Equation: Ln(T)=0.97Ln(X)+2.40

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	288	288	576

Source: Trip Generation Manual, 11th Edition

TRIP GENERATION CALCULATIONS
Phases 1-2

Land Use: Single-Family Detached Housing
Land Use Code: 210
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 194

AM PEAK HOUR

Trip Equation: Ln(T)=0.91Ln(X)+0.12

	Enter	Exit	Total
Directional Distribution	26%	74%	
Trip Ends	35	101	136

PM PEAK HOUR

Trip Equation: Ln(T)=0.94Ln(X)+0.27

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	117	68	185

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.68

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	928	928	1,856

SATURDAY

Trip Equation: Ln(T)=0.97Ln(X)+2.40

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	913	913	1,826

Source: Trip Generation Manual, 11th Edition

TRIP GENERATION CALCULATIONS
Phase 2

Land Use: Single-Family Attached Housing
Land Use Code: 215
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 124

AM PEAK HOUR

Trip Equation: T=0.52(X)-5.70

	Enter	Exit	Total
Directional Distribution	31%	69%	
Trip Ends	18	41	59

PM PEAK HOUR

Trip Equation: T=0.60(X)-3.93

	Enter	Exit	Total
Directional Distribution	57%	43%	
Trip Ends	40	30	70

WEEKDAY

Trip Equation: T=7.62(X)-50.48

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	447	447	894

SATURDAY

Trip Equation: T=13.21(X)-444.34

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	597	597	1,194

Source: Trip Generation Manual, 11th Edition

TRIP GENERATION CALCULATIONS
Phases 1-3

Land Use: Single-Family Detached Housing
Land Use Code: 210
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 249

AM PEAK HOUR

Trip Equation: Ln(T)=0.91Ln(X)+0.12

	Enter	Exit	Total
Directional Distribution	26%	74%	
Trip Ends	44	127	171

PM PEAK HOUR

Trip Equation: Ln(T)=0.94Ln(X)+0.27

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	147	87	234

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.68

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,168	1,168	2,336

SATURDAY

Trip Equation: Ln(T)=0.97Ln(X)+2.40

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,163	1,163	2,326

Source: Trip Generation Manual, 11th Edition

TRIP GENERATION CALCULATIONS
Phases 1-4

Land Use:	Single-Family Detached Housing
Land Use Code:	210
Setting/Location	General Urban/Suburban
Variable:	Dwelling Units
Variable Value:	302

AM PEAK HOUR

Trip Equation: Ln(T)=0.91Ln(X)+0.12

	Enter	Exit	Total
Directional Distribution	26%	74%	
Trip Ends	53	151	204

PM PEAK HOUR

Trip Equation: Ln(T)=0.94Ln(X)+0.27

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	177	104	281

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.68

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,395	1,395	2,790

SATURDAY

Trip Equation: Ln(T)=0.97Ln(X)+2.40

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,402	1,402	2,804

Source: Trip Generation Manual, 11th Edition

TRIP GENERATION CALCULATIONS
Phases 1-5

Land Use: Single-Family Detached Housing
Land Use Code: 210
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 336

AM PEAK HOUR

Trip Equation: Ln(T)=0.91Ln(X)+0.12

	Enter	Exit	Total
Directional Distribution	26%	74%	
Trip Ends	58	166	224

PM PEAK HOUR

Trip Equation: Ln(T)=0.94Ln(X)+0.27

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	195	115	310

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.68

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,539	1,539	3,078

SATURDAY

Trip Equation: Ln(T)=0.97Ln(X)+2.40

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,555	1,555	3,110

Source: Trip Generation Manual, 11th Edition

TRIP GENERATION CALCULATIONS
Phases 1-6

Land Use: Single-Family Detached Housing
Land Use Code: 210
Setting/Location General Urban/Suburban
Variable: Dwelling Units
Variable Value: 347

AM PEAK HOUR

Trip Equation: Ln(T)=0.91Ln(X)+0.12

	Enter	Exit	Total
Directional Distribution	26%	74%	
Trip Ends	60	171	231

PM PEAK HOUR

Trip Equation: Ln(T)=0.94Ln(X)+0.27

	Enter	Exit	Total
Directional Distribution	63%	37%	
Trip Ends	202	118	320

WEEKDAY

Trip Equation: Ln(T)=0.92Ln(X)+2.68

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,585	1,585	3,170

SATURDAY

Trip Equation: Ln(T)=0.97Ln(X)+2.40

	Enter	Exit	Total
Directional Distribution	50%	50%	
Trip Ends	1,605	1,605	3,210

Source: Trip Generation Manual, 11th Edition

Appendix C

Traffic Counts

In-Process Data

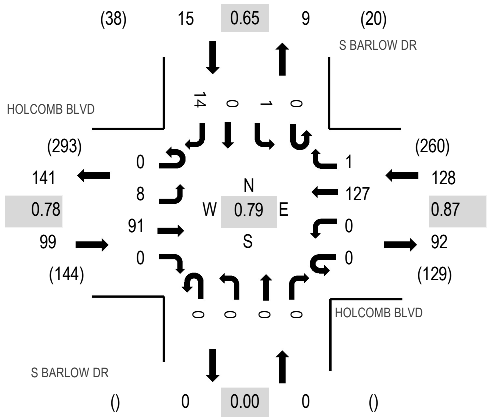
Item #1.

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

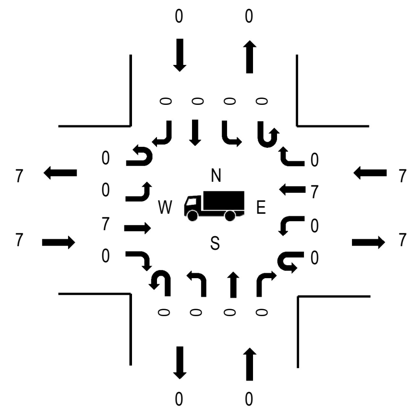
Location: 1 S BARLOW DR & HOLCOMB BLVD AM
Date: Thursday, April 15, 2021
Peak Hour: 08:00 AM - 09:00 AM
Peak 15-Minutes: 08:45 AM - 09:00 AM

Peak Hour

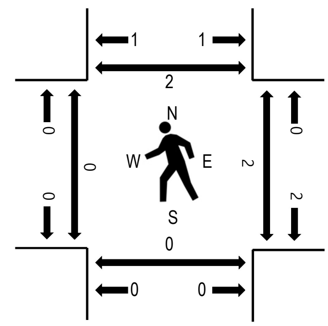
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	7.1%	0.78
WB	5.5%	0.87
NB	0.0%	0.00
SB	0.0%	0.65
All	5.8%	0.79

Traffic Counts - Motorized Vehicles

Interval Start Time	HOLCOMB BLVD Eastbound U-Turn	Left	Thru	Right	HOLCOMB BLVD Westbound U-Turn	Left	Thru	Right	S BARLOW DR Northbound U-Turn	Left	Thru	Right	S BARLOW DR Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour
7:00 AM	0	0	1	0	0	0	8	0	0	0	0	0	0	0	0	1	10	200
7:05 AM	0	0	2	0	0	0	8	0	0	0	0	0	0	0	0	2	12	207
7:10 AM	0	2	1	0	0	0	13	0	0	0	0	0	0	0	0	1	17	218
7:15 AM	0	1	2	0	0	0	15	0	0	0	0	0	0	0	0	0	18	217
7:20 AM	0	0	4	0	0	0	8	0	0	0	0	0	0	0	0	2	14	215
7:25 AM	0	0	1	0	0	0	10	1	0	0	0	0	0	0	0	1	13	228
7:30 AM	0	1	4	0	0	0	13	1	0	0	0	0	0	0	0	2	21	233
7:35 AM	0	0	1	0	0	0	8	1	0	0	0	0	0	0	0	2	12	229
7:40 AM	0	0	5	0	0	0	10	0	0	0	0	0	0	0	0	2	17	228
7:45 AM	0	2	6	0	0	0	11	0	0	0	0	0	0	0	0	4	23	231
7:50 AM	0	2	5	0	0	0	18	0	0	0	0	0	0	0	0	4	29	241
7:55 AM	0	0	5	0	0	0	7	0	0	0	0	0	0	0	0	2	14	229
8:00 AM	0	2	4	0	0	0	9	1	0	0	0	0	0	0	0	1	17	242
8:05 AM	0	0	11	0	0	0	9	0	0	0	0	0	0	1	0	2	23	
8:10 AM	0	1	5	0	0	0	9	0	0	0	0	0	0	0	0	1	16	
8:15 AM	0	0	2	0	0	0	12	0	0	0	0	0	0	0	0	2	16	
8:20 AM	0	1	13	0	0	0	12	0	0	0	0	0	0	0	0	1	27	
8:25 AM	0	1	8	0	0	0	9	0	0	0	0	0	0	0	0	0	18	
8:30 AM	0	0	9	0	0	0	8	0	0	0	0	0	0	0	0	0	17	
8:35 AM	0	0	4	0	0	0	7	0	0	0	0	0	0	0	0	0	11	
8:40 AM	0	1	9	0	0	0	8	0	0	0	0	0	0	0	0	2	20	
8:45 AM	0	1	16	0	0	0	14	0	0	0	0	0	0	0	0	2	33	
8:50 AM	0	0	5	0	0	0	10	0	0	0	0	0	0	0	0	2	17	
8:55 AM	0	1	5	0	0	0	20	0	0	0	0	0	0	0	0	1	27	
Count Total	0	16	128	0	0	0	256	4	0	0	0	0	0	1	0	37	442	
Peak Hour	0	8	91	0	0	0	127	1	0	0	0	0	0	1	0	14	242	

Location: 1 S BARLOW DR & HOLCOMB BLVD AM

Item #1.

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	1	1
7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	1	0	0	0	1	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	1	0	0	0	1	7:20 AM	0	0	0	0	0	7:20 AM	0	0	1	0	1
7:25 AM	0	0	2	0	2	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	1	1
7:40 AM	0	0	0	0	0	7:40 AM	0	0	2	0	2	7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	1	0	1	0	2	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	1	0	0	0	1	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	2	0	0	0	2	8:05 AM	0	0	0	0	0	8:05 AM	0	0	1	0	1
8:10 AM	0	0	0	0	0	8:10 AM	2	0	0	0	2	8:10 AM	0	0	0	0	0
8:15 AM	0	0	1	0	1	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	0	3	0	3	8:20 AM	0	0	0	0	0	8:20 AM	0	0	1	0	1
8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	1	0	0	0	1	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	1	1
8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	2	0	3	0	5	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	0	0	0	1	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	1	1
8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	10	0	10	0	20	Count Total	2	0	2	0	4	Count Total	0	0	3	4	7
Peak Hour	7	0	7	0	14	Peak Hour	2	0	0	0	2	Peak Hour	0	0	2	2	4

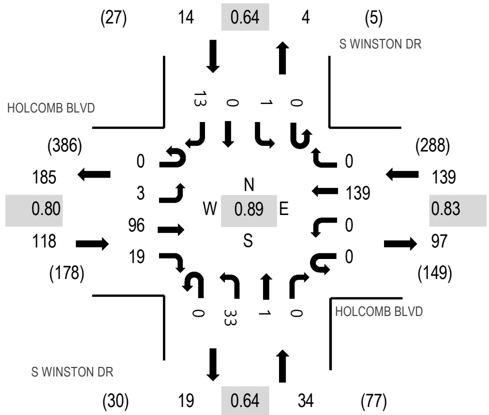
Item #1.

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

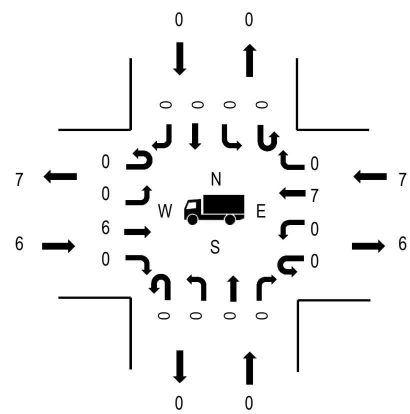
Location: 2 S WINSTON DR & HOLCOMB BLVD AM
Date: Thursday, April 15, 2021
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour

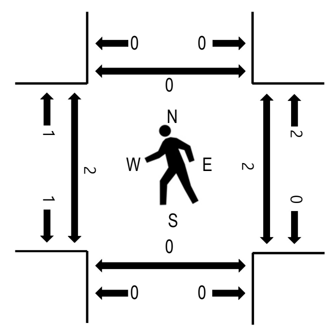
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	5.1%	0.80
WB	5.0%	0.83
NB	0.0%	0.64
SB	0.0%	0.64
All	4.3%	0.89

Traffic Counts - Motorized Vehicles

Interval	HOLCOMB BLVD Eastbound				HOLCOMB BLVD Westbound				S WINSTON DR Northbound				S WINSTON DR Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
7:00 AM	0	0	1	1	0	0	9	0	0	3	0	0	0	0	0	1	15	269
7:05 AM	0	0	3	0	0	0	11	0	0	3	0	0	0	0	0	0	17	273
7:10 AM	0	0	3	0	0	0	14	0	0	3	0	0	0	0	0	2	22	283
7:15 AM	0	0	5	0	0	0	14	0	0	5	0	0	0	0	0	2	26	279
7:20 AM	0	0	2	0	0	0	10	0	0	1	0	0	0	0	0	1	14	281
7:25 AM	0	0	2	0	0	0	12	0	0	1	0	0	0	0	0	0	15	298
7:30 AM	0	0	3	0	0	0	17	0	0	3	0	0	0	0	0	1	24	304
7:35 AM	0	0	3	2	0	0	10	0	0	6	0	0	0	0	0	3	24	303
7:40 AM	0	0	3	4	0	0	9	0	0	8	0	0	0	1	0	1	26	302
7:45 AM	0	0	9	0	0	0	17	0	0	2	0	0	0	0	0	2	30	305
7:50 AM	0	0	8	2	0	0	18	0	0	1	0	0	0	0	0	2	31	304
7:55 AM	0	0	5	4	0	0	11	0	0	3	0	0	0	0	0	2	25	300
8:00 AM	0	1	6	1	0	0	8	0	0	2	0	0	0	0	0	1	19	301
8:05 AM	0	0	11	2	0	0	13	0	0	1	0	0	0	0	0	0	27	
8:10 AM	0	0	5	1	0	0	8	0	0	4	0	0	0	0	0	0	18	
8:15 AM	0	0	7	1	0	0	14	0	0	3	1	0	0	0	0	2	28	
8:20 AM	0	1	8	2	0	0	14	0	0	5	0	0	0	1	0	0	31	
8:25 AM	0	0	9	1	0	0	9	0	0	1	0	0	0	0	0	1	21	
8:30 AM	0	0	8	1	0	0	8	0	0	4	0	0	0	0	0	2	23	
8:35 AM	0	0	9	1	0	0	7	0	0	5	0	0	0	0	0	1	23	
8:40 AM	0	1	11	3	0	0	12	0	0	2	0	0	0	0	0	0	29	
8:45 AM	0	0	13	0	0	0	13	0	0	2	0	1	0	0	0	0	29	
8:50 AM	0	0	4	3	0	0	17	0	0	2	0	1	0	0	0	0	27	
8:55 AM	0	0	7	1	0	0	13	0	0	3	1	0	0	0	0	1	26	
Count Total	0	3	145	30	0	0	288	0	0	73	2	2	0	2	0	25	570	
Peak Hour	0	3	96	19	0	0	139	0	0	33	1	0	0	1	0	13	305	

Location: 2 S WINSTON DR & HOLCOMB BLVD AM

Item #1.

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval	Heavy Vehicles					Interval	Bicycles on Roadway					Interval	Pedestrians/Bicycles on Crosswalk				
Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	1	0	0	0	1	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	1	0	0	0	1	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	0	2	0	2	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	1	0	0	0	1	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	1	1
7:45 AM	2	0	0	0	2	7:45 AM	0	0	0	0	0	7:45 AM	1	0	0	0	1
7:50 AM	0	0	1	0	1	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0	7:55 AM	0	0	1	0	1
8:00 AM	0	0	1	0	1	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	1	0	0	0	1	8:05 AM	0	0	0	0	0	8:05 AM	1	0	0	0	1
8:10 AM	0	0	0	0	0	8:10 AM	2	0	0	0	2	8:10 AM	0	0	1	1	2
8:15 AM	0	0	1	0	1	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	0	3	0	3	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	2	0	0	0	2	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	1	0	1	0	2	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	0	1	0	1	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0	8:50 AM	0	0	1	0	1
8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	9	0	10	0	19	Count Total	2	0	0	0	2	Count Total	2	0	3	2	7
Peak Hour	6	0	7	0	13	Peak Hour	2	0	0	0	2	Peak Hour	2	0	2	1	5

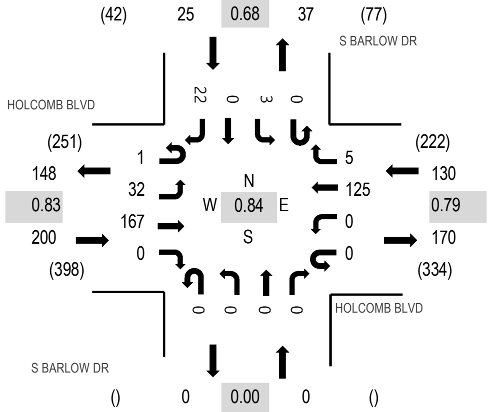
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 S BARLOW DR & HOLCOMB BLVD PM
Date: Thursday, April 15, 2021
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:30 PM - 05:45 PM

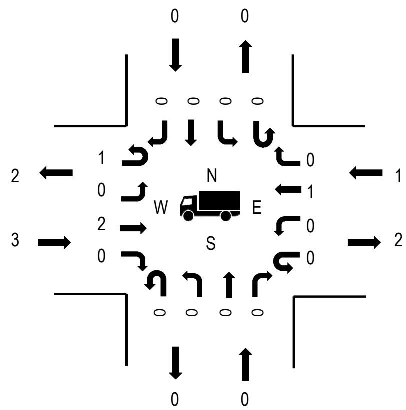
Item #1.

Peak Hour

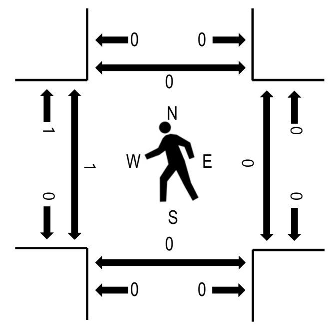
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.5%	0.83
WB	0.8%	0.79
NB	0.0%	0.00
SB	0.0%	0.68
All	1.1%	0.84

Traffic Counts - Motorized Vehicles

Interval Start Time	HOLCOMB BLVD Eastbound				HOLCOMB BLVD Westbound				S BARLOW DR Northbound				S BARLOW DR Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	6	8	0	0	0	7	1	0	0	0	0	0	1	0	4	27	333
4:05 PM	0	4	16	0	0	0	10	1	0	0	0	0	0	0	0	2	33	329
4:10 PM	0	4	13	0	0	0	7	0	0	0	0	0	0	0	0	0	24	327
4:15 PM	0	6	15	0	0	0	6	0	0	0	0	0	0	0	0	1	28	337
4:20 PM	0	1	19	0	0	0	8	1	0	0	0	0	0	0	0	2	31	336
4:25 PM	0	4	17	0	0	0	6	0	0	0	0	0	0	0	0	0	27	322
4:30 PM	0	2	10	0	0	0	8	0	0	0	0	0	0	0	0	0	20	317
4:35 PM	0	4	13	0	0	0	4	0	0	0	0	0	0	0	0	1	22	340
4:40 PM	0	1	11	0	0	0	10	1	0	0	0	0	0	0	0	3	26	349
4:45 PM	0	3	15	0	0	0	11	1	0	0	0	0	0	0	0	0	30	355
4:50 PM	0	1	16	0	0	0	13	1	0	0	0	0	0	0	0	1	32	349
4:55 PM	0	3	13	0	0	0	15	0	0	0	0	0	0	0	0	2	33	334
5:00 PM	0	5	11	0	0	0	5	0	0	0	0	0	0	0	0	2	23	329
5:05 PM	1	4	10	0	0	0	14	1	0	0	0	0	0	0	0	1	31	
5:10 PM	0	2	20	0	0	0	9	0	0	0	0	0	0	0	0	3	34	
5:15 PM	0	4	12	0	0	0	9	0	0	0	0	0	0	0	0	2	27	
5:20 PM	0	2	7	0	0	0	6	0	0	0	0	0	0	1	0	1	17	
5:25 PM	0	1	10	0	0	0	7	0	0	0	0	0	0	1	0	3	22	
5:30 PM	0	3	26	0	0	0	11	1	0	0	0	0	0	0	0	2	43	
5:35 PM	0	2	10	0	0	0	15	0	0	0	0	0	0	0	0	4	31	
5:40 PM	0	2	17	0	0	0	10	1	0	0	0	0	0	1	0	1	32	
5:45 PM	0	1	11	0	0	0	11	0	0	0	0	0	0	1	0	0	24	
5:50 PM	0	2	9	0	0	0	4	0	0	0	0	0	0	0	0	2	17	
5:55 PM	0	1	20	0	0	0	7	0	0	0	0	0	0	0	0	0	28	
Count Total	1	68	329	0	0	0	213	9	0	0	0	0	0	5	0	37	662	
Peak Hour	1	32	167	0	0	0	125	5	0	0	0	0	0	3	0	22	355	

Item #1.

Location: 1 S BARLOW DR & HOLCOMB BLVD PM

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval	Heavy Vehicles					Interval	Bicycles on Roadway					Interval	Pedestrians/Bicycles on Crosswalk				
Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	1	1
4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	0	0	1	0	1	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	1	1
4:20 PM	1	0	0	0	1	4:20 PM	0	0	0	0	0	4:20 PM	1	0	0	2	3
4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	0	0	0	0	0	4:35 PM	0	0	1	0	1	4:35 PM	0	0	0	0	0
4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	2	2
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	1	0	0	0	1
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	1	0	0	0	1	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	2	0	0	0	2	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	1	0	1	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	1	1
5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	4	0	2	0	6	Count Total	0	0	1	0	1	Count Total	2	0	0	7	9
Peak Hour	3	0	1	0	4	Peak Hour	0	0	0	0	0	Peak Hour	1	0	0	1	2

Item #1.

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 2 S WINSTON DR & HOLCOMB BLVD PM

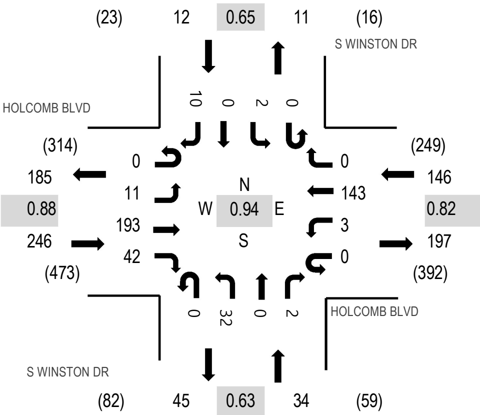
Date: Thursday, April 15, 2021

Peak Hour: 04:45 PM - 05:45 PM

Peak 15-Minutes: 05:25 PM - 05:40 PM

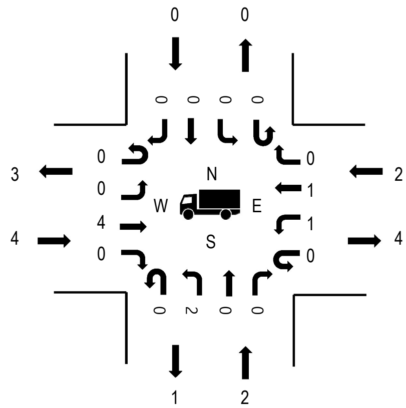
Peak Hour

Motorized Vehicles

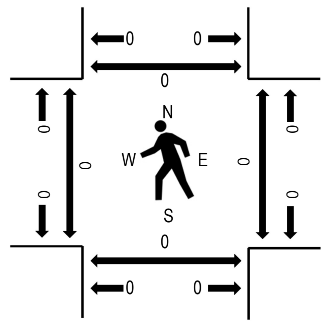


Note: Total study counts contained in parentheses.

Heavy Vehicles



Pedestrians



	HV%	PHF
EB	1.6%	0.88
WB	1.4%	0.82
NB	5.9%	0.63
SB	0.0%	0.65
All	1.8%	0.94

Traffic Counts - Motorized Vehicles

Interval	HOLCOMB BLVD Eastbound				HOLCOMB BLVD Westbound				S WINSTON DR Northbound				S WINSTON DR Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
4:00 PM	0	0	12	3	0	0	13	0	0	2	0	0	0	0	0	2	32	393
4:05 PM	0	0	20	2	0	1	9	0	0	0	1	0	0	0	0	1	34	389
4:10 PM	0	0	15	2	0	0	6	0	0	1	0	1	0	0	0	0	25	397
4:15 PM	0	0	19	4	0	0	9	0	0	2	0	1	0	0	0	0	35	411
4:20 PM	0	0	17	2	0	0	8	0	0	1	0	1	0	1	0	0	30	411
4:25 PM	0	0	23	6	0	0	7	0	0	1	0	0	0	0	0	0	37	412
4:30 PM	0	0	11	3	0	0	7	0	0	4	0	0	0	0	0	0	25	407
4:35 PM	0	1	17	4	0	0	7	0	0	1	0	1	0	1	0	0	32	429
4:40 PM	0	1	9	4	0	0	11	1	0	0	0	0	0	0	0	1	27	435
4:45 PM	0	0	16	1	0	0	14	0	0	4	0	1	0	0	0	1	37	438
4:50 PM	0	0	16	4	0	1	11	0	0	2	0	0	0	1	0	2	37	433
4:55 PM	0	1	21	3	0	0	16	0	0	0	0	0	0	0	0	1	42	422
5:00 PM	0	1	13	5	0	1	8	0	0	0	0	0	0	0	0	0	28	411
5:05 PM	0	3	13	4	0	1	15	0	0	5	0	0	0	0	0	1	42	
5:10 PM	0	3	19	5	0	0	9	0	0	1	0	0	0	1	0	1	39	
5:15 PM	0	0	16	4	0	0	11	0	0	4	0	0	0	0	0	0	35	
5:20 PM	0	0	11	7	0	0	6	0	0	5	0	0	0	0	0	2	31	
5:25 PM	0	0	15	1	0	0	12	0	0	4	0	0	0	0	0	0	32	
5:30 PM	0	0	24	3	0	0	14	0	0	4	0	1	0	0	0	1	47	
5:35 PM	0	1	13	2	0	0	20	0	0	1	0	0	0	0	0	1	38	
5:40 PM	0	2	16	3	0	0	7	0	0	2	0	0	0	0	0	0	30	
5:45 PM	0	0	12	2	0	0	12	0	0	4	0	0	0	0	0	2	32	
5:50 PM	0	1	14	2	0	0	6	0	0	1	0	0	0	0	0	2	26	
5:55 PM	0	0	19	2	0	0	6	0	0	2	0	1	0	0	0	1	31	
Count Total	0	14	381	78	0	4	244	1	0	51	1	7	0	4	0	19	804	
Peak Hour	0	11	193	42	0	3	143	0	0	32	0	2	0	2	0	10	[illegible]	

Location: 2 S WINSTON DR & HOLCOMB BLVD PM

Item #1.

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0
4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0
4:15 PM	0	0	1	0	1
4:20 PM	1	0	0	0	1
4:25 PM	0	0	0	0	0
4:30 PM	1	0	0	0	1
4:35 PM	0	0	0	0	0
4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
4:50 PM	0	1	0	0	1
4:55 PM	0	0	0	0	0
5:00 PM	1	0	0	0	1
5:05 PM	0	0	1	0	1
5:10 PM	0	0	0	0	0
5:15 PM	0	1	0	0	1
5:20 PM	0	0	0	0	0
5:25 PM	3	0	0	0	3
5:30 PM	0	0	0	0	0
5:35 PM	0	0	1	0	1
5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0
Count Total	6	2	3	0	11
Peak Hour	4	2	2	0	8

Interval Start Time	Bicycles on Roadway EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0
4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:35 PM	0	0	1	0	1
4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	0	0
5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0
Count Total	0	0	1	0	1
Peak Hour	0	0	0	0	0

Interval Start Time	Pedestrians/Bicycles on Crosswalk EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0
4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:20 PM	2	1	1	0	4
4:25 PM	0	0	0	0	0
4:30 PM	1	0	0	0	1
4:35 PM	0	0	1	0	1
4:40 PM	0	0	2	0	2
4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	0	0
5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0
Count Total	3	1	4	0	8
Peak Hour	0	0	0	0	0

Quality Counts, LLC
7409 SW Tech Center Drive, Suite B150
Tigard, OR, 97223
www.qualitycounts.net

Oregon City 2017
Volume Traffic Survey

Site Code: 14507995
Station ID: # 89
Holcomb Blvd E of Barlow Dr

Start Time	02-Nov-17 Thu	EB Morning	EB Afternoon	Hour Totals Morning	Hour Totals Afternoon	WB Morning	WB Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		1	18			1	23				
12:15		3	20			1	28				
12:30		1	16			1	24				
12:45		1	25	6	79	3	21	6	96	12	175
01:00		2	25			1	22				
01:15		1	27			0	24				
01:30		1	25			0	20				
01:45		2	29	6	106	0	25	1	91	7	197
02:00		1	26			0	22				
02:15		0	25			1	19				
02:30		0	32			0	22				
02:45		2	20	3	103	1	12	2	75	5	178
03:00		1	40			1	23				
03:15		1	31			2	15				
03:30		0	30			1	27				
03:45		0	36	2	137	0	19	4	84	6	221
04:00		0	45			2	26				
04:15		0	42			10	26				
04:30		1	31			5	21				
04:45		1	36	2	154	7	15	24	88	26	242
05:00		4	49			13	28				
05:15		1	47			15	26				
05:30		1	40			16	21				
05:45		2	21	8	157	30	20	74	95	82	252
06:00		5	35			30	27				
06:15		2	36			33	25				
06:30		8	27			26	17				
06:45		6	22	21	120	24	12	113	81	134	201
07:00		14	20			49	15				
07:15		19	19			55	10				
07:30		14	21			44	12				
07:45		19	16	66	76	37	11	185	48	251	124
08:00		24	17			32	5				
08:15		13	23			19	10				
08:30		14	13			30	8				
08:45		15	18	66	71	33	7	114	30	180	101
09:00		18	13			23	3				
09:15		9	10			25	2				
09:30		10	15			18	5				
09:45		12	8	49	46	16	7	82	17	131	63
10:00		15	8			14	3				
10:15		20	11			22	3				
10:30		18	6			25	3				
10:45		11	7	64	32	21	2	82	11	146	43
11:00		14	4			24	2				
11:15		9	3			22	1				
11:30		28	3			21	1				
11:45		19	2	70	12	23	1	90	5	160	17
Total		363	1093			777	721			1140	1814
Percent		24.9%	75.1%			51.9%	48.1%			38.6%	61.4%
Grand Total		363	1093			777	721			1140	1814
Percent		24.9%	75.1%			51.9%	48.1%			38.6%	61.4%

ADT | ADT 2,953 | AADT 2,953

All Traffic Data Services, LLC
alltrafficdata.net

Date Start: 15-Apr-21
Date End: 15-Apr-21
Winston Dr South of Holcomb Blvd

Start Time	15-Apr-21 Thu	NB	SB							Total
12:00 AM		0	1							1
01:00		0	2							2
02:00		1	0							1
03:00		1	1							2
04:00		1	1							2
05:00		15	0							15
06:00		31	7							38
07:00		**40**	14							54
08:00		38	21							**59**
09:00		24	12							36
10:00		23	21							44
11:00		32	**27**							59
12:00 PM		22	26							48
01:00		24	22							46
02:00		29	39							68
03:00		29	30							59
04:00		26	42							68
05:00		**36**	**46**							**82**
06:00		24	37							61
07:00		16	29							45
08:00		15	23							38
09:00		9	25							34
10:00		3	7							10
11:00		0	6							6
Total		439	439							878
Percent		50.0%	50.0%							
AM Peak	-	07:00	11:00	-	-	-	-	-	-	08:00
Vol.	-	40	27	-	-	-	-	-	-	59
PM Peak	-	17:00	17:00	-	-	-	-	-	-	17:00
Vol.	-	36	46	-	-	-	-	-	-	82
Total		439	439							878
Percent		50.0%	50.0%							

ADT ADT 878 AADT 878

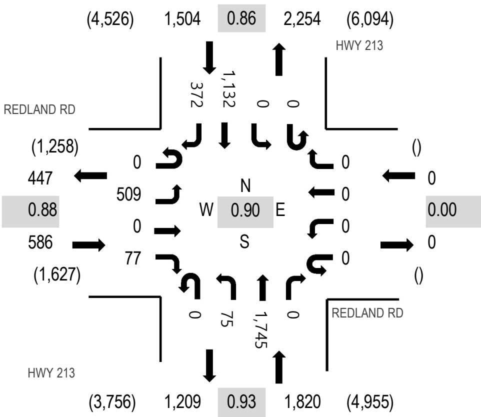
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 HWY 213 & REDLAND RD AM
Date: Thursday, July 22, 2021
Peak Hour: 07:05 AM - 08:05 AM
Peak 15-Minutes: 07:35 AM - 07:50 AM

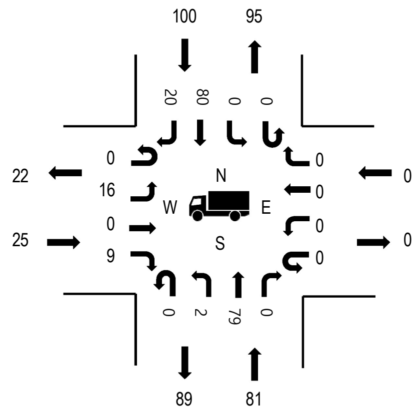
Item #1.

Peak Hour

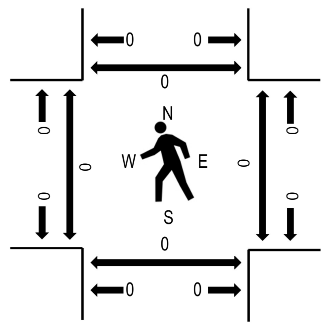
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	4.3%	0.88
WB	0.0%	0.00
NB	4.5%	0.93
SB	6.6%	0.86
All	5.3%	0.90

Traffic Counts - Motorized Vehicles

Interval Start Time	REDLAND RD Eastbound				REDLAND RD Westbound				HWY 213 Northbound				HWY 213 Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	36	0	3	0	0	0	0	0	4	139	0	0	0	83	13	278	3,898
7:05 AM	0	56	0	6	0	0	0	0	0	8	133	0	0	0	68	15	286	3,910
7:10 AM	0	35	0	3	0	0	0	0	0	3	185	0	0	0	74	32	332	3,894
7:15 AM	0	32	0	3	0	0	0	0	0	10	157	0	0	0	90	26	318	3,827
7:20 AM	0	56	0	12	0	0	0	0	0	3	117	0	0	0	84	26	298	3,857
7:25 AM	0	44	0	4	0	0	0	0	0	11	165	0	0	0	88	34	346	3,858
7:30 AM	0	38	0	7	0	0	0	0	0	6	151	0	0	0	115	26	343	3,792
7:35 AM	0	61	0	5	0	0	0	0	0	2	145	0	0	0	88	35	336	3,768
7:40 AM	0	34	0	8	0	0	0	0	0	4	160	0	0	0	122	40	368	3,746
7:45 AM	0	42	0	17	0	0	0	0	0	6	166	0	0	0	108	44	383	3,680
7:50 AM	0	33	0	5	0	0	0	0	0	6	121	0	0	0	108	37	310	3,625
7:55 AM	0	42	0	1	0	0	0	0	0	12	124	0	0	0	88	33	300	3,637
8:00 AM	0	36	0	6	0	0	0	0	0	4	121	0	0	0	99	24	290	3,614
8:05 AM	0	33	0	7	0	0	0	0	0	4	128	0	0	0	81	17	270	3,571
8:10 AM	0	40	0	8	0	0	0	0	0	7	110	0	0	0	76	24	265	3,591
8:15 AM	0	42	0	8	0	0	0	0	0	6	129	0	0	0	126	37	348	3,576
8:20 AM	0	38	0	6	0	0	0	0	0	4	127	0	0	0	93	31	299	3,521
8:25 AM	0	44	0	5	0	0	0	0	0	5	118	0	0	0	68	40	280	3,522
8:30 AM	0	25	0	3	0	0	0	0	0	4	136	0	0	0	117	34	319	3,530
8:35 AM	0	42	0	6	0	0	0	0	0	10	128	0	0	0	103	25	314	3,510
8:40 AM	0	49	0	7	0	0	0	0	0	7	128	0	0	0	79	32	302	3,511
8:45 AM	0	26	0	6	0	0	0	0	0	13	146	0	0	0	111	26	328	3,531
8:50 AM	0	36	0	3	0	0	0	0	0	12	128	0	0	0	110	33	322	3,570
8:55 AM	0	44	0	11	0	0	0	0	0	4	102	0	0	0	97	19	277	3,578
9:00 AM	0	29	0	6	0	0	0	0	0	3	93	0	0	0	90	26	247	3,596
9:05 AM	0	35	0	9	0	0	0	0	0	4	114	0	0	0	103	25	290	
9:10 AM	0	20	0	9	0	0	0	0	0	1	110	0	0	0	89	21	250	
9:15 AM	0	56	0	12	0	0	0	0	1	11	119	0	0	0	77	17		

Location: 1 HWY 213 & REDLAND RD AM

9:20 AM	0	26	0	8	0	0	0	0	0	6	130	0	0	0	110	20	300
9:25 AM	0	28	0	5	0	0	0	0	0	5	120	0	0	0	101	29	288
9:30 AM	0	45	0	7	0	0	0	0	0	8	116	0	0	0	107	16	299
9:35 AM	0	27	0	7	0	0	0	0	1	11	126	0	0	0	107	36	315
9:40 AM	0	39	0	10	0	0	0	0	0	6	131	0	0	0	105	31	322
9:45 AM	0	45	0	7	0	0	0	0	0	9	160	0	0	0	107	39	367
9:50 AM	0	32	0	13	0	0	0	0	0	7	118	0	0	0	124	36	330
9:55 AM	0	30	0	8	0	0	0	0	1	8	117	0	0	0	106	25	295
Count Total	0	1,376	0	251	0	0	0	0	3	234	4,718	0	0	0	3,502	1,024	11,108
Peak Hour	0	509	0	77	0	0	0	0	0	75	1,745	0	0	0	1,132	372	3,910

Item #1.

Location: 1 HWY 213 & REDLAND RD AM

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	8	0	6	14	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	1	7	0	6	14	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	1	5	0	7	13	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	9	0	7	16	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	6	7	0	6	19	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	5	0	10	15	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	1	10	0	16	27	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	3	3	0	7	13	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	3	10	0	1	14	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	1	6	0	10	17	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	3	5	0	11	19	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	2	10	0	8	20	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	4	4	0	11	19	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	2	6	0	7	15	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	0	5	0	8	13	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	4	6	0	13	23	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	9	0	3	12	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	2	4	0	10	16	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	12	0	17	29	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	3	10	0	9	22	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	1	9	0	11	21	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	2	8	0	5	15	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	4	0	12	17	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	2	7	0	8	17	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
9:00 AM	1	7	0	6	14	9:00 AM	0	0	0	0	0	9:00 AM	0	0	0	0	0
9:05 AM	1	4	0	11	16	9:05 AM	0	0	0	0	0	9:05 AM	0	0	0	0	0
9:10 AM	2	5	0	12	19	9:10 AM	0	0	0	0	0	9:10 AM	0	0	0	0	0
9:15 AM	2	12	0	9	23	9:15 AM	0	0	0	0	0	9:15 AM	0	0	0	0	0
9:20 AM	1	7	0	11	19	9:20 AM	0	0	0	0	0	9:20 AM	0	0	0	0	0
9:25 AM	2	7	0	14	23	9:25 AM	0	0	0	0	0	9:25 AM	0	0	0	0	0
9:30 AM	2	8	0	9	19	9:30 AM	0	0	0	0	0	9:30 AM	1	1	0	0	2
9:35 AM	0	9	0	6	15	9:35 AM	0	0	0	0	0	9:35 AM	0	0	0	0	0
9:40 AM	1	5	0	13	19	9:40 AM	0	0	0	0	0	9:40 AM	0	0	0	0	0
9:45 AM	1	15	0	11	27	9:45 AM	0	0	0	0	0	9:45 AM	0	0	0	0	0
9:50 AM	0	6	0	15	21	9:50 AM	0	0	0	0	0	9:50 AM	0	0	0	0	0
9:55 AM	2	8	0	11	21	9:55 AM	0	0	0	0	0	9:55 AM	0	0	0	0	0
Count Total	57	262	0	337	656	Count Total	0	0	0	0	0	Count Total	1	1	0	0	2
Peak Hour	25	81	0	100	206	Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	0	0

Location: 2 REDLAND RD & ABERNATHY RD AM

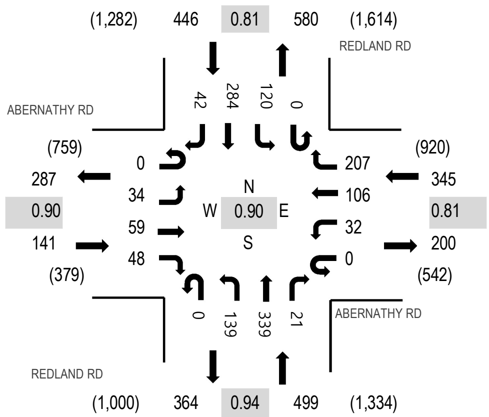
Item #1.

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

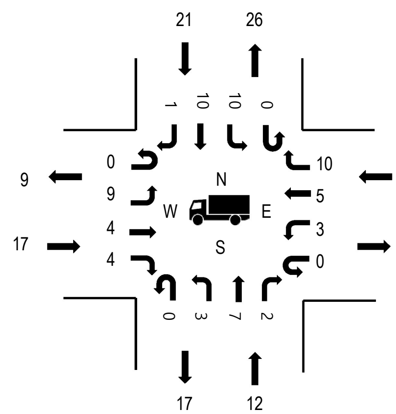
Location: 2 REDLAND RD & ABERNATHY RD AM
Date: Thursday, July 22, 2021
Peak Hour: 07:25 AM - 08:25 AM
Peak 15-Minutes: 07:40 AM - 07:55 AM

Peak Hour

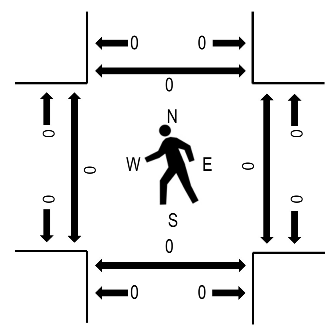
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	12.1%	0.90
WB	5.2%	0.81
NB	2.4%	0.94
SB	4.7%	0.81
All	4.8%	0.90

Traffic Counts - Motorized Vehicles

Interval	ABERNATHY RD Eastbound				ABERNATHY RD Westbound				REDLAND RD Northbound				REDLAND RD Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
7:00 AM	0	1	2	1	0	0	6	14	0	10	28	2	0	10	15	6	95	1,359
7:05 AM	0	1	3	1	0	0	2	16	0	8	32	0	0	6	9	5	83	1,388
7:10 AM	0	2	6	0	0	3	7	21	0	8	18	1	0	6	13	4	89	1,393
7:15 AM	0	1	3	2	0	1	3	15	0	5	35	2	0	1	28	6	102	1,405
7:20 AM	0	3	5	3	0	1	7	11	0	10	29	0	0	10	19	6	104	1,417
7:25 AM	0	3	4	3	0	3	7	22	0	11	39	2	0	14	18	3	129	1,431
7:30 AM	0	0	3	3	0	3	14	20	0	7	25	4	0	11	27	2	119	1,402
7:35 AM	0	3	7	8	0	3	13	21	0	13	26	0	0	8	16	4	122	1,400
7:40 AM	0	6	4	1	0	2	10	14	0	10	37	1	0	13	32	3	133	1,394
7:45 AM	0	4	8	9	0	5	4	21	0	13	25	0	0	13	24	2	128	1,360
7:50 AM	0	3	1	4	0	5	12	16	0	14	34	1	0	6	36	5	137	1,352
7:55 AM	0	0	6	2	0	2	6	13	0	14	25	2	0	11	32	5	118	1,321
8:00 AM	0	3	5	5	0	0	9	15	0	9	27	5	0	14	27	5	124	1,332
8:05 AM	0	0	8	2	0	2	4	12	0	10	25	3	0	3	16	3	88	1,321
8:10 AM	0	5	4	1	0	4	7	10	0	14	30	0	0	8	14	4	101	1,326
8:15 AM	0	5	3	5	0	3	10	22	0	13	20	2	0	9	21	1	114	1,322
8:20 AM	0	2	6	5	0	0	10	21	0	11	26	1	0	10	21	5	118	1,319
8:25 AM	0	5	4	3	0	2	6	18	0	5	20	0	0	6	27	4	100	1,282
8:30 AM	0	2	3	1	0	3	10	12	0	11	23	4	0	11	32	5	117	1,282
8:35 AM	0	1	7	11	0	3	14	19	0	5	25	1	0	6	19	5	116	1,264
8:40 AM	0	0	4	2	0	1	5	14	0	10	23	3	0	11	18	8	99	1,233
8:45 AM	0	1	3	2	0	0	9	15	0	10	36	0	0	11	23	10	120	1,239
8:50 AM	0	1	12	9	0	1	6	13	0	8	21	1	0	10	20	4	106	1,234
8:55 AM	0	2	3	4	0	1	10	20	0	11	28	4	0	9	28	9	129	1,245
9:00 AM	0	0	4	6	0	1	11	17	0	8	20	0	0	17	23	6	113	1,224
9:05 AM	0	0	4	1	0	3	4	17	0	11	24	1	0	10	15	3	93	
9:10 AM	0	2	5	7	0	0	10	19	0	6	19	1	0	7	17	4		

Item #1.

Location: 2 REDLAND RD & ABERNATHY RD AM

9:15 AM	0	1	4	7	0	2	7	20	0	11	33	0	0	8	16	2	111
9:20 AM	0	3	1	6	0	0	7	14	0	3	18	1	0	10	13	5	81
9:25 AM	0	2	2	8	0	1	4	13	0	12	26	2	0	13	13	4	100
9:30 AM	0	1	4	5	0	1	4	16	0	10	24	1	0	7	23	3	99
9:35 AM	0	3	1	10	0	2	4	12	0	1	28	0	0	3	16	5	85
9:40 AM	0	2	3	3	0	1	7	17	0	5	20	2	0	7	32	6	105
9:45 AM	0	3	2	8	0	4	6	14	0	6	31	1	0	12	21	7	115
9:50 AM	0	4	1	3	0	0	2	18	0	9	25	7	0	13	29	6	117
9:55 AM	0	1	4	3	0	5	7	16	0	6	25	1	0	13	25	2	108
Count Total	0	76	149	154	0	68	264	588	0	328	950	56	0	337	778	167	3,915
Peak Hour	0	34	59	48	0	32	106	207	0	139	339	21	0	120	284	42	1,431

Location: 2 REDLAND RD & ABERNATHY RD AM

Item #1.

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval	Heavy Vehicles					Interval	Bicycles on Roadway					Interval	Pedestrians/Bicycles on Crosswalk				
Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total
7:00 AM	0	1	1	1	3	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	2	1	0	2	5	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	1	0	1	2	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	1	2	1	4	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	1	0	2	2	5	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	2	1	1	1	5	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	1	1	1	2	5	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	2	0	1	3	6	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	3	0	0	3	6	7:40 AM	0	0	1	0	1	7:40 AM	0	0	0	0	0
7:45 AM	4	2	2	0	8	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	2	0	0	3	5	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	2	0	3	5	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	2	2	5	1	10	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	1	1	1	3	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	0	0	3	1	4	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	1	0	3	0	4	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	0	3	1	3	7	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	1	1	2	4	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	1	2	0	0	3	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	1	0	3	1	5	8:35 AM	0	0	0	0	0	8:35 AM	0	0	0	0	0
8:40 AM	0	1	0	3	4	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	2	0	0	2	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	0	2	2	5	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	1	2	1	1	5	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
9:00 AM	1	1	1	4	7	9:00 AM	0	0	0	0	0	9:00 AM	0	0	0	0	0
9:05 AM	0	0	1	0	1	9:05 AM	0	0	0	0	0	9:05 AM	0	0	0	0	0
9:10 AM	0	1	1	0	2	9:10 AM	0	0	1	0	1	9:10 AM	0	0	0	0	0
9:15 AM	0	3	1	3	7	9:15 AM	0	0	0	0	0	9:15 AM	0	0	0	0	0
9:20 AM	0	0	0	1	1	9:20 AM	0	0	0	0	0	9:20 AM	0	0	0	0	0
9:25 AM	1	1	2	0	4	9:25 AM	0	0	0	0	0	9:25 AM	0	0	0	0	0
9:30 AM	1	1	0	2	4	9:30 AM	0	0	0	0	0	9:30 AM	0	0	0	0	0
9:35 AM	0	2	0	0	2	9:35 AM	0	0	0	1	1	9:35 AM	0	0	0	0	0
9:40 AM	0	0	0	1	1	9:40 AM	0	0	0	0	0	9:40 AM	0	0	0	0	0
9:45 AM	0	1	0	4	5	9:45 AM	0	0	0	0	0	9:45 AM	0	0	0	0	0
9:50 AM	2	0	0	4	6	9:50 AM	0	0	0	0	0	9:50 AM	0	0	0	0	0
9:55 AM	1	1	0	3	5	9:55 AM	0	0	0	0	0	9:55 AM	0	0	0	0	0
Count Total	30	35	36	59	160	Count Total	0	0	2	1	3	Count Total	0	0	0	0	0
Peak Hour	17	12	18	21	68	Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0

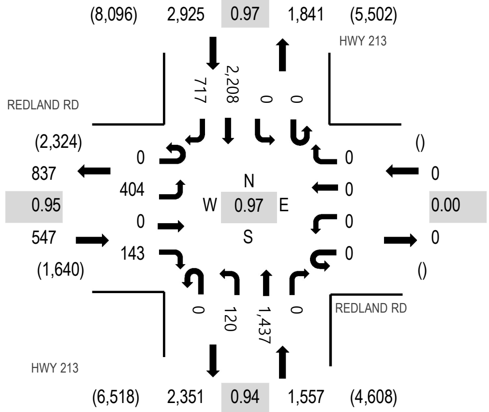
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 HWY 213 & REDLAND RD PM
Date: Thursday, July 22, 2021
Peak Hour: 04:35 PM - 05:35 PM
Peak 15-Minutes: 05:05 PM - 05:20 PM

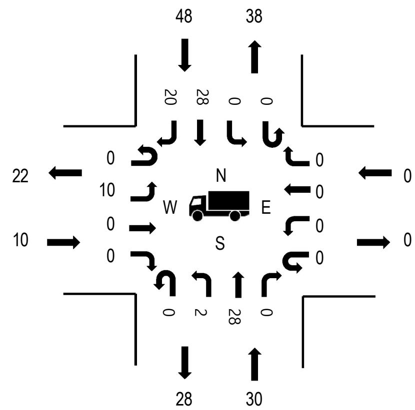
Item #1.

Peak Hour

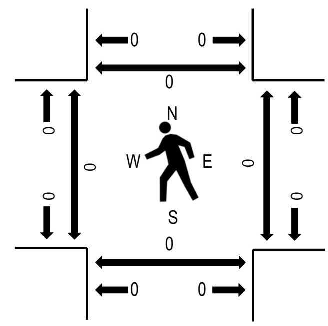
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.8%	0.95
WB	0.0%	0.00
NB	1.9%	0.94
SB	1.6%	0.97
All	1.7%	0.97

Traffic Counts - Motorized Vehicles

Interval Start Time	REDLAND RD Eastbound				REDLAND RD Westbound				HWY 213 Northbound				HWY 213 Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
3:00 PM	0	32	0	10	0	0	0	0	0	6	128	0	0	0	157	44	377	4,487
3:05 PM	0	27	0	5	0	0	0	0	0	12	144	0	0	0	156	51	395	4,507
3:10 PM	0	44	0	17	0	0	0	0	0	13	119	0	0	0	135	28	356	4,515
3:15 PM	0	26	0	4	0	0	0	0	0	13	135	0	0	0	165	54	397	4,587
3:20 PM	0	35	0	6	0	0	0	0	0	7	127	0	0	0	170	40	385	4,597
3:25 PM	0	45	0	12	0	0	0	0	0	6	105	0	0	0	156	49	373	4,620
3:30 PM	0	42	0	5	0	0	0	0	0	15	128	0	0	0	139	41	370	4,679
3:35 PM	0	31	0	9	0	0	0	0	0	4	112	0	0	0	197	50	403	4,714
3:40 PM	0	32	0	15	0	0	0	0	0	11	98	0	0	0	131	38	325	4,722
3:45 PM	0	32	0	9	0	0	0	0	0	15	115	0	0	0	134	40	345	4,845
3:50 PM	0	29	0	3	0	0	0	0	0	8	113	0	0	0	161	66	380	4,906
3:55 PM	0	25	0	15	0	0	0	0	0	10	100	0	0	0	181	50	381	4,912
4:00 PM	0	51	0	15	0	0	0	0	0	14	124	0	0	0	150	43	397	4,968
4:05 PM	0	24	0	5	0	0	0	0	0	8	132	0	0	0	179	55	403	4,959
4:10 PM	0	30	0	11	0	0	0	0	0	9	133	0	0	0	188	57	428	4,979
4:15 PM	0	50	0	21	0	0	0	0	0	3	95	0	0	0	194	44	407	5,017
4:20 PM	0	24	0	12	0	0	0	0	0	16	127	0	0	0	162	67	408	5,021
4:25 PM	0	22	0	13	0	0	0	0	0	6	121	0	0	0	196	74	432	5,010
4:30 PM	0	41	0	18	0	0	0	0	0	10	114	0	0	0	169	53	405	5,010
4:35 PM	0	37	0	17	0	0	0	0	0	16	128	0	0	0	150	63	411	5,029
4:40 PM	0	29	0	9	0	0	0	0	0	3	137	0	0	0	221	49	448	5,016
4:45 PM	0	33	0	13	0	0	0	0	0	8	105	0	0	0	186	61	406	4,955
4:50 PM	0	35	0	6	0	0	0	0	0	10	115	0	0	0	163	57	386	4,994
4:55 PM	0	32	0	11	0	0	0	0	0	10	128	0	0	0	197	59	437	4,955
5:00 PM	0	25	0	12	0	0	0	0	0	12	99	0	0	0	183	57	388	4,889
5:05 PM	0	56	0	14	0	0	0	0	0	13	120	0	0	0	168	52	423	
5:10 PM	0	27	0	18	0	0	0	0	0	9	136	0	0	0	191	85	466	
5:15 PM	0	19	0	8	0	0	0	0	0	8	119	0	0	0	199	58		

Location: 1 HWY 213 & REDLAND RD PM

5:20 PM	0	50	0	12	0	0	0	0	0	11	112	0	0	0	154	58	[illegible]
5:25 PM	0	31	0	15	0	0	0	0	0	12	124	0	0	0	190	60	432
5:30 PM	0	30	0	8	0	0	0	0	0	8	114	0	0	0	206	58	424
5:35 PM	0	46	0	13	0	0	0	0	0	9	109	0	0	0	158	63	398
5:40 PM	0	39	0	5	0	0	0	0	0	6	120	0	0	0	149	68	387
5:45 PM	0	35	0	13	0	0	0	0	0	8	131	0	0	0	194	64	445
5:50 PM	0	28	0	15	0	0	0	0	0	8	85	0	0	0	143	68	347
5:55 PM	0	45	0	7	0	0	0	0	0	8	111	0	0	0	145	55	371
Count Total	0	1,239	0	401	0	0	0	0	0	345	4,263	0	0	0	6,117	1,979	14,344
Peak Hour	0	404	0	143	0	0	0	0	0	120	1,437	0	0	0	2,208	717	5,029

Location: 1 HWY 213 & REDLAND RD PM

Item #1.

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles				
	EB	NB	WB	SB	Total
3:00 PM	0	7	0	8	15
3:05 PM	0	5	0	6	11
3:10 PM	1	5	0	7	13
3:15 PM	1	4	0	6	11
3:20 PM	1	2	0	8	11
3:25 PM	3	3	0	1	7
3:30 PM	4	3	0	1	8
3:35 PM	1	3	0	5	9
3:40 PM	1	2	0	3	6
3:45 PM	2	4	0	3	9
3:50 PM	0	4	0	5	9
3:55 PM	2	3	0	5	10
4:00 PM	3	6	0	6	15
4:05 PM	3	5	0	8	16
4:10 PM	1	1	0	6	8
4:15 PM	1	4	0	8	13
4:20 PM	0	8	0	5	13
4:25 PM	0	7	0	6	13
4:30 PM	2	4	0	8	14
4:35 PM	0	4	0	5	9
4:40 PM	1	1	0	2	4
4:45 PM	3	2	0	5	10
4:50 PM	2	3	0	1	6
4:55 PM	0	3	0	5	8
5:00 PM	1	3	0	5	9
5:05 PM	0	2	0	3	5
5:10 PM	2	3	0	9	14
5:15 PM	1	4	0	2	7
5:20 PM	0	0	0	4	4
5:25 PM	0	3	0	2	5
5:30 PM	0	2	0	5	7
5:35 PM	0	3	0	4	7
5:40 PM	0	1	0	5	6
5:45 PM	1	2	0	8	11
5:50 PM	0	2	0	4	6
5:55 PM	1	3	0	3	7
Count Total	38	121	0	177	336
Peak Hour	10	30	0	48	88

Interval Start Time	Bicycles on Roadway				
	EB	NB	WB	SB	Total
3:00 PM	0	0	0	0	0
3:05 PM	0	0	0	0	0
3:10 PM	0	0	0	0	0
3:15 PM	0	0	0	0	0
3:20 PM	0	0	0	0	0
3:25 PM	0	0	0	0	0
3:30 PM	0	0	0	0	0
3:35 PM	0	0	0	0	0
3:40 PM	0	0	0	0	0
3:45 PM	0	0	0	0	0
3:50 PM	0	0	0	0	0
3:55 PM	0	0	0	0	0
4:00 PM	0	0	0	0	0
4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:35 PM	0	0	0	0	0
4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	1	1
5:05 PM	0	0	0	1	1
5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0
5:30 PM	0	1	0	0	1
5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0
Count Total	0	1	0	2	3
Peak Hour	0	1	0	2	3

Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total
3:00 PM	0	0	0	0	0
3:05 PM	0	0	0	0	0
3:10 PM	0	0	0	0	0
3:15 PM	0	0	0	0	0
3:20 PM	0	0	0	0	0
3:25 PM	0	0	0	0	0
3:30 PM	0	0	0	0	0
3:35 PM	0	0	0	0	0
3:40 PM	0	0	0	0	0
3:45 PM	0	0	0	0	0
3:50 PM	0	0	0	0	0
3:55 PM	0	0	0	0	0
4:00 PM	0	1	0	0	1
4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:35 PM	0	0	0	0	0
4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
4:50 PM	0	1	0	0	1
4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	0	0
5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0
Count Total	0	2	0	0	2
Peak Hour	0	1	0	0	1

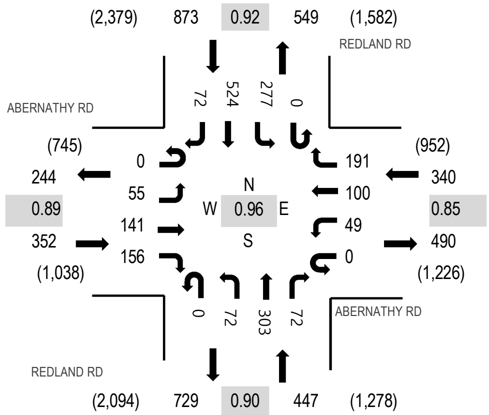
Item #1.

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

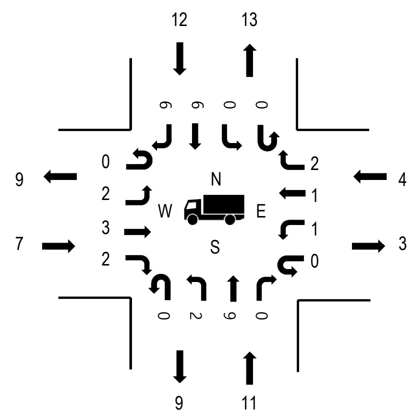
Location: 2 REDLAND RD & ABERNATHY RD PM
Date: Thursday, July 22, 2021
Peak Hour: 04:25 PM - 05:25 PM
Peak 15-Minutes: 05:10 PM - 05:25 PM

Peak Hour

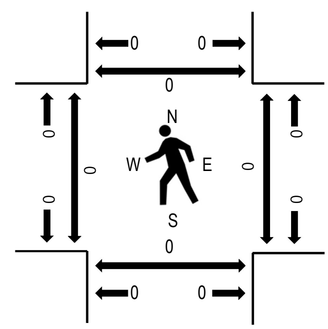
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	2.0%	0.89
WB	1.2%	0.85
NB	2.5%	0.90
SB	1.4%	0.92
All	1.7%	0.96

Traffic Counts - Motorized Vehicles

Interval	ABERNATHY RD Eastbound				ABERNATHY RD Westbound				REDLAND RD Northbound				REDLAND RD Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
3:00 PM	0	0	10	19	0	1	4	15	0	8	25	3	0	17	44	9	155	1,721
3:05 PM	0	6	7	21	0	2	7	16	0	7	21	0	0	12	25	6	130	1,708
3:10 PM	0	4	5	5	0	8	6	17	0	10	24	1	0	22	35	7	144	1,743
3:15 PM	0	1	5	12	0	1	2	15	0	12	22	6	0	9	34	8	127	1,770
3:20 PM	0	4	7	21	0	4	9	17	0	9	16	4	0	22	29	12	154	1,805
3:25 PM	0	8	13	11	0	4	5	17	0	4	28	3	0	10	34	2	139	1,811
3:30 PM	0	6	7	10	0	5	9	24	0	9	19	3	0	20	35	8	155	1,851
3:35 PM	0	4	7	6	0	3	15	14	0	8	25	1	0	9	30	4	126	1,844
3:40 PM	0	4	12	20	0	0	4	12	0	11	23	4	0	13	38	5	146	1,893
3:45 PM	0	3	11	13	0	2	10	14	0	10	24	3	0	18	31	9	148	1,920
3:50 PM	0	4	20	16	0	3	6	15	0	8	16	5	0	18	30	11	152	1,942
3:55 PM	0	2	16	20	0	3	7	12	0	11	22	0	0	13	35	4	145	1,964
4:00 PM	0	4	9	16	0	3	8	7	0	7	26	4	0	20	36	2	142	1,990
4:05 PM	0	5	15	12	0	5	11	16	0	5	17	3	0	25	47	4	165	1,990
4:10 PM	0	4	8	15	0	6	9	20	0	4	26	2	0	17	55	5	171	1,982
4:15 PM	0	2	14	16	0	0	7	20	0	6	27	4	0	18	43	5	162	1,991
4:20 PM	0	5	8	11	0	3	5	17	0	10	23	1	0	12	57	8	160	2,005
4:25 PM	0	5	12	14	0	3	10	17	0	6	29	7	0	25	42	9	179	2,012
4:30 PM	0	2	8	14	0	1	8	11	0	8	23	4	0	22	45	2	148	1,989
4:35 PM	0	4	20	18	0	7	9	25	0	0	25	3	0	20	35	9	175	2,001
4:40 PM	0	2	10	11	0	5	13	19	0	13	22	4	0	18	48	8	173	1,988
4:45 PM	0	3	11	5	0	3	8	15	0	6	32	5	0	27	52	3	170	1,969
4:50 PM	0	4	8	16	0	2	9	16	0	4	32	6	0	22	49	6	174	1,956
4:55 PM	0	3	9	14	0	6	12	15	0	5	25	8	0	22	46	6	171	1,959
5:00 PM	0	8	11	13	0	4	6	9	0	2	23	6	0	14	37	9	142	1,936
5:05 PM	0	6	16	8	0	4	8	19	0	5	24	7	0	27	29	4	157	
5:10 PM	0	6	14	7	0	6	4	21	0	9	24	7	0	29	49	4		

Location: 2 REDLAND RD & ABERNATHY RD PM

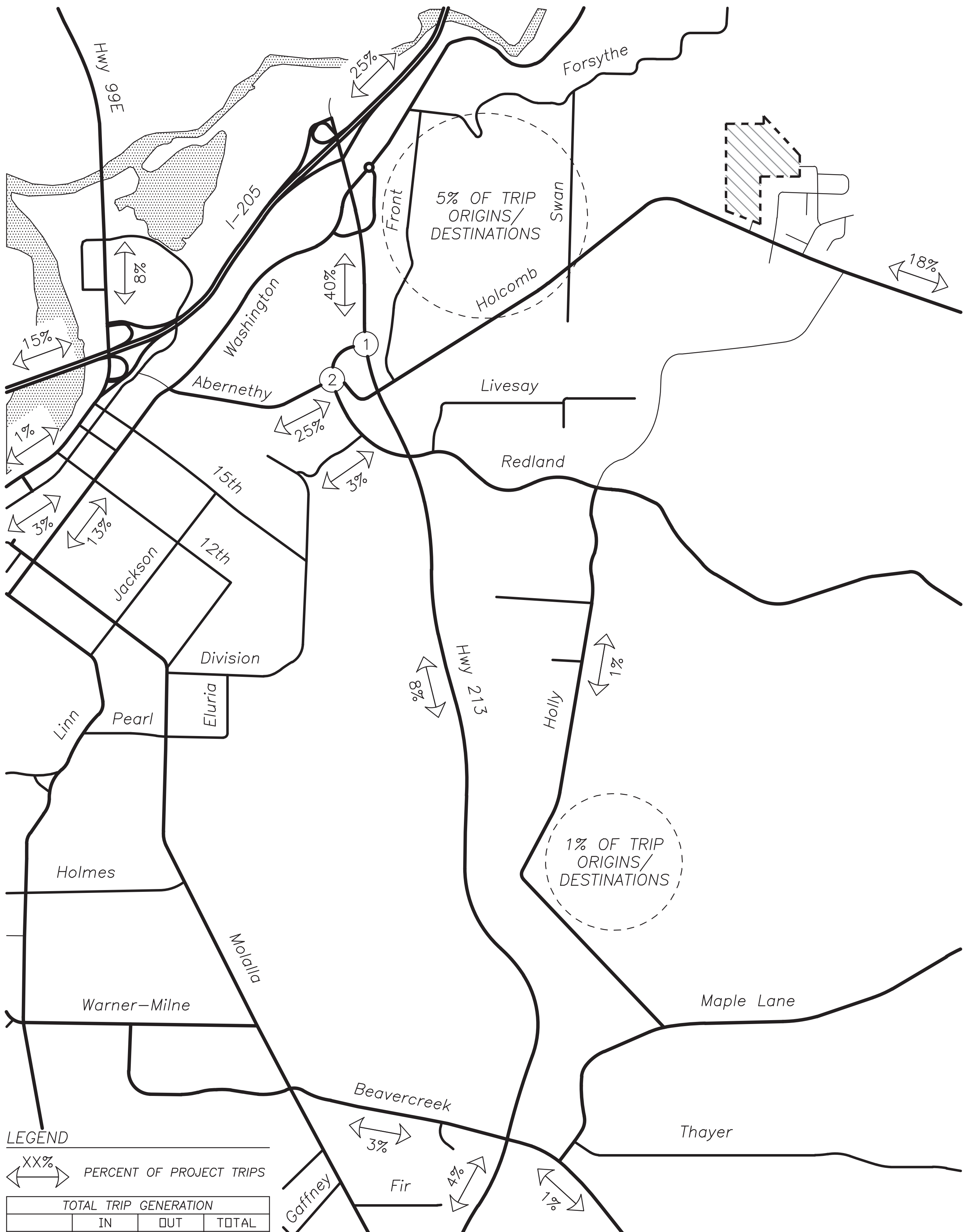
5:15 PM	0	8	16	17	0	5	5	11	0	7	18	8	0	20	53	8	176
5:20 PM	0	4	6	19	0	3	8	13	0	7	26	7	0	31	39	4	167
5:25 PM	0	1	11	12	0	1	6	16	0	5	29	6	0	24	40	5	156
5:30 PM	0	9	8	26	0	1	6	19	0	8	19	6	0	21	35	2	160
5:35 PM	0	9	7	15	0	5	5	14	0	12	16	3	0	20	55	1	162
5:40 PM	0	5	4	18	0	2	5	15	0	11	19	3	0	16	49	7	154
5:45 PM	0	4	17	15	0	1	9	17	0	9	31	3	0	13	34	4	157
5:50 PM	0	2	7	11	0	2	5	17	0	4	32	6	1	34	53	3	177
5:55 PM	0	3	9	9	0	2	7	12	0	5	25	9	0	13	44	10	148
Count Total	0	154	378	506	0	116	267	569	0	265	858	155	1	693	1,472	213	5,647
Peak Hour	0	55	141	156	0	49	100	191	0	72	303	72	0	277	524	72	2,012

Location: 2 REDLAND RD & ABERNATHY RD PM

Item #1.

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval	Heavy Vehicles					Interval	Bicycles on Roadway					Interval	Pedestrians/Bicycles on Crosswalk				
Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total
3:00 PM	0	0	2	4	6	3:00 PM	0	0	0	0	0	3:00 PM	0	0	0	0	0
3:05 PM	2	0	0	0	2	3:05 PM	0	0	0	0	0	3:05 PM	0	0	0	0	0
3:10 PM	0	1	1	3	5	3:10 PM	0	0	0	0	0	3:10 PM	0	0	0	0	0
3:15 PM	0	1	0	1	2	3:15 PM	0	0	0	0	0	3:15 PM	0	0	0	0	0
3:20 PM	1	2	1	0	4	3:20 PM	0	0	0	0	0	3:20 PM	0	0	0	0	0
3:25 PM	1	0	1	2	4	3:25 PM	0	0	0	0	0	3:25 PM	0	0	1	0	1
3:30 PM	2	1	4	0	7	3:30 PM	0	0	0	0	0	3:30 PM	0	0	0	0	0
3:35 PM	0	1	2	0	3	3:35 PM	0	0	0	0	0	3:35 PM	0	0	0	0	0
3:40 PM	1	0	0	1	2	3:40 PM	0	0	0	0	0	3:40 PM	0	0	0	0	0
3:45 PM	0	0	2	1	3	3:45 PM	0	0	0	0	0	3:45 PM	0	0	0	0	0
3:50 PM	2	1	0	1	4	3:50 PM	0	0	0	0	0	3:50 PM	0	0	0	0	0
3:55 PM	0	0	0	3	3	3:55 PM	0	0	0	0	0	3:55 PM	0	0	0	0	0
4:00 PM	1	1	1	1	4	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	1	0	0	0	1	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	1	0	0	1	2	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	2	1	0	2	5	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0
4:25 PM	1	0	1	0	2	4:25 PM	0	1	0	0	1	4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	2	2	4:30 PM	1	0	0	0	1	4:30 PM	0	0	0	0	0
4:35 PM	1	1	0	0	2	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	1	1	1	1	4	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	2	1	0	0	3	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	0	1	0	0	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	2	0	1	3	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	2	0	0	2	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	1	0	3	4	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	0	1	2	1	4	5:10 PM	1	0	0	0	1	5:10 PM	0	0	0	0	0
5:15 PM	2	1	0	4	7	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	3	1	0	1	5	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	0	2	0	1	3	5:30 PM	0	0	0	0	0	5:30 PM	0	0	1	0	1
5:35 PM	0	0	1	2	3	5:35 PM	1	0	0	0	1	5:35 PM	0	1	0	0	1
5:40 PM	0	1	2	0	3	5:40 PM	0	0	1	0	1	5:40 PM	0	1	0	0	1
5:45 PM	0	0	0	1	1	5:45 PM	0	1	0	0	1	5:45 PM	0	0	1	0	1
5:50 PM	0	1	1	0	2	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	2	2	0	0	4	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	26	27	22	37	112	Count Total	3	2	1	0	6	Count Total	0	2	3	0	5
Peak Hour	7	11	4	12	34	Peak Hour	2	1	0	0	3	Peak Hour	0	0	0	0	0

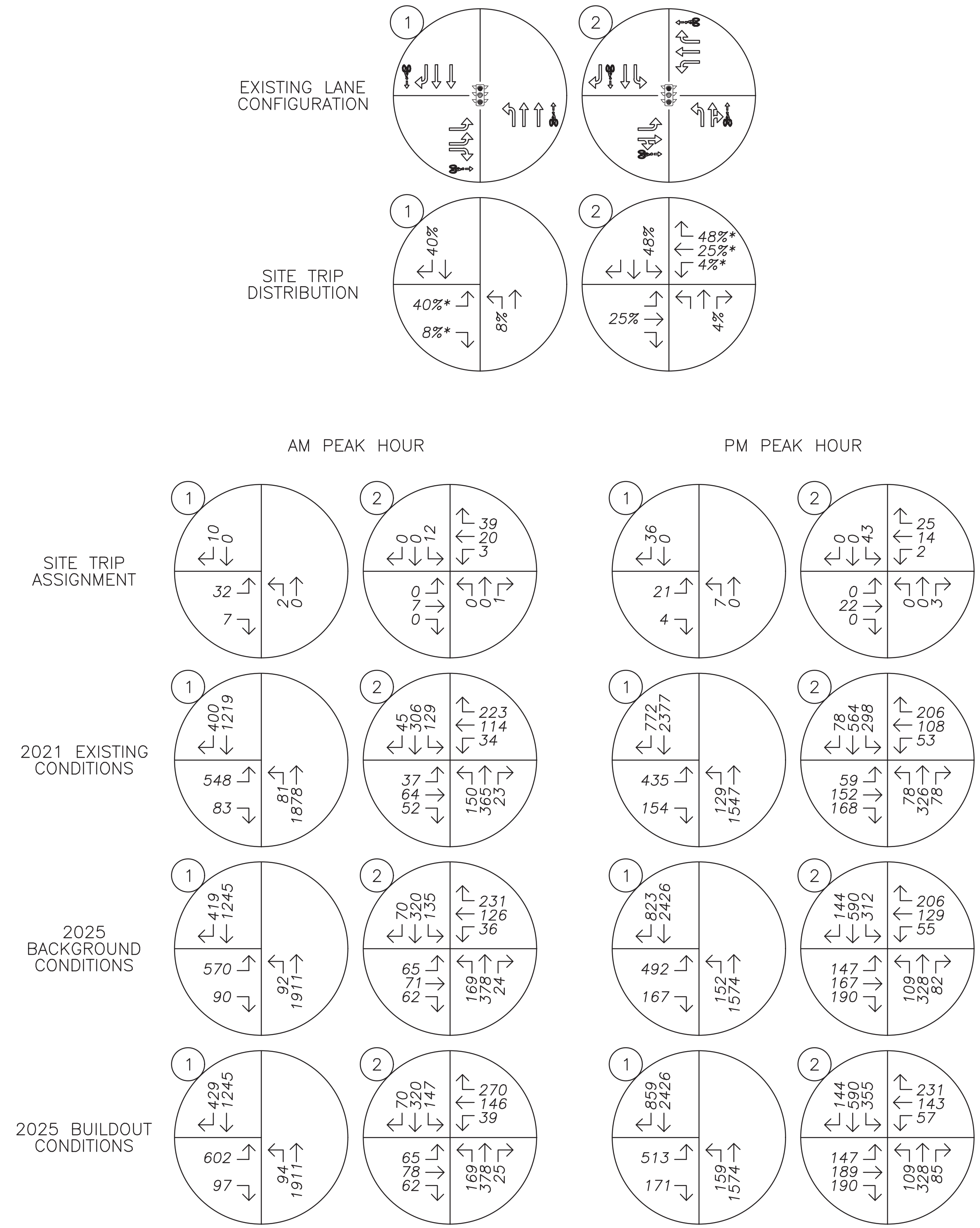


LEGEND

XX% PERCENT OF PROJECT TRIPS

TOTAL TRIP GENERATION			
	IN	OUT	TOTAL
AM	26	80	106
PM	89	53	142

NOTE: OUTBOUND PERCENTAGES ARE *



No Scale

TRAFFIC VOLUMES

Year 2021 Existing, 2025 Background, and 2025 Buildout Conditions

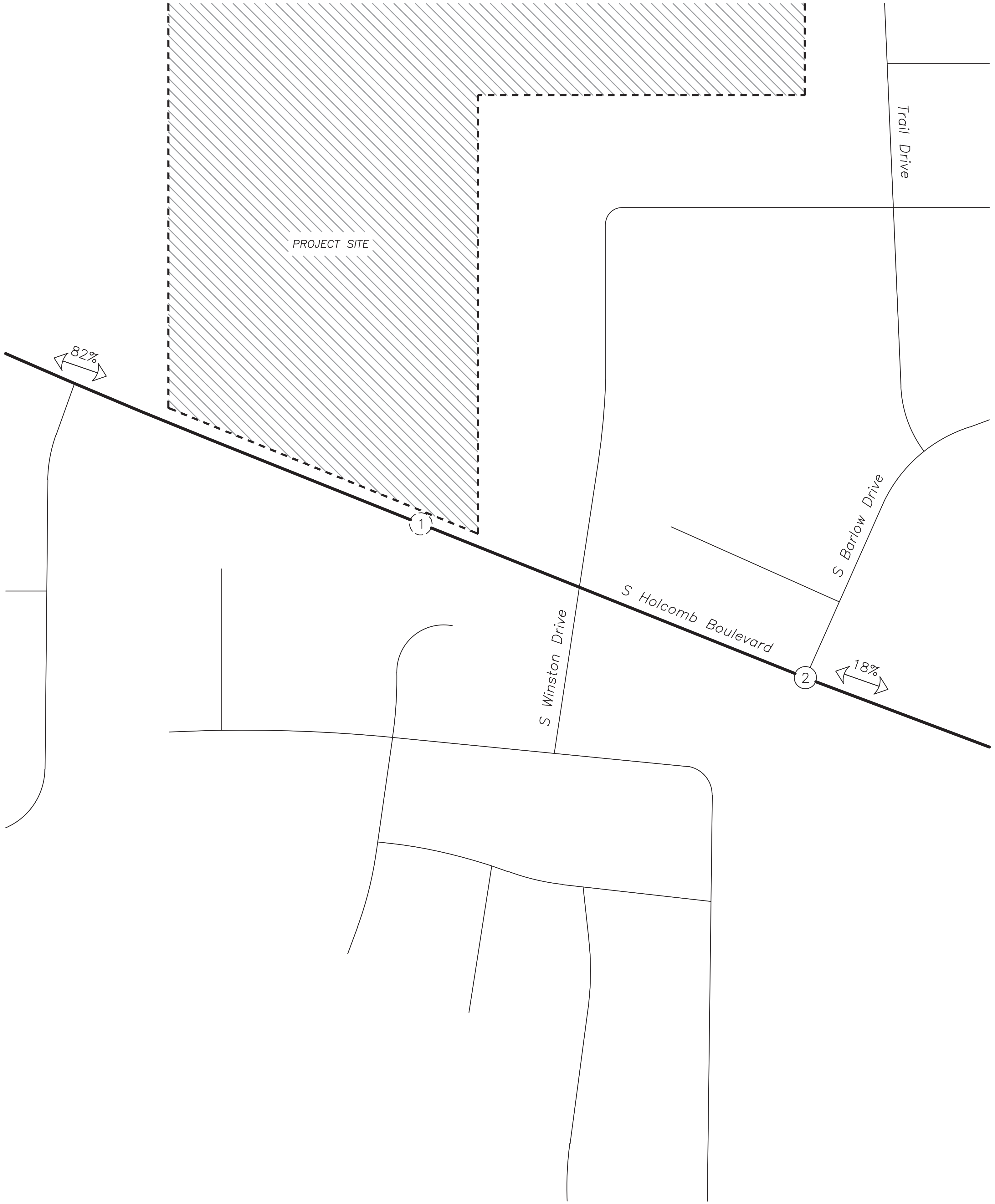
AM & PM Peak Hours

lancaster mobley

Figure 1

Serres Farm Master P

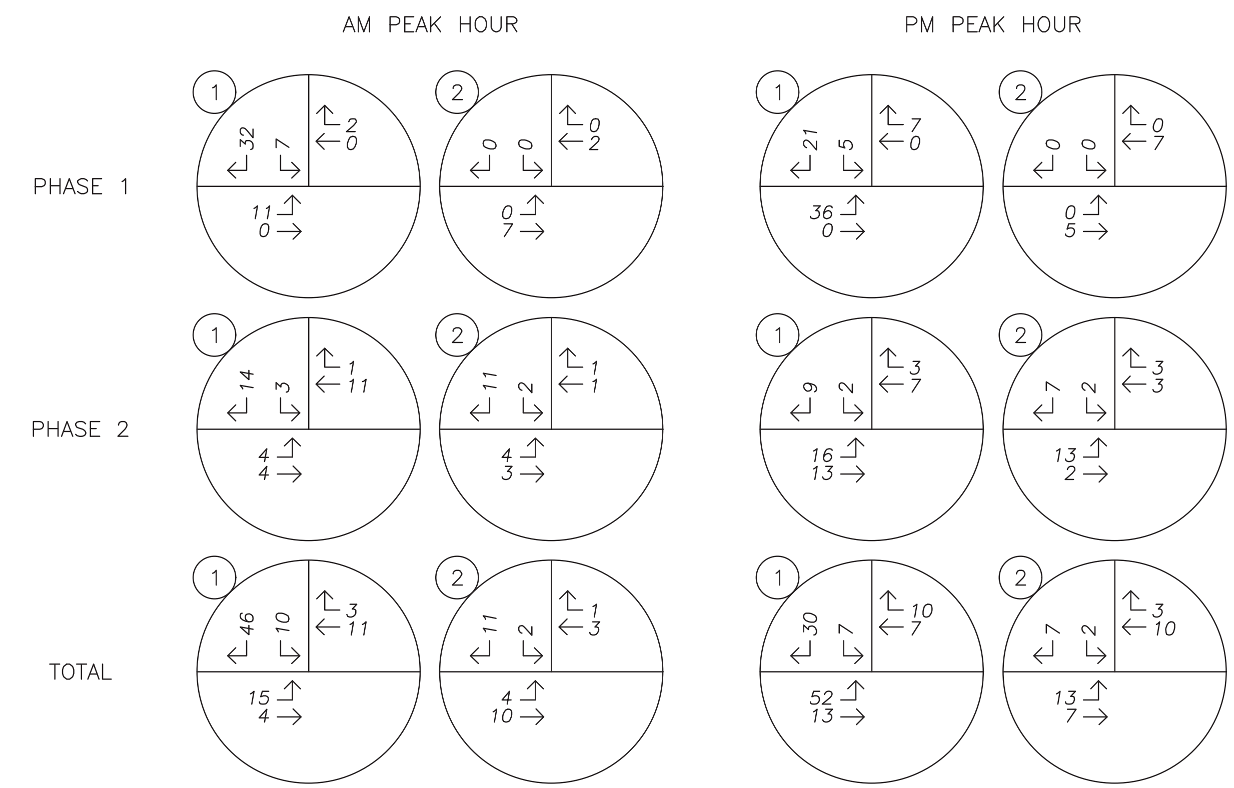
9/15/2



LEGEND

XX% PERCENT OF PROJECT TRIPS

TOTAL TRIP GENERATION			
	IN	OUT	TOTAL
AM	23	69	92
PM	78	46	124



No Scale

Figure 3

Serres Farm Master P

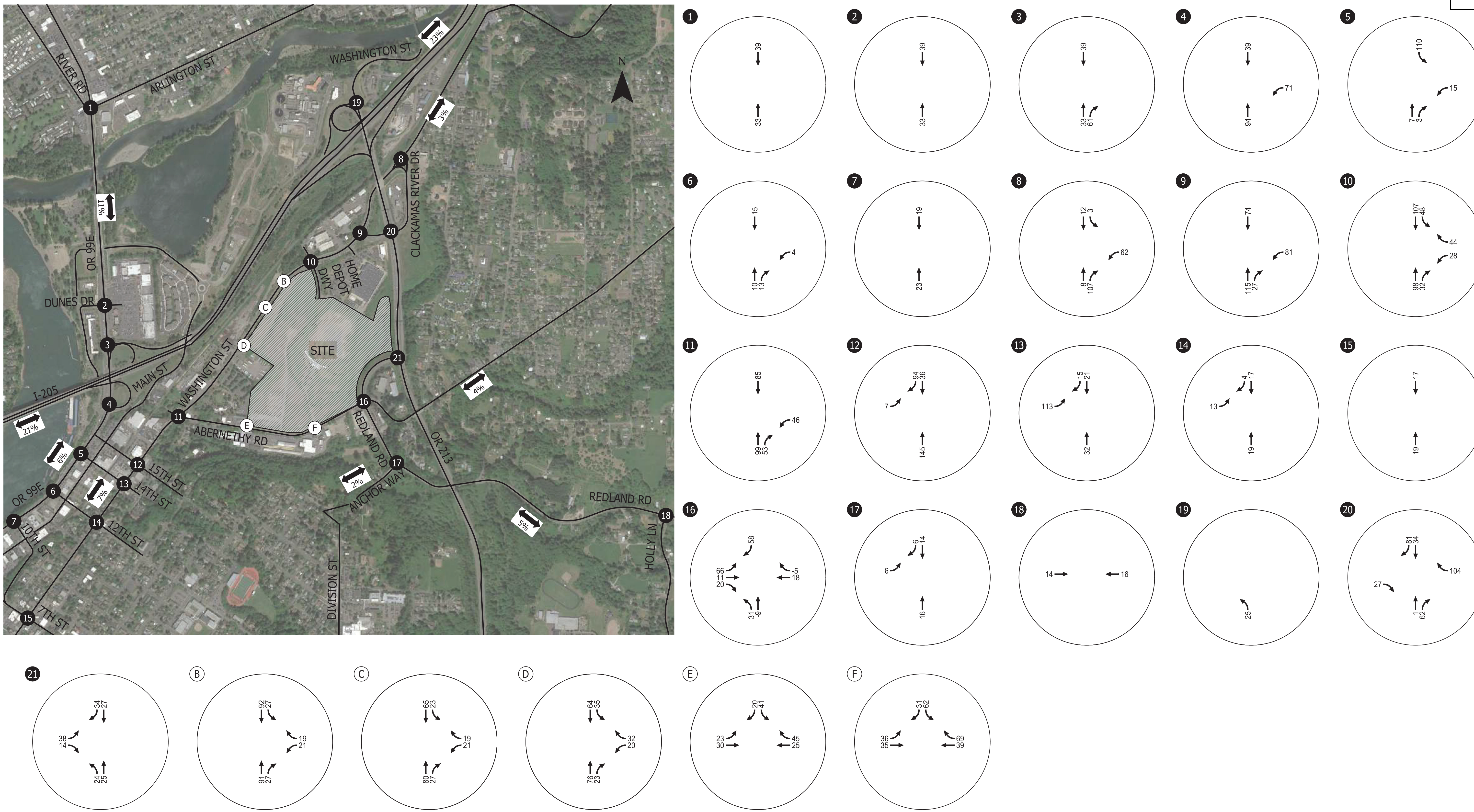
5/19/2

SITE TRIP ASSIGNMENT

Proposed Development Plan - Site Trips

AM & PM Peak Hours

lancaster **mobley**

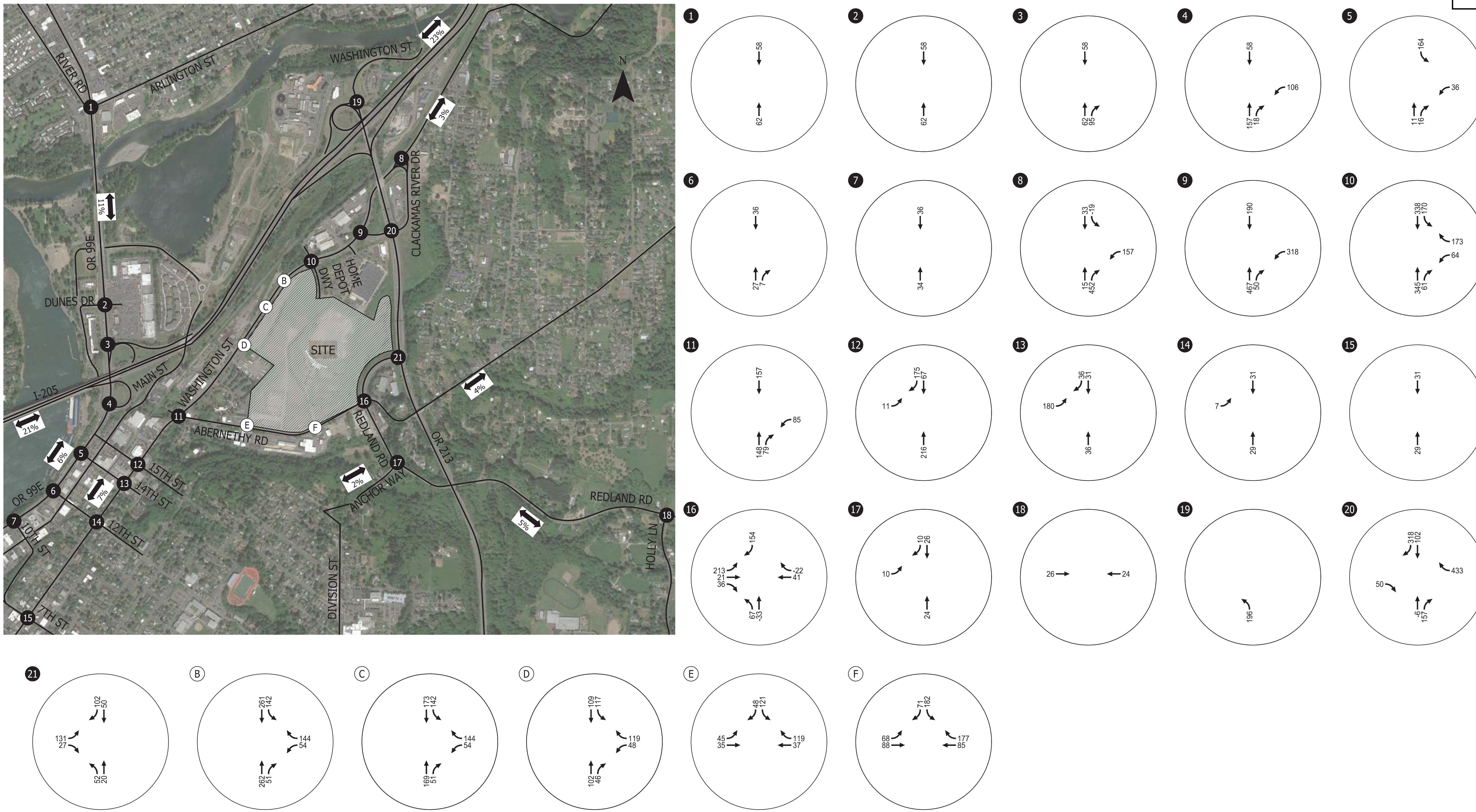


Total External Site Trip Assignment
Weekday AM Peak Hour
Oregon City, Oregon

Figure 20

KITTELSON & ASSOCIATES

Item #1.



Total External Site Trip Assignment
Weekday PM Peak Hour
Oregon City, Oregon

Figure 22

H:\24\24824 - Rivers Edge Development\report\figs\24824 Fig.dwg Mar 17, 2021 - 10:12am - mruiz-leon Layout Tab: TA_PM1

KITTELSON & ASSOCIATES

Appendix D

Crash History Data

URBAN NON-SYSTEM CRASH LISTING

CITY OF OREGON CITY, CLACKAMAS COUNTY

HOLCOMB BLVD at WINSTON DR, City of Oregon City, Clackamas County, 01/01/2015 to 12/31/2019

SER# / INVEST / RD DPT / UNLOC?	S P E D	A L C	D R U G S	M J I N V	S C H L	W O R K	DATE / DAY / TIME / LAT	CLASS / DIST / FROM / LONG	CITY STREET / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	P#	PRTC / TYPE	INJ / SVRTY	A G E	S E X	LICNS / RES	PED / LOC	ERROR	ACT	EVENT	CAUSE

URBAN NON-SYSTEM CRASH LISTING

CITY OF OREGON CITY, CLACKAMAS COUNTY **HOLCOMB BLVD at BARLOW DR, City of Oregon City, Clackamas County, 01/01/2015 to 12/31/2019**

SER# / INVEST / RD DPT / UNLOC?	S P E D	A L C	D R U G S	M J I N V	S C H L	W O R K	DATE / DAY / TIME / LAT	CLASS / DIST / FROM / LONG	CITY STREET / FIRST STREET / SECOND STREET / LRS	RD CHAR / DIRECT / LOCTN	INT-TYPE / (MEDIAN) / LEGS / (#LANES)	INT-REL / TRAF- / CONTL	OFFRD / RNDBT / DRVWY	WTHR / SURF / LIGHT	CRASH / COLL / SVRTY	V#	SPCL USE / TRLR QTY / OWNER / TYPE	MOVE / FROM / TO	P#	PRTC / TYPE	INJ / SVRTY	A G E	S E X	LICNS / RES	PED / LOC	ERROR	ACT	EVENT	CAUSE

HOLCOMB BLVD at BARLOW DR, City of Oregon City, Clackamas County, 01/01/2015 to 12/31/2019

Appendix E

Left-turn Lane Warrant Analysis

Preliminary Signal Warrant Analysis

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (EB)

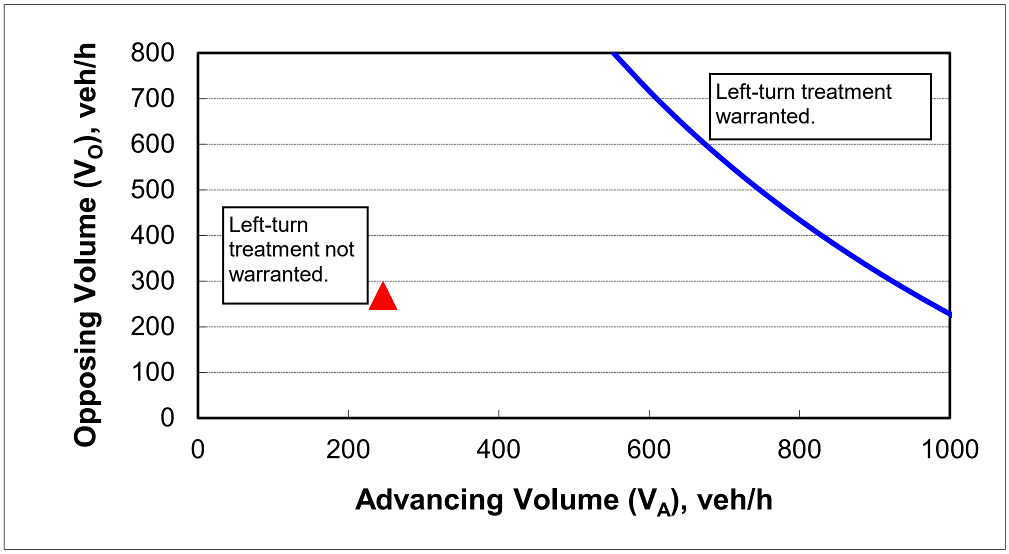
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	2%
Advancing volume (V_A), veh/h:	246
Opposing volume (V_O), veh/h:	268

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	957
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (WB)

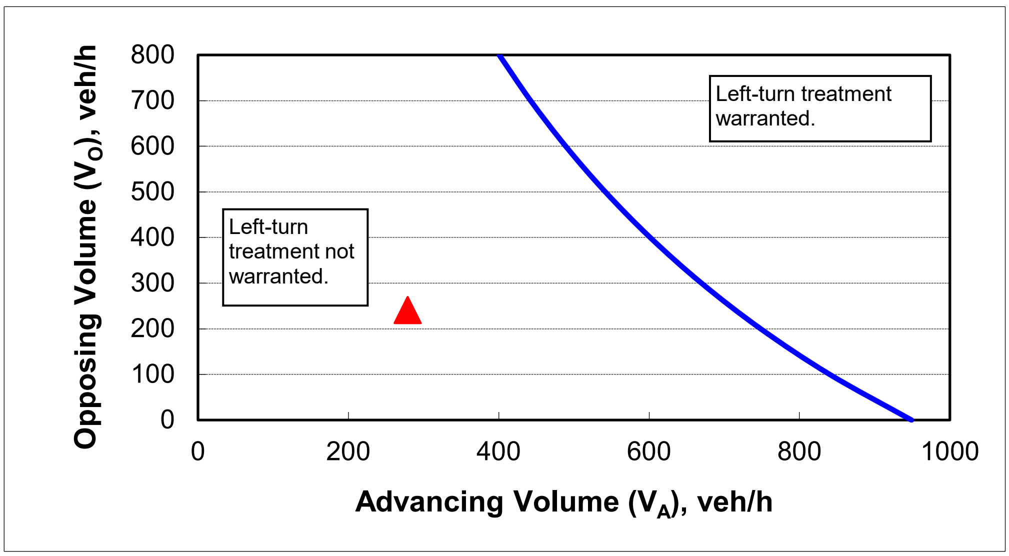
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	4%
Advancing volume (V_A), veh/h:	279
Opposing volume (V_O), veh/h:	241

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	715
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (EB)

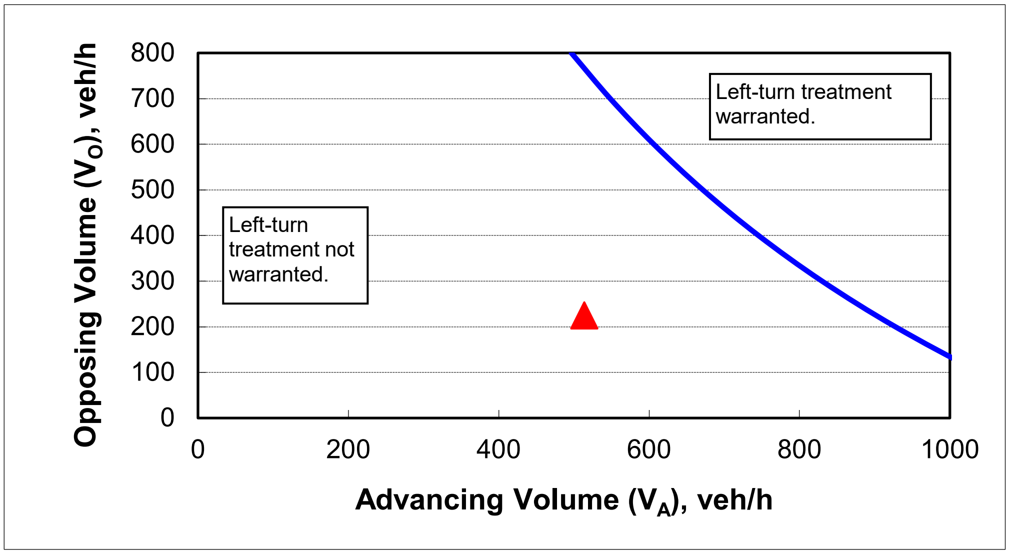
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	3%
Advancing volume (V_A), veh/h:	514
Opposing volume (V_O), veh/h:	225

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	902
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (WB)

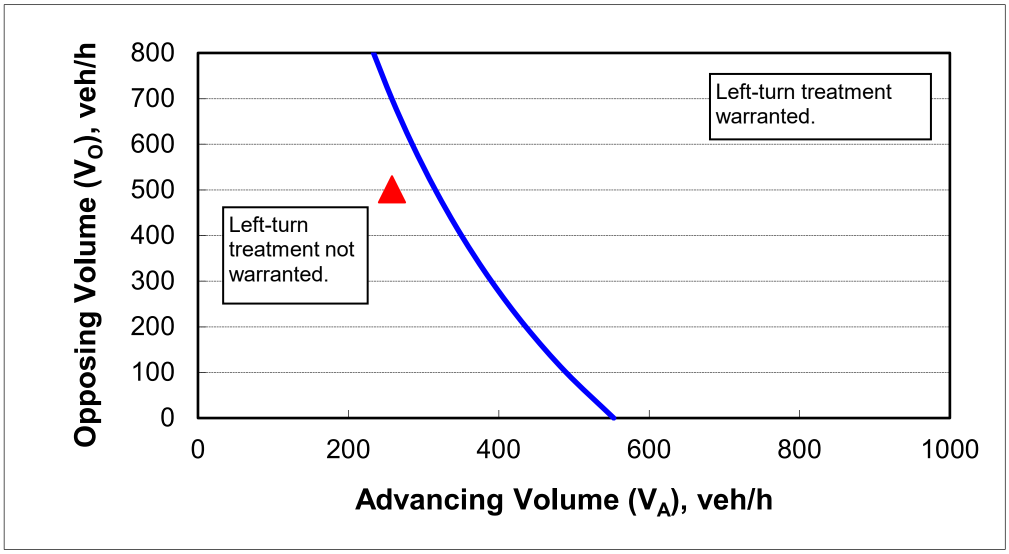
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	13%
Advancing volume (V_A), veh/h:	258
Opposing volume (V_O), veh/h:	501

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	315
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 2. S Barlow Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (EB)

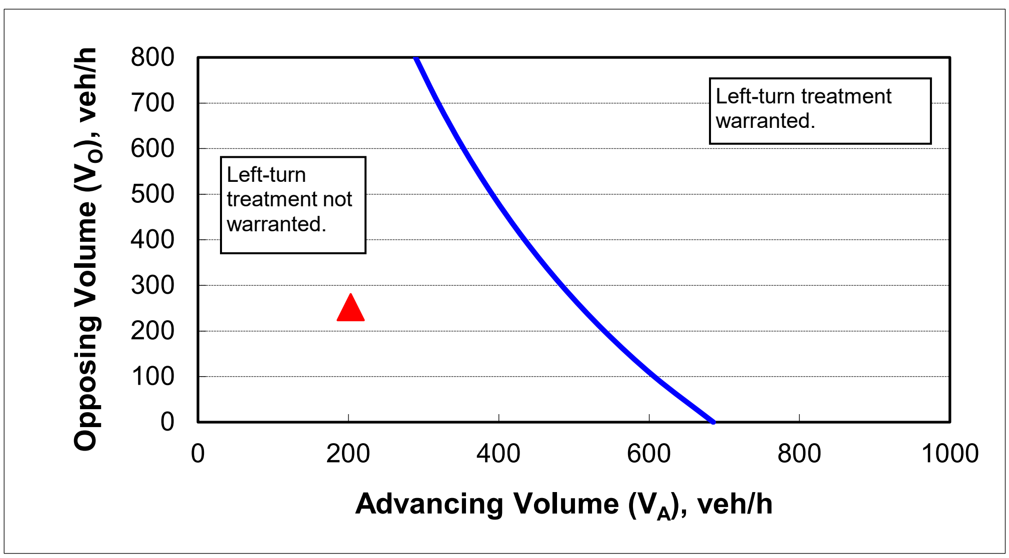
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	8%
Advancing volume (V_A), veh/h:	203
Opposing volume (V_O), veh/h:	252

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	510
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 2. S Barlow Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (EB)

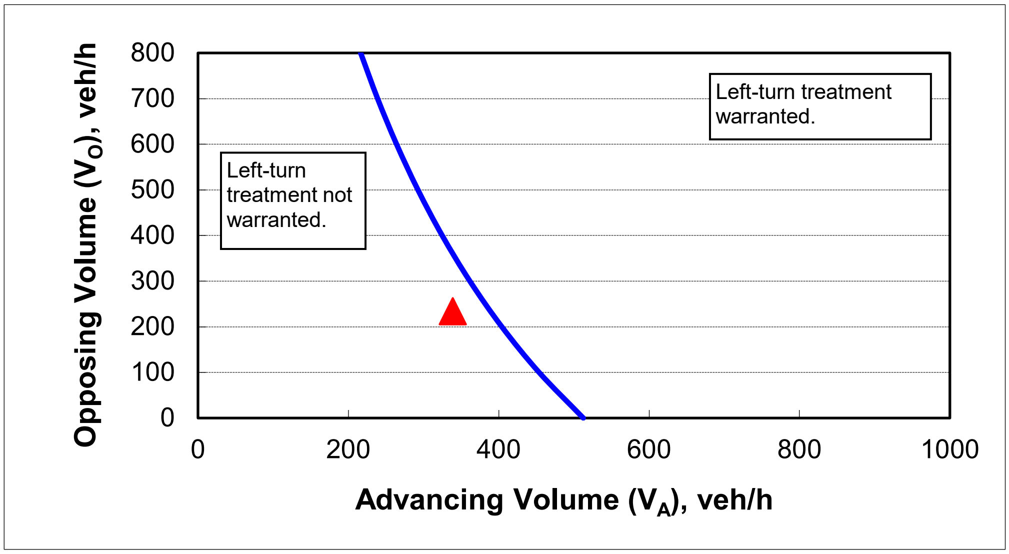
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	15%
Advancing volume (V_A), veh/h:	339
Opposing volume (V_O), veh/h:	234

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	389
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 3. Street A at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (WB)

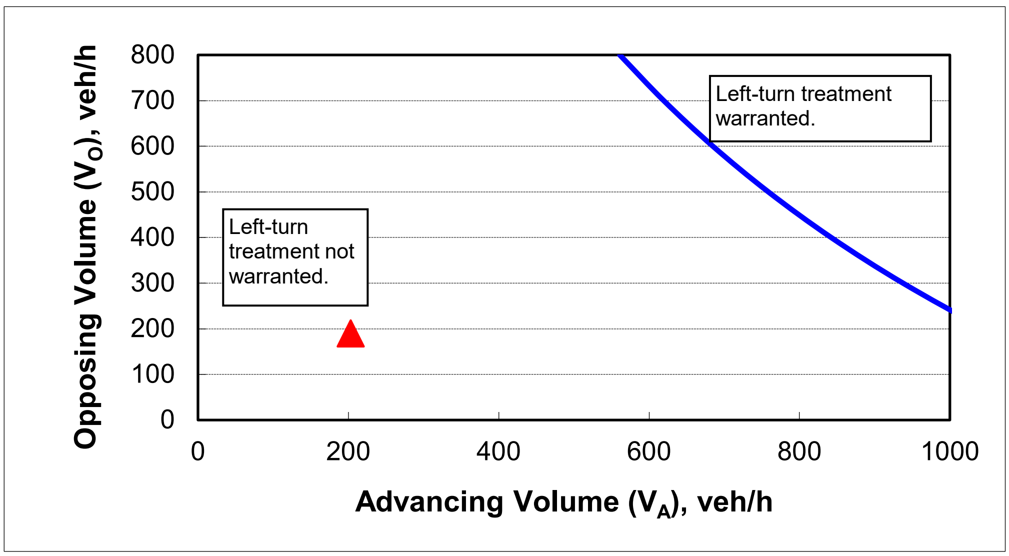
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	2%
Advancing volume (V_A), veh/h:	203
Opposing volume (V_O), veh/h:	190

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1060
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 3. Street A at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (WB)

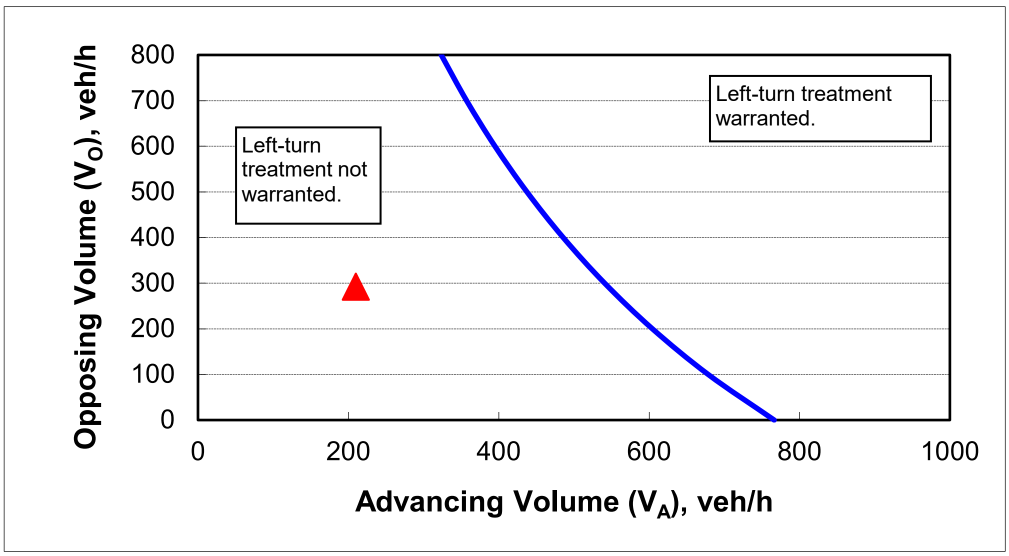
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	6%
Advancing volume (V_A), veh/h:	210
Opposing volume (V_O), veh/h:	292

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	546
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (EB)
(with S Holly Lane Connection)

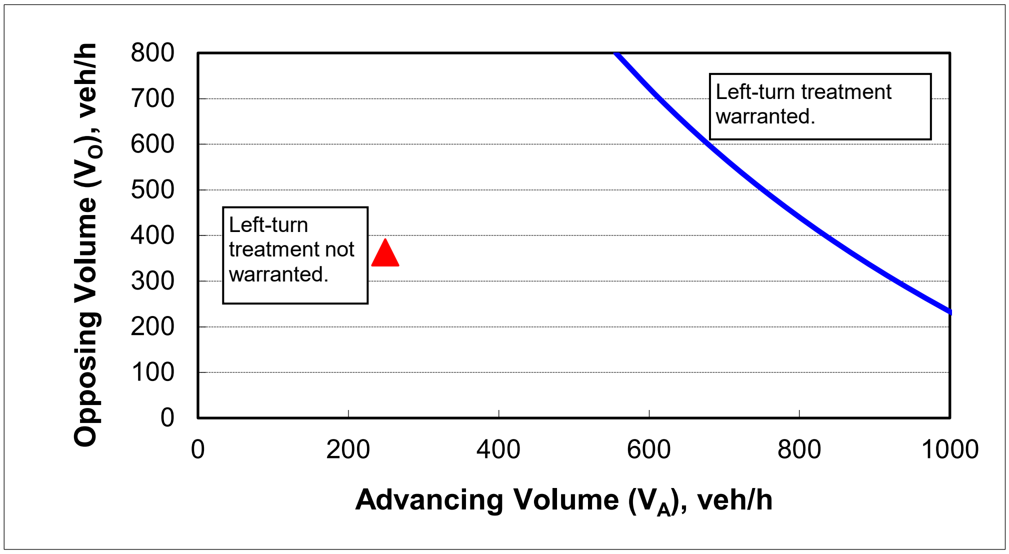
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	2%
Advancing volume (V_A), veh/h:	249
Opposing volume (V_O), veh/h:	363

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	868
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project:	Park Place Master Plan
Intersection:	1. S Winston Drive at S Holcomb Boulevard
Date:	11/30/2021
Scenario:	2030 Buildout Conditions - AM Peak Hour (WB) (with S Holly Lane Connection)

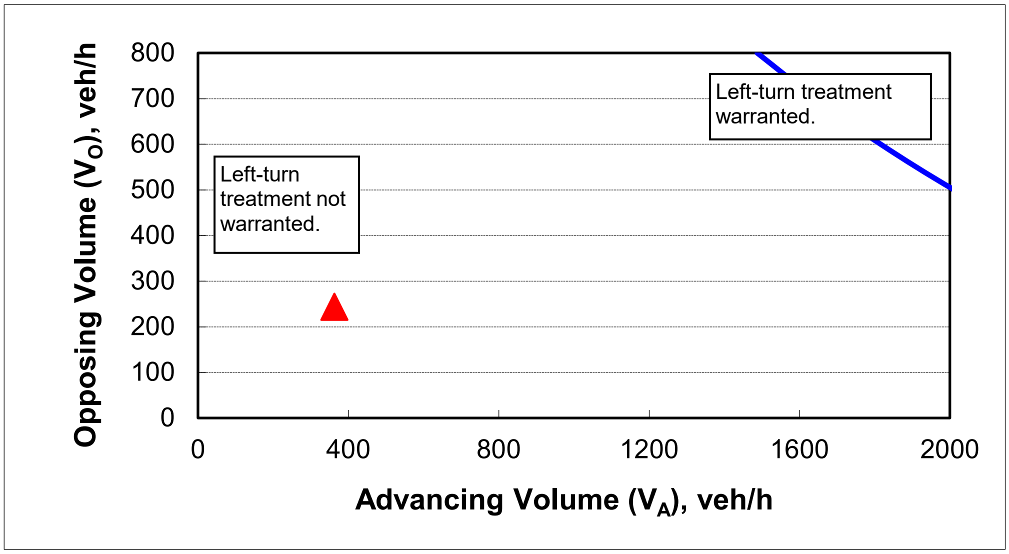
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	0%
Advancing volume (V_A), veh/h:	363
Opposing volume (V_O), veh/h:	244

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	2645
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (EB)
(with S Holly Lane Connection)

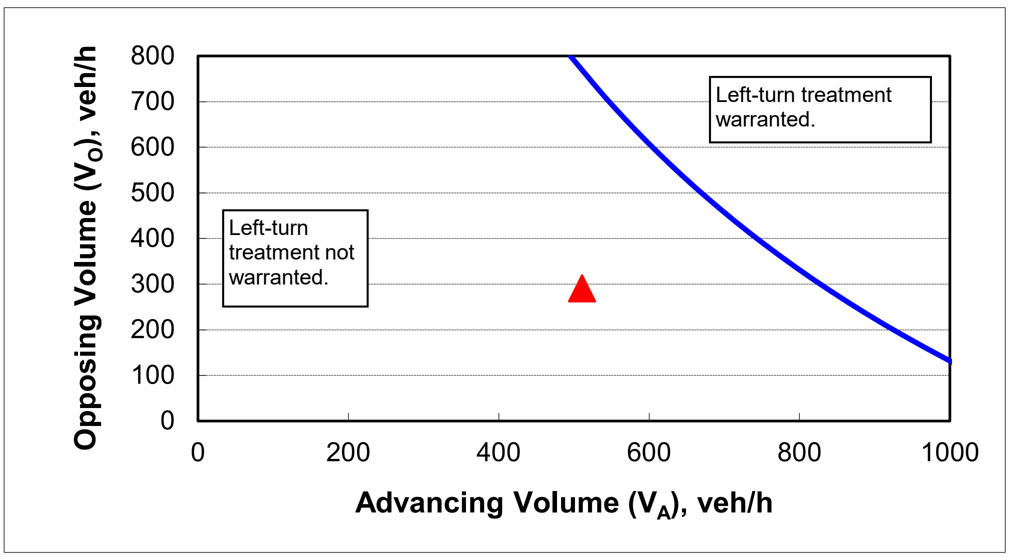
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	3%
Advancing volume (V_A), veh/h:	511
Opposing volume (V_O), veh/h:	291

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	836
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 1. S Winston Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (WB) (with S Holly Lane Connection)

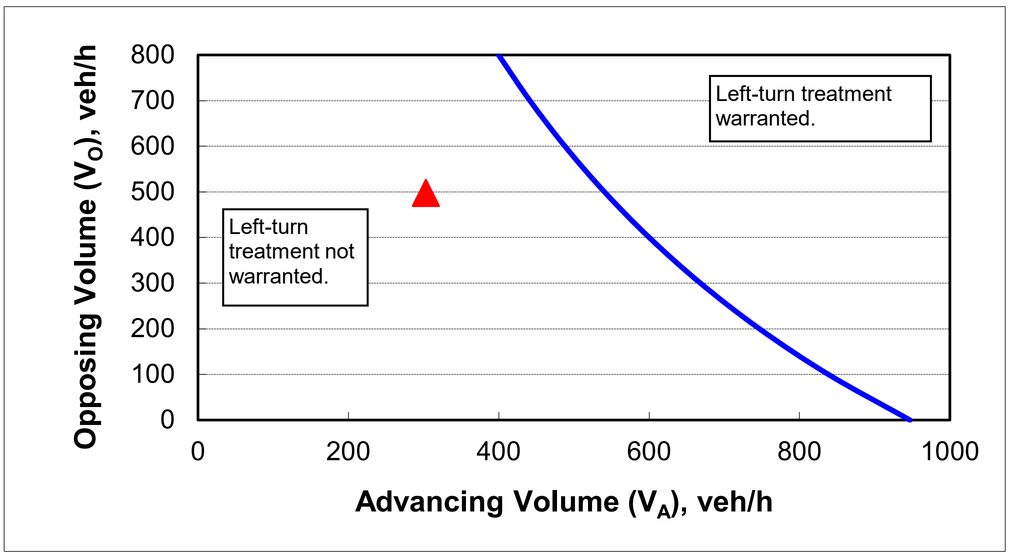
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	4%
Advancing volume (V_A), veh/h:	303
Opposing volume (V_O), veh/h:	498

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	542
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

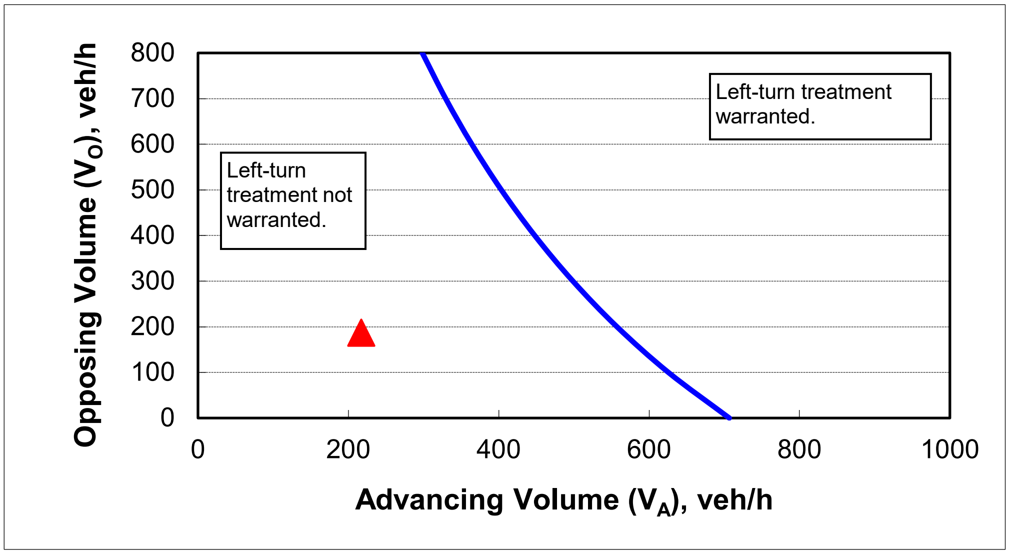
Project: Park Place Master Plan
Intersection: 2. S Barlow Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (EB)
(with S Holly Lane Connection)

2-lane roadway (English)
INPUT

Variable	Value
85th percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	7%
Advancing volume (V_A), veh/h:	217
Opposing volume (V_O), veh/h:	187

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	566
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 2. S Barlow Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - AM Peak Hour (WB)
(with S Holly Lane Connection)

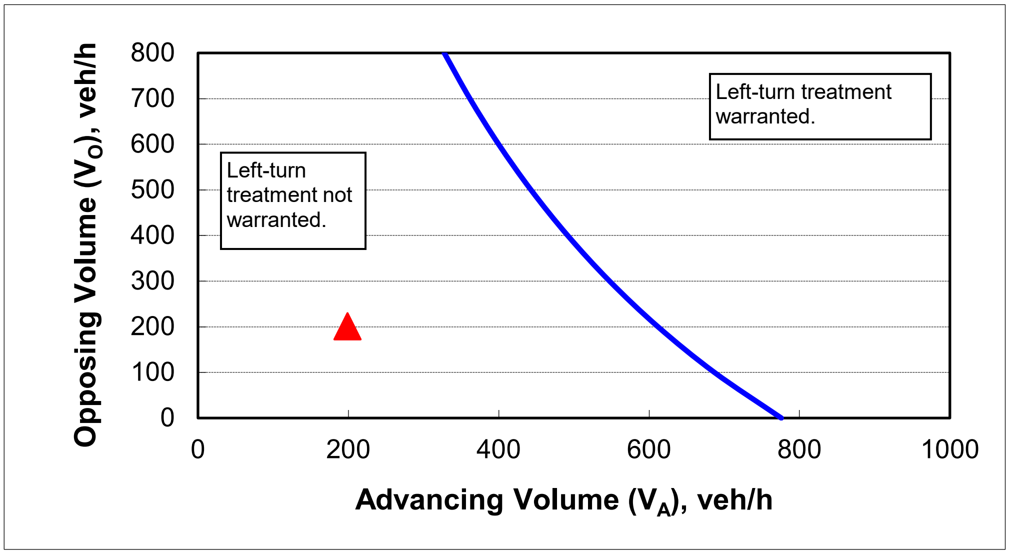
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	6%
Advancing volume (V_A), veh/h:	199
Opposing volume (V_O), veh/h:	201

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	611
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 2. S Barlow Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (EB)
(with S Holly Lane Connection)

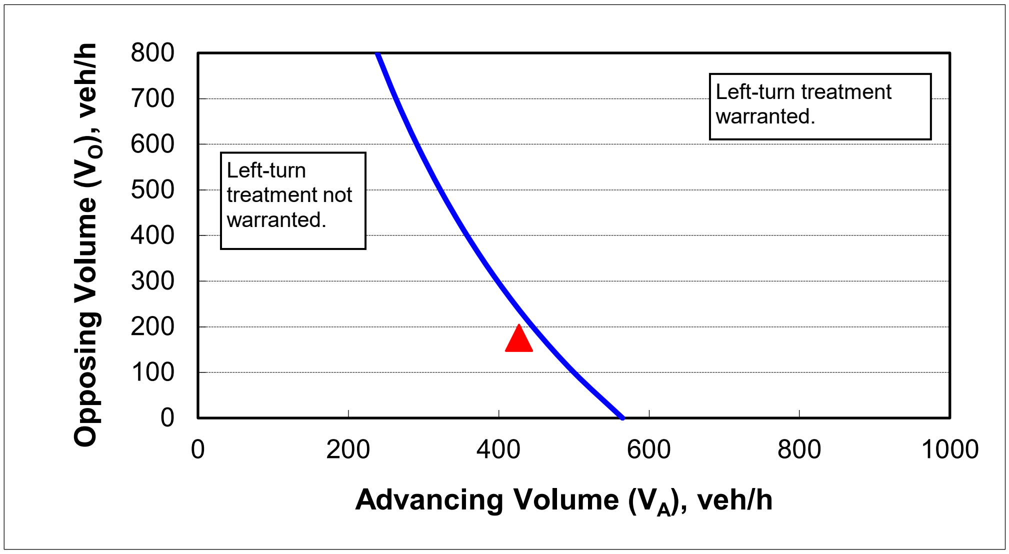
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	12%
Advancing volume (V_A), veh/h:	427
Opposing volume (V_O), veh/h:	176

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	458
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Left-Turn Lane Warrant Analysis

Project: Park Place Master Plan
Intersection: 2. S Barlow Drive at S Holcomb Boulevard
Date: 11/30/2021
Scenario: 2030 Buildout Conditions - PM Peak Hour (WB)
(with S Holly Lane Connection)

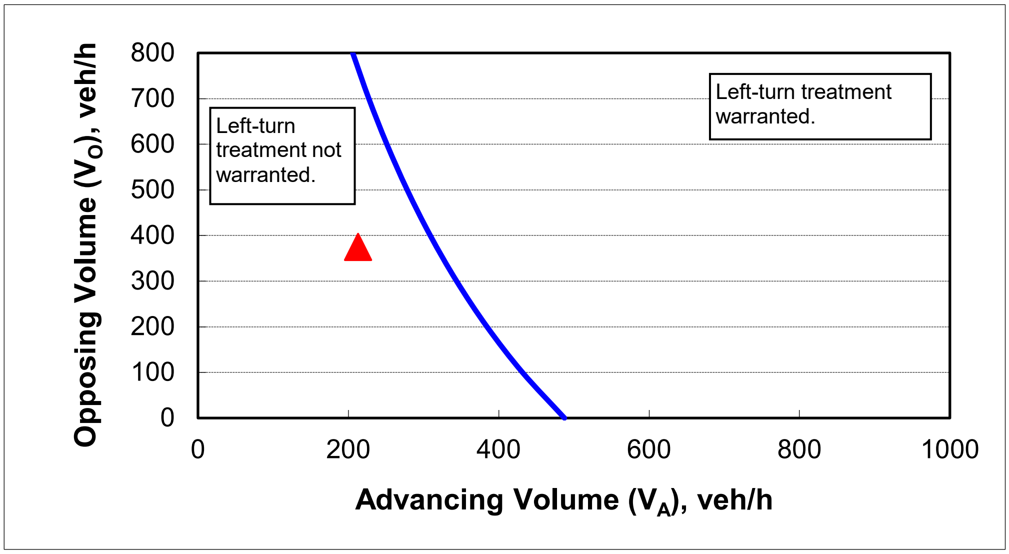
2-lane roadway (English)

INPUT

Variable	Value
85^{th} percentile speed, mph:	35
Percent of left-turns in advancing volume (V_A), %:	17%
Advancing volume (V_A), veh/h:	213
Opposing volume (V_O), veh/h:	375

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	317
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Traffic Signal Warrant Analysis

Project: Park Place Master Plan
Date: 11/30/2021
Scenario: 2030 Buildout Conditions with Lot 200 (without S Holly Lane connection)

Major Street: S Holcomb Boulevard
Number of Lanes: 1
PM Peak Hour Volumes: 772

Minor Street: S Winston Drive
Number of Lanes: 1
PM Peak Hour Volumes: 138

Warrant Used:

X 100 percent of standard warrants used

___ 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	7,720	8,850	
Minor Street*	1,380	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	7,720	13,300	
Minor Street*	1,380	1,350	**No**
Combination Warrant			
Major Street	7,720	10,640	
Minor Street*	1,380	2,120	**No**

Note: Minor street right-turning traffic volumes reduced by 25%.

Traffic Signal Warrant Analysis

Project: Park Place Master Plan
Date: 11/30/2021
Scenario: 2030 Buildout Conditions with Lot 200 (with S Holly Lane connection)

Major Street: S Holcomb Boulevard — Minor Street: S Winston Drive

	Major Street		Minor Street
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	814	PM Peak Hour Volumes:	61

Warrant Used:

X 100 percent of standard warrants used

___ 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	8,140	8,850	
Minor Street*	610	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	8,140	13,300	
Minor Street*	610	1,350	**No**
Combination Warrant			
Major Street	8,140	10,640	
Minor Street*	610	2,120	**No**

Note: Minor street right-turning traffic volumes reduced by 25%.

Traffic Signal Warrant Analysis

Project:	Park Place Master Plan
Date:	11/30/2021
Scenario:	2030 Buildout Conditions with Lot 200 (without S Holly Lane connection)

Major Street:	S Holcomb Boulevard	Minor Street:	S Barlow Drive
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	573	PM Peak Hour Volumes:	31

Warrant Used:

___X___ 100 percent of standard warrants used

______ 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	5,730	8,850	
Minor Street*	310	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	5,730	13,300	
Minor Street*	310	1,350	**No**
Combination Warrant			
Major Street	5,730	10,640	
Minor Street*	310	2,120	**No**

Note: Minor street right-turning traffic volumes reduced by 25%.

Traffic Signal Warrant Analysis

Project: Park Place Master Plan
Date: 11/30/2021
Scenario: 2030 Buildout Conditions with Lot 200 (with S Holly Lane connection)

Major Street:	S Holcomb Boulevard	Minor Street:	S Barlow Drive
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	640	PM Peak Hour Volumes:	120

Warrant Used:

X 100 percent of standard warrants used

___ 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100% Warrants	70% Warrants	100% Warrants	70% Warrants
Major St.	Minor St.				
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	6,400	8,850	
Minor Street*	1,200	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	6,400	13,300	
Minor Street*	1,200	1,350	**No**
Combination Warrant			
Major Street	6,400	10,640	
Minor Street*	1,200	2,120	**No**

Note: Minor street right-turning traffic volumes reduced by 25%.

Traffic Signal Warrant Analysis

Project:	Park Place Master Plan
Date:	11/30/2021
Scenario:	2030 Buildout Conditions with Lot 200 (without S Holly Lane connection)

Major Street:	S Holcomb Boulevard	Minor Street:	Street A
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	502	PM Peak Hour Volumes:	43

Warrant Used:

X 100 percent of standard warrants used

_____ 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	5,020	8,850	
Minor Street*	430	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	5,020	13,300	
Minor Street*	430	1,350	**No**
Combination Warrant			
Major Street	5,020	10,640	
Minor Street*	430	2,120	**No**

Note: Minor street right-turning traffic volumes reduced by 25%.

Appendix F

Level of Service Descriptions

Capacity Reports

Queuing Reports

LEVEL OF SERVICE

Level of service is used to describe the quality of traffic flow. Levels of service A to C are considered good, and rural roads are usually designed for level of service C. Urban streets and signalized intersections are typically designed for level of service D. Level of service E is considered to be the limit of acceptable delay. For unsignalized intersections, level of service E is generally considered acceptable. Here is a more complete description of levels of service:

Level of service A: Very low delay at intersections, with all traffic signal cycles clearing and no vehicles waiting through more than one signal cycle. On highways, low volume and high speeds, with speeds not restricted by other vehicles.

Level of service B: Operating speeds beginning to be affected by other traffic; short traffic delays at intersections. Higher average intersection delay than for level of service A resulting from more vehicles stopping.

Level of service C: Operating speeds and maneuverability closely controlled by other traffic; higher delays at intersections than for level of service B due to a significant number of vehicles stopping. Not all signal cycles clear the waiting vehicles. This is the recommended design standard for rural highways.

Level of service D: Tolerable operating speeds; long traffic delays occur at intersections. The influence of congestion is noticeable. At traffic signals many vehicles stop, and the proportion of vehicles not stopping declines. The number of signal cycle failures, for which vehicles must wait through more than one signal cycle, are noticeable. This is typically the design level for urban signalized intersections.

Level of service E: Restricted speeds, very long traffic delays at traffic signals, and traffic volumes near capacity. Flow is unstable so that any interruption, no matter how minor, will cause queues to form and service to deteriorate to level of service F. Traffic signal cycle failures are frequent occurrences. For unsignalized intersections, level of service E or better is generally considered acceptable.

Level of service F: Extreme delays, resulting in long queues which may interfere with other traffic movements. There may be stoppages of long duration, and speeds may drop to zero. There may be frequent signal cycle failures. Level of service F will typically result when vehicle arrival rates are greater than capacity. It is considered unacceptable by most drivers.

LEVEL OF SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (Seconds)
A	<10
B	10-20
C	20-35
D	35-55
E	55-80
F	>80

LEVEL OF SERVICE CRITERIA
FOR UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (Seconds)
A	<10
B	10-15
C	15-25
D	25-35
E	35-50
F	>50

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	115	23	0	167	0	40	1	0	1	0	16
Future Vol, veh/h	4	115	23	0	167	0	40	1	0	1	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	4	129	26	0	188	0	45	1	0	1	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	188	0	0	155	0	0	349	338	144	341	351	190
Stage 1	-	-	-	-	-	-	150	150	-	188	188	-
Stage 2	-	-	-	-	-	-	199	188	-	153	163	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1368	-	-	1407	-	-	609	586	909	617	577	857
Stage 1	-	-	-	-	-	-	857	777	-	818	748	-
Stage 2	-	-	-	-	-	-	807	748	-	854	767	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1368	-	-	1407	-	-	594	584	907	613	575	855
Mov Cap-2 Maneuver	-	-	-	-	-	-	594	584	-	613	575	-
Stage 1	-	-	-	-	-	-	854	775	-	816	748	-
Stage 2	-	-	-	-	-	-	789	748	-	849	765	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	11.6	9.4
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	594	1368	-	-	1407	-	-	836
HCM Lane V/C Ratio	0.078	0.003	-	-	-	-	-	0.023
HCM Control Delay (s)	11.6	7.6	0	-	0	-	-	9.4
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

12/01/2021

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	109	152	1	1	17
Future Vol, veh/h	10	109	152	1	1	17
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	13	138	192	1	1	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	195	0	-	0	361	195
Stage 1	-	-	-	-	195	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1349	-	-	-	642	851
Stage 1	-	-	-	-	843	-
Stage 2	-	-	-	-	868	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1346	-	-	-	633	849
Mov Cap-2 Maneuver	-	-	-	-	633	-
Stage 1	-	-	-	-	833	-
Stage 2	-	-	-	-	866	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1346	-	-	-	833
HCM Lane V/C Ratio	0.009	-	-	-	0.027
HCM Control Delay (s)	7.7	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	548	83	81	1878	1219	400
Future Volume (veh/h)	548	83	81	1878	1219	400
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	609	71	90	2087	1354	397
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	826	491	126	2257	1792	1169
Arrive On Green	0.24	0.24	0.07	0.65	0.52	0.52
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	609	71	90	2087	1354	397
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	12.4	2.4	3.8	39.6	23.4	6.1
Cycle Q Clear(g_c), s	12.4	2.4	3.8	39.6	23.4	6.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	826	491	126	2257	1792	1169
V/C Ratio(X)	0.74	0.14	0.72	0.92	0.76	0.34
Avail Cap(c_a), veh/h	826	491	155	2313	1792	1169
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.2	18.4	34.0	11.5	14.0	2.7
Incr Delay (d2), s/veh	5.0	0.5	11.4	6.9	1.9	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	2.6	1.9	10.8	7.1	3.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.2	19.0	45.4	18.4	15.9	2.9
LnGrp LOS	C	B	D	B	B	A
Approach Vol, veh/h	680			2177	1751	
Approach Delay, s/veh	29.9			19.5	13.0	
Approach LOS	C			B	B	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	22.2	52.8	9.4	43.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	16.5	49.5	6.2	38.8
Max Q Clear Time (g_c+I1), s	14.4	41.6	5.8	25.4
Green Ext Time (p_c), s	0.6	6.7	0.0	8.1

Intersection Summary	
HCM 6th Ctrl Delay	18.6
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	37	64	52	34	114	223	150	365	23	129	306	45
Future Volume (veh/h)	37	64	52	34	114	223	150	365	23	129	306	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	41	71	7	38	127	32	167	406	22	143	340	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	81	172	17	82	200	167	224	813	44	194	819	694
Arrive On Green	0.05	0.11	0.10	0.05	0.11	0.11	0.13	0.46	0.45	0.11	0.45	0.00
Sat Flow, veh/h	1640	1538	152	1739	1826	1526	1781	1758	95	1739	1826	1547
Grp Volume(v), veh/h	41	0	78	38	127	32	167	0	428	143	340	0
Grp Sat Flow(s),veh/h/ln	1640	0	1690	1739	1826	1526	1781	0	1853	1739	1826	1547
Q Serve(g_s), s	1.5	0.0	2.6	1.3	4.0	1.1	5.4	0.0	9.7	4.8	7.6	0.0
Cycle Q Clear(g_c), s	1.5	0.0	2.6	1.3	4.0	1.1	5.4	0.0	9.7	4.8	7.6	0.0
Prop In Lane	1.00		0.09	1.00		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	81	0	189	82	200	167	224	0	857	194	819	694
V/C Ratio(X)	0.50	0.00	0.41	0.46	0.63	0.19	0.75	0.00	0.50	0.74	0.42	0.00
Avail Cap(c_a), veh/h	150	0	251	162	274	229	297	0	857	261	819	694
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.93	0.93	0.00
Uniform Delay (d), s/veh	27.8	0.0	24.8	27.8	25.6	24.3	25.3	0.0	11.3	25.8	11.2	0.0
Incr Delay (d2), s/veh	4.8	0.0	1.4	4.0	3.3	0.5	7.0	0.0	2.1	6.7	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.0	0.6	1.8	0.4	2.5	0.0	3.5	2.1	2.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.6	0.0	26.3	31.8	28.9	24.8	32.3	0.0	13.4	32.4	12.7	0.0
LnGrp LOS	C	A	C	C	C	C	C	A	B	C	B	A
Approach Vol, veh/h		119			197			595			483	
Approach Delay, s/veh		28.4			28.8			18.7			18.5	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	31.7	6.8	10.7	11.5	30.9	7.0	10.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	20.0	5.1	8.4	9.5	19.0	5.0	8.5
Max Q Clear Time (g_c+I1), s	6.8	11.7	3.3	4.6	7.4	9.6	3.5	6.0
Green Ext Time (p_c), s	0.1	1.5	0.0	0.1	0.1	1.2	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	20.9
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	193	42	3	143	0	32	0	2	2	0	10
Future Vol, veh/h	11	193	42	3	143	0	32	0	2	2	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	12	205	45	3	152	0	34	0	2	2	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	152	0	0	250	0	0	416	410	228	411	432	152
Stage 1	-	-	-	-	-	-	252	252	-	158	158	-
Stage 2	-	-	-	-	-	-	164	158	-	253	274	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1429	-	-	1321	-	-	540	525	801	555	519	900
Stage 1	-	-	-	-	-	-	743	691	-	849	771	-
Stage 2	-	-	-	-	-	-	829	759	-	756	687	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1429	-	-	1321	-	-	529	519	801	548	513	900
Mov Cap-2 Maneuver	-	-	-	-	-	-	529	519	-	548	513	-
Stage 1	-	-	-	-	-	-	736	684	-	841	769	-
Stage 2	-	-	-	-	-	-	818	757	-	746	680	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	12.1	9.5
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	540	1429	-	-	1321	-	-	813
HCM Lane V/C Ratio	0.067	0.008	-	-	0.002	-	-	0.016
HCM Control Delay (s)	12.1	7.5	0	-	7.7	0	-	9.5
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

12/01/2021

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	33	167	125	5	3	22
Future Vol, veh/h	33	167	125	5	3	22
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	39	199	149	6	4	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	155	0	-	0	429	153
Stage 1	-	-	-	-	152	-
Stage 2	-	-	-	-	277	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1425	-	-	-	587	898
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	774	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1425	-	-	-	569	897
Mov Cap-2 Maneuver	-	-	-	-	569	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	774	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1425	-	-	-	839
HCM Lane V/C Ratio	0.028	-	-	-	0.035
HCM Control Delay (s)	7.6	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	435	154	129	1547	2377	772
Future Volume (veh/h)	435	154	129	1547	2377	772
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	448	154	133	1595	2451	783
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	504	357	141	2799	2399	1278
Arrive On Green	0.05	0.05	0.08	0.79	0.68	0.68
Sat Flow, veh/h	3456	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	448	154	133	1595	2451	783
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1552
Q Serve(g_s), s	15.5	10.4	8.9	20.8	81.0	21.9
Cycle Q Clear(g_c), s	15.5	10.4	8.9	20.8	81.0	21.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	504	357	141	2799	2399	1278
V/C Ratio(X)	0.89	0.43	0.94	0.57	1.02	0.61
Avail Cap(c_a), veh/h	504	357	141	2799	2399	1278
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.83	0.83	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	44.7	55.0	4.9	19.5	3.9
Incr Delay (d2), s/veh	17.6	3.1	58.6	0.3	24.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	9.9	6.1	4.5	33.2	11.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	73.7	47.8	113.6	5.2	43.6	4.8
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	602			1728	3234	
Approach Delay, s/veh	67.1			13.5	34.2	
Approach LOS	E			B	C	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		21.5		98.5			13.5	85.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		17.0		94.0			9.0	80.5
Max Q Clear Time (g_c+I1), s		17.5		22.8			10.9	83.0
Green Ext Time (p_c), s		0.0		16.9			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	31.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	152	168	53	108	206	78	326	78	298	564	78
Future Volume (veh/h)	59	152	168	53	108	206	78	326	78	298	564	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	61	158	142	55	112	45	81	340	74	310	588	32
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	86	178	160	78	366	310	110	630	137	352	1060	899
Arrive On Green	0.05	0.20	0.19	0.04	0.19	0.19	0.06	0.43	0.42	0.06	0.19	0.19
Sat Flow, veh/h	1781	896	806	1795	1885	1598	1767	1470	320	1795	1885	1598
Grp Volume(v), veh/h	61	0	300	55	112	45	81	0	414	310	588	32
Grp Sat Flow(s),veh/h/ln	1781	0	1702	1795	1885	1598	1767	0	1790	1795	1885	1598
Q Serve(g_s), s	4.1	0.0	20.6	3.6	6.1	2.8	5.4	0.0	20.6	20.6	34.0	2.0
Cycle Q Clear(g_c), s	4.1	0.0	20.6	3.6	6.1	2.8	5.4	0.0	20.6	20.6	34.0	2.0
Prop In Lane	1.00		0.47	1.00		1.00	1.00		0.18	1.00		1.00
Lane Grp Cap(c), veh/h	86	0	338	78	366	310	110	0	767	352	1060	899
V/C Ratio(X)	0.71	0.00	0.89	0.70	0.31	0.15	0.74	0.00	0.54	0.88	0.55	0.04
Avail Cap(c_a), veh/h	145	0	397	105	396	335	175	0	767	434	1060	899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.70	0.70	0.70
Uniform Delay (d), s/veh	56.3	0.0	46.9	56.6	41.4	40.1	55.3	0.0	25.5	54.7	35.2	22.2
Incr Delay (d2), s/veh	10.3	0.0	18.9	12.7	0.5	0.2	9.3	0.0	2.7	12.0	1.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	10.4	1.9	2.9	1.1	2.6	0.0	8.9	11.0	17.5	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.6	0.0	65.8	69.3	41.9	40.3	64.6	0.0	28.2	66.7	36.7	22.2
LnGrp LOS	E	A	E	E	D	D	E	A	C	E	D	C
Approach Vol, veh/h		361			212			495			930	
Approach Delay, s/veh		65.9			48.7			34.2			46.2	
Approach LOS		E			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.5	55.4	9.2	27.8	11.5	71.5	9.8	27.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	28.5	39.5	6.5	27.5	11.4	56.6	9.3	24.7
Max Q Clear Time (g_c+I1), s	22.6	22.6	5.6	22.6	7.4	36.0	6.1	8.1
Green Ext Time (p_c), s	0.5	2.1	0.0	0.7	0.0	3.5	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	47.1
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	134	24	0	188	0	42	1	0	1	0	17
Future Vol, veh/h	4	134	24	0	188	0	42	1	0	1	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	4	151	27	0	211	0	47	1	0	1	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	211	0	0	178	0	0	396	384	167	386	397	213
Stage 1	-	-	-	-	-	-	173	173	-	211	211	-
Stage 2	-	-	-	-	-	-	223	211	-	175	186	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1342	-	-	1380	-	-	568	553	882	576	544	832
Stage 1	-	-	-	-	-	-	834	760	-	796	731	-
Stage 2	-	-	-	-	-	-	784	731	-	832	750	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1342	-	-	1380	-	-	553	551	880	573	542	830
Mov Cap-2 Maneuver	-	-	-	-	-	-	553	551	-	573	542	-
Stage 1	-	-	-	-	-	-	831	758	-	794	731	-
Stage 2	-	-	-	-	-	-	764	731	-	827	748	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	12.1	9.6
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	553	1342	-	-	1380	-	-	810
HCM Lane V/C Ratio	0.087	0.003	-	-	-	-	-	0.025
HCM Control Delay (s)	12.1	7.7	0	-	0	-	-	9.6
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	123	161	2	3	29
Future Vol, veh/h	14	123	161	2	3	29
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	18	156	204	3	4	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	209	0	-	0	402	208
Stage 1	-	-	-	-	208	-
Stage 2	-	-	-	-	194	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1333	-	-	-	608	837
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	844	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1330	-	-	-	596	835
Mov Cap-2 Maneuver	-	-	-	-	596	-
Stage 1	-	-	-	-	818	-
Stage 2	-	-	-	-	842	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1330	-	-	-	805
HCM Lane V/C Ratio	0.013	-	-	-	0.05
HCM Control Delay (s)	7.7	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	598	97	94	1900	1238	426
Future Volume (veh/h)	598	97	94	1900	1238	426
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	664	91	104	2111	1376	427
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	844	515	143	2238	1740	1154
Arrive On Green	0.25	0.25	0.08	0.65	0.51	0.51
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	664	91	104	2111	1376	427
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	13.7	3.1	4.4	41.4	24.8	7.1
Cycle Q Clear(g_c), s	13.7	3.1	4.4	41.4	24.8	7.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	844	515	143	2238	1740	1154
V/C Ratio(X)	0.79	0.18	0.73	0.94	0.79	0.37
Avail Cap(c_a), veh/h	844	515	169	2267	1740	1154
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.81	0.81	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.3	17.9	33.6	12.1	15.1	3.1
Incr Delay (d2), s/veh	6.0	0.6	12.2	8.8	2.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	3.2	2.2	12.0	7.8	3.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.3	18.5	45.8	20.9	17.7	3.3
LnGrp LOS	C	B	D	C	B	A
Approach Vol, veh/h	755			2215	1803	
Approach Delay, s/veh	30.7			22.1	14.2	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		22.6		52.4			10.2	42.2
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		17.5		48.5			6.8	37.2
Max Q Clear Time (g_c+I1), s		15.7		43.4			6.4	26.8
Green Ext Time (p_c), s		0.6		4.5			0.0	6.9

Intersection Summary

HCM 6th Ctrl Delay	20.5
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	76	61	38	144	265	165	369	25	144	313	69
Future Volume (veh/h)	64	76	61	38	144	265	165	369	25	144	313	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	71	84	19	42	160	33	183	410	24	160	348	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	108	192	43	87	230	192	241	732	43	213	741	628
Arrive On Green	0.07	0.14	0.13	0.05	0.13	0.13	0.14	0.42	0.41	0.12	0.41	0.00
Sat Flow, veh/h	1640	1352	306	1739	1826	1526	1781	1750	102	1739	1826	1547
Grp Volume(v), veh/h	71	0	103	42	160	33	183	0	434	160	348	0
Grp Sat Flow(s),veh/h/ln	1640	0	1658	1739	1826	1526	1781	0	1852	1739	1826	1547
Q Serve(g_s), s	2.5	0.0	3.4	1.4	5.0	1.2	5.9	0.0	10.7	5.3	8.4	0.0
Cycle Q Clear(g_c), s	2.5	0.0	3.4	1.4	5.0	1.2	5.9	0.0	10.7	5.3	8.4	0.0
Prop In Lane	1.00		0.18	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	108	0	235	87	230	192	241	0	775	213	741	628
V/C Ratio(X)	0.65	0.00	0.44	0.48	0.70	0.17	0.76	0.00	0.56	0.75	0.47	0.00
Avail Cap(c_a), veh/h	164	0	235	162	243	203	297	0	775	261	741	628
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.91	0.91	0.00
Uniform Delay (d), s/veh	27.3	0.0	23.6	27.7	25.1	23.4	25.0	0.0	13.3	25.4	13.1	0.0
Incr Delay (d2), s/veh	6.5	0.0	1.3	4.0	7.9	0.4	8.6	0.0	2.9	8.4	1.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.3	0.6	2.5	0.4	2.8	0.0	4.1	2.4	3.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.9	0.0	24.9	31.8	33.0	23.8	33.6	0.0	16.2	33.8	15.0	0.0
LnGrp LOS	C	A	C	C	C	C	C	A	B	C	B	A
Approach Vol, veh/h		174			235			617			508	
Approach Delay, s/veh		28.6			31.5			21.3			21.0	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.4	29.1	7.0	12.5	12.1	28.3	8.0	11.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	20.5	5.1	7.9	9.5	19.5	5.5	7.5
Max Q Clear Time (g_c+I1), s	7.3	12.7	3.4	5.4	7.9	10.4	4.5	7.0
Green Ext Time (p_c), s	0.0	1.5	0.0	0.1	0.1	1.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	23.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	221	44	3	166	0	33	0	2	2	0	10
Future Vol, veh/h	11	221	44	3	166	0	33	0	2	2	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	12	235	47	3	177	0	35	0	2	2	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	177	0	0	282	0	0	472	466	259	467	489	177
Stage 1	-	-	-	-	-	-	283	283	-	183	183	-
Stage 2	-	-	-	-	-	-	189	183	-	284	306	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1399	-	-	1286	-	-	496	488	770	509	482	871
Stage 1	-	-	-	-	-	-	715	670	-	823	752	-
Stage 2	-	-	-	-	-	-	804	741	-	727	665	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1399	-	-	1286	-	-	485	482	770	502	476	871
Mov Cap-2 Maneuver	-	-	-	-	-	-	485	482	-	502	476	-
Stage 1	-	-	-	-	-	-	708	663	-	815	750	-
Stage 2	-	-	-	-	-	-	792	739	-	718	658	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	12.9	9.7
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	495	1399	-	-	1286	-	-	776
HCM Lane V/C Ratio	0.075	0.008	-	-	0.002	-	-	0.016
HCM Control Delay (s)	12.9	7.6	0	-	7.8	0	-	9.7
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	1.7					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	47	181	140	8	5	30
Future Vol, veh/h	47	181	140	8	5	30
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	56	215	167	10	6	36

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	177	0	-	0	499	173
Stage 1	-	-	-	-	172	-
Stage 2	-	-	-	-	327	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1399	-	-	-	535	876
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	735	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1399	-	-	-	511	875
Mov Cap-2 Maneuver	-	-	-	-	511	-
Stage 1	-	-	-	-	824	-
Stage 2	-	-	-	-	735	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1399	-	-	-	794
HCM Lane V/C Ratio	0.04	-	-	-	0.052
HCM Control Delay (s)	7.7	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	511	170	158	1565	2412	854
Future Volume (veh/h)	511	170	158	1565	2412	854
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	527	172	163	1613	2487	867
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	547	396	163	2754	2310	1259
Arrive On Green	0.05	0.05	0.09	0.77	0.65	0.65
Sat Flow, veh/h	3456	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	527	172	163	1613	2487	867
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1552
Q Serve(g_s), s	18.3	11.4	11.0	22.4	78.0	29.1
Cycle Q Clear(g_c), s	18.3	11.4	11.0	22.4	78.0	29.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	547	396	163	2754	2310	1259
V/C Ratio(X)	0.96	0.43	1.00	0.59	1.08	0.69
Avail Cap(c_a), veh/h	547	396	163	2754	2310	1259
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.74	0.74	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.5	42.8	54.5	5.6	21.0	5.0
Incr Delay (d2), s/veh	25.2	2.6	69.9	0.3	43.2	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.4	10.9	7.9	5.3	39.1	15.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	81.8	45.4	124.4	5.9	64.2	6.6
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	699			1776	3354	
Approach Delay, s/veh	72.8			16.8	49.3	
Approach LOS	E			B	D	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	23.0	97.0	15.0	82.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	18.5	92.5	10.5	77.5
Max Q Clear Time (g_c+I1), s	20.3	24.4	13.0	80.0
Green Ext Time (p_c), s	0.0	17.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	42.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	185	186	56	140	227	107	320	83	348	577	142
Future Volume (veh/h)	145	185	186	56	140	227	107	320	83	348	577	142
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	151	193	164	58	146	34	111	333	79	362	601	71
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	186	211	179	82	320	271	143	531	126	404	965	817
Arrive On Green	0.10	0.23	0.22	0.05	0.17	0.17	0.08	0.37	0.36	0.07	0.17	0.17
Sat Flow, veh/h	1781	923	784	1795	1885	1598	1767	1443	342	1795	1885	1598
Grp Volume(v), veh/h	151	0	357	58	146	34	111	0	412	362	601	71
Grp Sat Flow(s),veh/h/ln	1781	0	1707	1795	1885	1598	1767	0	1785	1795	1885	1598
Q Serve(g_s), s	10.0	0.0	24.5	3.8	8.4	2.2	7.4	0.0	22.8	24.0	35.5	4.5
Cycle Q Clear(g_c), s	10.0	0.0	24.5	3.8	8.4	2.2	7.4	0.0	22.8	24.0	35.5	4.5
Prop In Lane	1.00		0.46	1.00		1.00	1.00		0.19	1.00		1.00
Lane Grp Cap(c), veh/h	186	0	390	82	320	271	143	0	656	404	965	817
V/C Ratio(X)	0.81	0.00	0.92	0.71	0.46	0.13	0.78	0.00	0.63	0.90	0.62	0.09
Avail Cap(c_a), veh/h	273	0	413	105	320	271	177	0	656	464	965	817
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.60	0.60	0.60
Uniform Delay (d), s/veh	52.6	0.0	45.3	56.5	44.8	42.3	54.1	0.0	31.2	54.2	39.1	26.2
Incr Delay (d2), s/veh	11.0	0.0	24.1	14.3	1.0	0.2	15.8	0.0	4.5	12.1	1.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	12.8	2.0	4.0	0.9	3.8	0.0	10.2	12.9	18.3	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.5	0.0	69.4	70.8	45.9	42.5	69.9	0.0	35.7	66.3	41.0	26.4
LnGrp LOS	E	A	E	E	D	D	E	A	D	E	D	C
Approach Vol, veh/h		508			238			523			1034	
Approach Delay, s/veh		67.6			51.5			43.0			48.8	
Approach LOS		E			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	31.0	48.1	9.5	31.4	13.7	65.4	16.5	24.4				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	30.5	36.5	6.5	28.5	11.5	55.5	17.9	17.1				
Max Q Clear Time (g_c+I1), s	26.0	24.8	5.8	26.5	9.4	37.5	12.0	10.4				
Green Ext Time (p_c), s	0.5	1.8	0.0	0.4	0.0	3.6	0.2	0.4				
Intersection Summary												
HCM 6th Ctrl Delay			51.9									
HCM 6th LOS			D									

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	144	24	0	216	0	42	1	0	1	0	17
Future Vol, veh/h	4	144	24	0	216	0	42	1	0	1	0	17
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	4	162	27	0	243	0	47	1	0	1	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	243	0	0	189	0	0	439	427	178	429	440	245
Stage 1	-	-	-	-	-	-	184	184	-	243	243	-
Stage 2	-	-	-	-	-	-	255	243	-	186	197	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1306	-	-	1367	-	-	532	523	870	540	514	799
Stage 1	-	-	-	-	-	-	822	751	-	765	708	-
Stage 2	-	-	-	-	-	-	754	708	-	820	742	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1306	-	-	1367	-	-	517	521	868	537	512	797
Mov Cap-2 Maneuver	-	-	-	-	-	-	517	521	-	537	512	-
Stage 1	-	-	-	-	-	-	820	749	-	763	708	-
Stage 2	-	-	-	-	-	-	735	708	-	815	740	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	12.7	9.8
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	517	1306	-	-	1367	-	-	776
HCM Lane V/C Ratio	0.093	0.003	-	-	-	-	-	0.026
HCM Control Delay (s)	12.7	7.8	0	-	0	-	-	9.8
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	133	189	2	3	29
Future Vol, veh/h	14	133	189	2	3	29
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	18	168	239	3	4	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	244	0	-	0	449	243
Stage 1	-	-	-	-	243	-
Stage 2	-	-	-	-	206	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1293	-	-	-	571	801
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	833	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1291	-	-	-	560	799
Mov Cap-2 Maneuver	-	-	-	-	560	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	831	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1291	-	-	-	768
HCM Lane V/C Ratio	0.014	-	-	-	0.053
HCM Control Delay (s)	7.8	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	126	10	2	164	28	6
Future Vol, veh/h	126	10	2	164	28	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	159	13	3	208	35	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	172	0	380	166
Stage 1	-	-	-	-	166	-
Stage 2	-	-	-	-	214	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1381	-	622	878
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	822	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1381	-	621	878
Mov Cap-2 Maneuver	-	-	-	-	621	-
Stage 1	-	-	-	-	863	-
Stage 2	-	-	-	-	820	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	655	-	-	1381	-
HCM Lane V/C Ratio	0.066	-	-	0.002	-
HCM Control Delay (s)	10.9	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	611	100	95	1900	1238	431
Future Volume (veh/h)	611	100	95	1900	1238	431
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	679	95	106	2111	1376	433
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	844	517	145	2238	1735	1152
Arrive On Green	0.25	0.25	0.08	0.65	0.51	0.51
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	679	95	106	2111	1376	433
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	14.1	3.3	4.5	41.4	24.9	7.3
Cycle Q Clear(g_c), s	14.1	3.3	4.5	41.4	24.9	7.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	844	517	145	2238	1735	1152
V/C Ratio(X)	0.80	0.18	0.73	0.94	0.79	0.38
Avail Cap(c_a), veh/h	844	517	172	2267	1735	1152
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.78	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	17.8	33.5	12.1	15.2	3.1
Incr Delay (d2), s/veh	6.4	0.6	12.2	8.8	2.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	3.4	2.2	12.0	7.8	3.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.9	18.4	45.8	20.9	17.8	3.3
LnGrp LOS	C	B	D	C	B	A
Approach Vol, veh/h	774			2217	1809	
Approach Delay, s/veh	31.1			22.1	14.3	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		22.6		52.4			10.3	42.1
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		17.5		48.5			6.9	37.1
Max Q Clear Time (g_c+I1), s		16.1		43.4			6.5	26.9
Green Ext Time (p_c), s		0.5		4.5			0.0	6.8

Intersection Summary	
HCM 6th Ctrl Delay	20.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	79	61	39	153	281	165	369	25	150	313	69
Future Volume (veh/h)	64	79	61	39	153	281	165	369	25	150	313	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	71	88	20	43	170	34	183	410	24	167	348	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	108	197	45	89	239	200	241	716	42	221	732	620
Arrive On Green	0.07	0.15	0.14	0.05	0.13	0.13	0.14	0.41	0.40	0.13	0.40	0.00
Sat Flow, veh/h	1640	1351	307	1739	1826	1526	1781	1750	102	1739	1826	1547
Grp Volume(v), veh/h	71	0	108	43	170	34	183	0	434	167	348	0
Grp Sat Flow(s),veh/h/ln	1640	0	1657	1739	1826	1526	1781	0	1852	1739	1826	1547
Q Serve(g_s), s	2.5	0.0	3.6	1.4	5.4	1.2	5.9	0.0	10.9	5.6	8.5	0.0
Cycle Q Clear(g_c), s	2.5	0.0	3.6	1.4	5.4	1.2	5.9	0.0	10.9	5.6	8.5	0.0
Prop In Lane	1.00		0.19	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	108	0	242	89	239	200	241	0	758	221	732	620
V/C Ratio(X)	0.65	0.00	0.45	0.49	0.71	0.17	0.76	0.00	0.57	0.75	0.48	0.00
Avail Cap(c_a), veh/h	164	0	242	162	243	203	297	0	758	261	732	620
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.91	0.91	0.00
Uniform Delay (d), s/veh	27.3	0.0	23.4	27.7	25.0	23.2	25.0	0.0	13.7	25.3	13.3	0.0
Incr Delay (d2), s/veh	6.5	0.0	1.3	4.1	9.2	0.4	8.6	0.0	3.1	9.2	2.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.4	0.7	2.7	0.4	2.8	0.0	4.2	2.6	3.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.9	0.0	24.7	31.8	34.2	23.6	33.6	0.0	16.8	34.5	15.3	0.0
LnGrp LOS	C	A	C	C	C	C	C	A	B	C	B	A
Approach Vol, veh/h		179			247			617			515	
Approach Delay, s/veh		28.4			32.3			21.8			21.5	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.6	28.6	7.1	12.8	12.1	28.1	8.0	11.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.5	20.5	5.1	7.9	9.5	19.5	5.5	7.5
Max Q Clear Time (g_c+I1), s	7.6	12.9	3.4	5.6	7.9	10.5	4.5	7.4
Green Ext Time (p_c), s	0.0	1.4	0.0	0.1	0.1	1.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	24.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	11	252	44	3	185	0	33	0	2	2	0	10
Future Vol, veh/h	11	252	44	3	185	0	33	0	2	2	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	12	268	47	3	197	0	35	0	2	2	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	197	0	0	315	0	0	525	519	292	520	542	197
Stage 1	-	-	-	-	-	-	316	316	-	203	203	-
Stage 2	-	-	-	-	-	-	209	203	-	317	339	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1376	-	-	1251	-	-	457	455	738	470	450	849
Stage 1	-	-	-	-	-	-	687	648	-	804	737	-
Stage 2	-	-	-	-	-	-	784	726	-	698	643	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1376	-	-	1251	-	-	446	449	738	463	444	849
Mov Cap-2 Maneuver	-	-	-	-	-	-	446	449	-	463	444	-
Stage 1	-	-	-	-	-	-	679	641	-	795	735	-
Stage 2	-	-	-	-	-	-	772	724	-	688	636	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	13.6	9.9
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	456	1376	-	-	1251	-	-	745
HCM Lane V/C Ratio	0.082	0.009	-	-	0.003	-	-	0.017
HCM Control Delay (s)	13.6	7.6	0	-	7.9	0	-	9.9
HCM Lane LOS	B	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	47	212	159	8	5	30
Future Vol, veh/h	47	212	159	8	5	30
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	56	252	189	10	6	36

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	199	0	-	0	558	195
Stage 1	-	-	-	-	194	-
Stage 2	-	-	-	-	364	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1373	-	-	-	494	851
Stage 1	-	-	-	-	844	-
Stage 2	-	-	-	-	707	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1373	-	-	-	471	850
Mov Cap-2 Maneuver	-	-	-	-	471	-
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1373	-	-	-	762
HCM Lane V/C Ratio	0.041	-	-	-	0.055
HCM Control Delay (s)	7.7	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	0.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	186	31	7	148	19	4
Future Vol, veh/h	186	31	7	148	19	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	221	37	8	176	23	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	258	0	432	240
Stage 1	-	-	-	-	240	-
Stage 2	-	-	-	-	192	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1313	-	581	799
Stage 1	-	-	-	-	800	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1313	-	577	799
Mov Cap-2 Maneuver	-	-	-	-	577	-
Stage 1	-	-	-	-	800	-
Stage 2	-	-	-	-	835	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	606	-	-	1313	-
HCM Lane V/C Ratio	0.045	-	-	0.006	-
HCM Control Delay (s)	11.2	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	520	172	161	1565	2412	869
Future Volume (veh/h)	520	172	161	1565	2412	869
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	536	174	166	1613	2487	884
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	409	163	2724	2280	1260
Arrive On Green	0.06	0.06	0.09	0.77	0.64	0.64
Sat Flow, veh/h	3456	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	536	174	166	1613	2487	884
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1552
Q Serve(g_s), s	18.5	11.5	11.0	23.3	77.0	30.5
Cycle Q Clear(g_c), s	18.5	11.5	11.0	23.3	77.0	30.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	576	409	163	2724	2280	1260
V/C Ratio(X)	0.93	0.42	1.02	0.59	1.09	0.70
Avail Cap(c_a), veh/h	576	409	163	2724	2280	1260
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.0	42.3	54.5	6.0	21.5	5.1
Incr Delay (d2), s/veh	18.8	2.3	74.9	0.3	48.7	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	10.9	8.1	5.7	40.7	16.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	74.8	44.6	129.4	6.3	70.2	6.9
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	710			1779	3371	
Approach Delay, s/veh	67.4			17.8	53.6	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.0		96.0			15.0	81.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.5		91.5			10.5	76.5
Max Q Clear Time (g_c+I1), s		20.5		25.3			13.0	79.0
Green Ext Time (p_c), s		0.0		17.1			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	44.4
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	145	194	186	57	146	238	107	320	85	366	577	142
Future Volume (veh/h)	145	194	186	57	146	238	107	320	85	366	577	142
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	151	202	166	59	152	38	111	333	82	381	601	71
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	186	220	181	83	333	282	143	501	123	422	951	806
Arrive On Green	0.10	0.23	0.23	0.05	0.18	0.18	0.08	0.35	0.35	0.08	0.17	0.17
Sat Flow, veh/h	1781	939	771	1795	1885	1598	1767	1431	352	1795	1885	1598
Grp Volume(v), veh/h	151	0	368	59	152	38	111	0	415	381	601	71
Grp Sat Flow(s),veh/h/ln	1781	0	1710	1795	1885	1598	1767	0	1783	1795	1885	1598
Q Serve(g_s), s	10.0	0.0	25.2	3.9	8.7	2.4	7.4	0.0	23.7	25.3	35.6	4.5
Cycle Q Clear(g_c), s	10.0	0.0	25.2	3.9	8.7	2.4	7.4	0.0	23.7	25.3	35.6	4.5
Prop In Lane	1.00		0.45	1.00		1.00	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	186	0	402	83	333	282	143	0	625	422	951	806
V/C Ratio(X)	0.81	0.00	0.92	0.71	0.46	0.13	0.78	0.00	0.66	0.90	0.63	0.09
Avail Cap(c_a), veh/h	273	0	427	102	333	282	168	0	625	470	951	806
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.58	0.58	0.58
Uniform Delay (d), s/veh	52.6	0.0	44.9	56.4	44.2	41.7	54.1	0.0	33.0	54.0	39.6	26.7
Incr Delay (d2), s/veh	11.0	0.0	23.6	16.0	1.0	0.2	17.6	0.0	5.5	12.6	1.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	13.2	2.1	4.1	1.0	3.9	0.0	10.8	13.6	18.4	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.5	0.0	68.4	72.4	45.2	41.9	71.7	0.0	38.5	66.6	41.5	26.8
LnGrp LOS	E	A	E	E	D	D	E	A	D	E	D	C
Approach Vol, veh/h		519			249			526			1053	
Approach Delay, s/veh		67.0			51.1			45.5			49.6	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	32.2	46.0	9.6	32.2	13.7	64.5	16.5	25.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	30.9	35.3	6.3	29.5	10.9	55.3	17.9	17.9
Max Q Clear Time (g_c+I1), s	27.3	25.7	5.9	27.2	9.4	37.6	12.0	10.7
Green Ext Time (p_c), s	0.4	1.6	0.0	0.5	0.0	3.6	0.2	0.5

Intersection Summary	
HCM 6th Ctrl Delay	52.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	151	25	0	226	0	44	1	0	1	0	18
Future Vol, veh/h	4	151	25	0	226	0	44	1	0	1	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	4	170	28	0	254	0	49	1	0	1	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	254	0	0	198	0	0	458	446	186	449	460	256
Stage 1	-	-	-	-	-	-	192	192	-	254	254	-
Stage 2	-	-	-	-	-	-	266	254	-	195	206	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1294	-	-	1357	-	-	516	510	861	524	501	788
Stage 1	-	-	-	-	-	-	814	745	-	755	701	-
Stage 2	-	-	-	-	-	-	744	701	-	811	735	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1294	-	-	1357	-	-	501	508	859	521	499	786
Mov Cap-2 Maneuver	-	-	-	-	-	-	501	508	-	521	499	-
Stage 1	-	-	-	-	-	-	812	743	-	753	701	-
Stage 2	-	-	-	-	-	-	723	701	-	806	733	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	13	9.8
HCM LOS			B	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	501	1294	-	-	1357	-	-	766
HCM Lane V/C Ratio	0.101	0.003	-	-	-	-	-	0.028
HCM Control Delay (s)	13	7.8	0	-	0	-	-	9.8
HCM Lane LOS	B	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	140	199	2	3	30
Future Vol, veh/h	15	140	199	2	3	30
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	19	177	252	3	4	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	257	0	-	0	473	256
Stage 1	-	-	-	-	256	-
Stage 2	-	-	-	-	217	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1279	-	-	-	553	788
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	824	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1277	-	-	-	541	786
Mov Cap-2 Maneuver	-	-	-	-	541	-
Stage 1	-	-	-	-	776	-
Stage 2	-	-	-	-	822	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1277	-	-	-	755
HCM Lane V/C Ratio	0.015	-	-	-	0.055
HCM Control Delay (s)	7.9	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	133	10	2	174	28	6
Future Vol, veh/h	133	10	2	174	28	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	168	13	3	220	35	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	181	0	401	175
Stage 1	-	-	-	-	175	-
Stage 2	-	-	-	-	226	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1371	-	605	868
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	812	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1371	-	604	868
Mov Cap-2 Maneuver	-	-	-	-	604	-
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	810	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	638	-	-	1371	-
HCM Lane V/C Ratio	0.067	-	-	0.002	-
HCM Control Delay (s)	11.1	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	616	100	95	1917	1249	435
Future Volume (veh/h)	616	100	95	1917	1249	435
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	684	95	106	2130	1388	437
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	838	514	145	2245	1741	1152
Arrive On Green	0.25	0.25	0.08	0.65	0.51	0.51
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	684	95	106	2130	1388	437
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	14.2	3.3	4.5	42.1	25.2	7.4
Cycle Q Clear(g_c), s	14.2	3.3	4.5	42.1	25.2	7.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	838	514	145	2245	1741	1152
V/C Ratio(X)	0.82	0.18	0.73	0.95	0.80	0.38
Avail Cap(c_a), veh/h	838	514	172	2267	1741	1152
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.79	0.79	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.7	17.9	33.5	12.1	15.2	3.1
Incr Delay (d2), s/veh	7.0	0.6	12.2	9.5	2.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	3.4	2.2	12.2	7.9	3.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.6	18.6	45.8	21.6	17.9	3.3
LnGrp LOS	C	B	D	C	B	A
Approach Vol, veh/h	779			2236	1825	
Approach Delay, s/veh	31.8			22.8	14.4	
Approach LOS	C			C	B	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	22.5	52.5	10.3	42.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	17.5	48.5	6.9	37.1
Max Q Clear Time (g_c+I1), s	16.2	44.1	6.5	27.2
Green Ext Time (p_c), s	0.5	3.9	0.0	6.7

Intersection Summary	
HCM 6th Ctrl Delay	21.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	82	63	40	157	289	171	382	25	154	324	71
Future Volume (veh/h)	65	82	63	40	157	289	171	382	25	154	324	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	72	91	23	44	174	35	190	424	24	171	360	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	109	195	49	90	242	203	249	708	40	227	720	610
Arrive On Green	0.07	0.15	0.14	0.05	0.13	0.13	0.14	0.40	0.40	0.13	0.39	0.00
Sat Flow, veh/h	1640	1319	333	1739	1826	1526	1781	1753	99	1739	1826	1547
Grp Volume(v), veh/h	72	0	114	44	174	35	190	0	448	171	360	0
Grp Sat Flow(s),veh/h/ln	1640	0	1652	1739	1826	1526	1781	0	1852	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	3.8	1.5	5.5	1.2	6.2	0.0	11.4	5.7	8.9	0.0
Cycle Q Clear(g_c), s	2.6	0.0	3.8	1.5	5.5	1.2	6.2	0.0	11.4	5.7	8.9	0.0
Prop In Lane	1.00		0.20	1.00		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	109	0	244	90	242	203	249	0	748	227	720	610
V/C Ratio(X)	0.66	0.00	0.47	0.49	0.72	0.17	0.76	0.00	0.60	0.75	0.50	0.00
Avail Cap(c_a), veh/h	153	0	244	162	243	203	297	0	748	290	720	610
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.91	0.91	0.00
Uniform Delay (d), s/veh	27.3	0.0	23.5	27.7	24.9	23.1	24.9	0.0	14.1	25.2	13.7	0.0
Incr Delay (d2), s/veh	6.6	0.0	1.4	4.1	9.7	0.4	9.3	0.0	3.5	7.4	2.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.5	0.7	2.8	0.4	2.9	0.0	4.5	2.5	3.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	24.8	31.8	34.6	23.5	34.2	0.0	17.6	32.6	16.0	0.0
LnGrp LOS	C	A	C	C	C	C	C	A	B	C	B	A
Approach Vol, veh/h		186			253			638			531	
Approach Delay, s/veh		28.4			32.6			22.5			21.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	28.2	7.1	12.9	12.4	27.7	8.0	12.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	19.9	5.1	7.5	9.5	19.9	5.1	7.5
Max Q Clear Time (g_c+I1), s	7.7	13.4	3.5	5.8	8.2	10.9	4.6	7.5
Green Ext Time (p_c), s	0.1	1.3	0.0	0.1	0.1	1.3	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	24.4
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	264	46	3	194	0	35	0	2	2	0	11
Future Vol, veh/h	12	264	46	3	194	0	35	0	2	2	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	13	281	49	3	206	0	37	0	2	2	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	206	0	0	330	0	0	550	544	306	545	568	206
Stage 1	-	-	-	-	-	-	332	332	-	212	212	-
Stage 2	-	-	-	-	-	-	218	212	-	333	356	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1365	-	-	1235	-	-	440	441	725	452	435	840
Stage 1	-	-	-	-	-	-	673	637	-	795	731	-
Stage 2	-	-	-	-	-	-	775	720	-	685	633	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1365	-	-	1235	-	-	429	434	725	446	428	840
Mov Cap-2 Maneuver	-	-	-	-	-	-	429	434	-	446	428	-
Stage 1	-	-	-	-	-	-	665	629	-	785	729	-
Stage 2	-	-	-	-	-	-	762	718	-	675	625	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	14	10
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	439	1365	-	-	1235	-	-	739
HCM Lane V/C Ratio	0.09	0.009	-	-	0.003	-	-	0.019
HCM Control Delay (s)	14	7.7	0	-	7.9	0	-	10
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	222	167	9	5	31
Future Vol, veh/h	49	222	167	9	5	31
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	58	264	199	11	6	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	210	0	-	0	585	206
Stage 1	-	-	-	-	205	-
Stage 2	-	-	-	-	380	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1361	-	-	-	477	840
Stage 1	-	-	-	-	834	-
Stage 2	-	-	-	-	696	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1361	-	-	-	453	839
Mov Cap-2 Maneuver	-	-	-	-	453	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	696	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1361	-	-	-	750
HCM Lane V/C Ratio	0.043	-	-	-	0.057
HCM Control Delay (s)	7.8	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	197	31	7	157	19	4
Future Vol, veh/h	197	31	7	157	19	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	235	37	8	187	23	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	272	0	457	254
Stage 1	-	-	-	-	254	-
Stage 2	-	-	-	-	203	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1297	-	562	785
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	831	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1297	-	558	785
Mov Cap-2 Maneuver	-	-	-	-	558	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	825	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	588	-	-	1297	-
HCM Lane V/C Ratio	0.047	-	-	0.006	-
HCM Control Delay (s)	11.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	524	173	162	1579	2434	876
Future Volume (veh/h)	524	173	162	1579	2434	876
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	540	175	167	1628	2509	890
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	570	409	166	2730	2280	1257
Arrive On Green	0.05	0.05	0.09	0.77	0.64	0.64
Sat Flow, veh/h	3456	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	540	175	167	1628	2509	890
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1552
Q Serve(g_s), s	18.7	11.5	11.2	23.5	77.0	31.2
Cycle Q Clear(g_c), s	18.7	11.5	11.2	23.5	77.0	31.2
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	570	409	166	2730	2280	1257
V/C Ratio(X)	0.95	0.43	1.00	0.60	1.10	0.71
Avail Cap(c_a), veh/h	570	409	166	2730	2280	1257
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.69	0.69	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.2	42.2	54.4	5.9	21.5	5.3
Incr Delay (d2), s/veh	20.8	2.2	71.0	0.4	52.6	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.3	11.0	8.1	5.8	41.9	17.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	77.0	44.5	125.4	6.3	74.1	7.1
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	715			1795	3399	
Approach Delay, s/veh	69.0			17.4	56.5	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.8		96.2			15.2	81.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.3		91.7			10.7	76.5
Max Q Clear Time (g_c+I1), s		20.7		25.5			13.2	79.0
Green Ext Time (p_c), s		0.0		17.5			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	46.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	200	192	59	150	245	109	332	87	376	596	144
Future Volume (veh/h)	147	200	192	59	150	245	109	332	87	376	596	144
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	153	208	171	61	156	41	114	346	84	392	621	71
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	188	227	186	86	346	293	146	482	117	433	932	790
Arrive On Green	0.11	0.24	0.24	0.05	0.18	0.18	0.08	0.34	0.33	0.08	0.16	0.16
Sat Flow, veh/h	1781	938	772	1795	1885	1598	1767	1435	348	1795	1885	1598
Grp Volume(v), veh/h	153	0	379	61	156	41	114	0	430	392	621	71
Grp Sat Flow(s),veh/h/ln	1781	0	1710	1795	1885	1598	1767	0	1784	1795	1885	1598
Q Serve(g_s), s	10.1	0.0	25.9	4.0	8.8	2.6	7.6	0.0	25.3	26.0	37.1	4.5
Cycle Q Clear(g_c), s	10.1	0.0	25.9	4.0	8.8	2.6	7.6	0.0	25.3	26.0	37.1	4.5
Prop In Lane	1.00		0.45	1.00		1.00	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	188	0	413	86	346	293	146	0	599	433	932	790
V/C Ratio(X)	0.81	0.00	0.92	0.71	0.45	0.14	0.78	0.00	0.72	0.91	0.67	0.09
Avail Cap(c_a), veh/h	276	0	442	105	346	293	171	0	599	482	932	790
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.57	0.57	0.57
Uniform Delay (d), s/veh	52.5	0.0	44.4	56.3	43.6	41.0	54.0	0.0	34.9	53.9	40.9	27.3
Incr Delay (d2), s/veh	11.0	0.0	23.1	15.9	0.9	0.2	17.8	0.0	7.2	12.4	2.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	13.5	2.2	4.2	1.0	4.0	0.0	11.7	14.0	19.2	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.5	0.0	67.6	72.2	44.5	41.2	71.8	0.0	42.1	66.3	43.1	27.4
LnGrp LOS	E	A	E	E	D	D	E	A	D	E	D	C
Approach Vol, veh/h		532			258			544			1084	
Approach Delay, s/veh		66.4			50.5			48.3			50.4	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	32.9	44.3	9.7	33.0	13.9	63.4	16.7	26.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	31.7	33.3	6.5	30.5	11.1	53.9	18.1	18.9
Max Q Clear Time (g_c+I1), s	28.0	27.3	6.0	27.9	9.6	39.1	12.1	10.8
Green Ext Time (p_c), s	0.5	1.2	0.0	0.6	0.0	3.5	0.2	0.5

Intersection Summary	
HCM 6th Ctrl Delay	53.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	185	25	0	314	0	44	1	0	1	0	18
Future Vol, veh/h	4	185	25	0	314	0	44	1	0	1	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	4	208	28	0	353	0	49	1	0	1	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	353	0	0	236	0	0	595	583	224	586	597	355
Stage 1	-	-	-	-	-	-	230	230	-	353	353	-
Stage 2	-	-	-	-	-	-	365	353	-	233	244	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1189	-	-	1314	-	-	419	427	820	425	419	693
Stage 1	-	-	-	-	-	-	777	718	-	668	634	-
Stage 2	-	-	-	-	-	-	658	634	-	775	708	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1189	-	-	1314	-	-	405	425	818	422	417	692
Mov Cap-2 Maneuver	-	-	-	-	-	-	405	425	-	422	417	-
Stage 1	-	-	-	-	-	-	774	715	-	665	634	-
Stage 2	-	-	-	-	-	-	638	634	-	769	705	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	15.2	10.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	405	1189	-	-	1314	-	-	669
HCM Lane V/C Ratio	0.125	0.004	-	-	-	-	-	0.032
HCM Control Delay (s)	15.2	8	0	-	0	-	-	10.6
HCM Lane LOS	C	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	0.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	174	287	2	3	30
Future Vol, veh/h	15	174	287	2	3	30
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	19	220	363	3	4	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	368	0	-	0	627	367
Stage 1	-	-	-	-	367	-
Stage 2	-	-	-	-	260	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1163	-	-	-	451	683
Stage 1	-	-	-	-	705	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1161	-	-	-	441	682
Mov Cap-2 Maneuver	-	-	-	-	441	-
Stage 1	-	-	-	-	690	-
Stage 2	-	-	-	-	786	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1161	-	-	-	650
HCM Lane V/C Ratio	0.016	-	-	-	0.064
HCM Control Delay (s)	8.2	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

HCM 6th TWSC
3: Street A & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	133	44	9	174	116	26
Future Vol, veh/h	133	44	9	174	116	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	168	56	11	220	147	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	224	0	438	196
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	242	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1321	-	576	845
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	798	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1321	-	571	845
Mov Cap-2 Maneuver	-	-	-	-	571	-
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	791	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	13.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	607	-	-	1321	-
HCM Lane V/C Ratio	0.296	-	-	0.009	-
HCM Control Delay (s)	13.4	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.2	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	659	109	98	1917	1249	452
Future Volume (veh/h)	659	109	98	1917	1249	452
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	732	105	109	2130	1388	458
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	838	518	149	2245	1734	1149
Arrive On Green	0.25	0.25	0.09	0.65	0.51	0.51
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	732	105	109	2130	1388	458
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	15.5	3.6	4.6	42.1	25.3	7.9
Cycle Q Clear(g_c), s	15.5	3.6	4.6	42.1	25.3	7.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	838	518	149	2245	1734	1149
V/C Ratio(X)	0.87	0.20	0.73	0.95	0.80	0.40
Avail Cap(c_a), veh/h	838	518	174	2267	1734	1149
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.1	17.9	33.5	12.1	15.3	3.2
Incr Delay (d2), s/veh	9.2	0.6	12.5	9.5	2.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	3.7	2.3	12.2	8.0	4.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.4	18.6	45.9	21.6	18.1	3.5
LnGrp LOS	D	B	D	C	B	A
Approach Vol, veh/h	837			2239	1846	
Approach Delay, s/veh	34.1			22.8	14.4	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		22.5		52.5			10.4	42.1
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		17.5		48.5			7.0	37.0
Max Q Clear Time (g_c+I1), s		17.5		44.1			6.6	27.3
Green Ext Time (p_c), s		0.0		3.9			0.0	6.7

Intersection Summary			
HCM 6th Ctrl Delay			21.6
HCM 6th LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	92	63	44	184	341	171	382	27	174	324	71
Future Volume (veh/h)	65	92	63	44	184	341	171	382	27	174	324	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	72	102	28	49	204	56	190	424	26	193	360	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	109	210	58	95	275	230	248	649	40	250	688	583
Arrive On Green	0.07	0.16	0.15	0.05	0.15	0.15	0.14	0.37	0.36	0.14	0.38	0.00
Sat Flow, veh/h	1640	1293	355	1739	1826	1527	1781	1744	107	1739	1826	1547
Grp Volume(v), veh/h	72	0	130	49	204	56	190	0	450	193	360	0
Grp Sat Flow(s),veh/h/ln	1640	0	1648	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.3	1.6	6.4	1.9	6.2	0.0	12.1	6.4	9.2	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.3	1.6	6.4	1.9	6.2	0.0	12.1	6.4	9.2	0.0
Prop In Lane	1.00		0.22	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	109	0	268	95	275	230	248	0	689	250	688	583
V/C Ratio(X)	0.66	0.00	0.49	0.51	0.74	0.24	0.76	0.00	0.65	0.77	0.52	0.00
Avail Cap(c_a), veh/h	153	0	275	162	304	254	285	0	689	290	688	583
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.90	0.90	0.00
Uniform Delay (d), s/veh	27.3	0.0	22.9	27.6	24.4	22.5	24.9	0.0	15.6	24.7	14.5	0.0
Incr Delay (d2), s/veh	6.6	0.0	1.4	4.2	8.4	0.5	10.3	0.0	4.8	9.5	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	1.6	0.8	3.2	0.7	3.0	0.0	5.0	3.0	3.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	24.3	31.8	32.8	23.0	35.1	0.0	20.4	34.3	17.1	0.0
LnGrp LOS	C	A	C	C	C	C	D	A	C	C	B	A
Approach Vol, veh/h		202			309			640			553	
Approach Delay, s/veh		27.7			30.9			24.8			23.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.6	26.3	7.3	13.7	12.4	26.6	8.0	13.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	17.9	5.1	9.5	9.1	18.3	5.1	9.5
Max Q Clear Time (g_c+I1), s	8.4	14.1	3.6	6.3	8.2	11.2	4.6	8.4
Green Ext Time (p_c), s	0.1	0.9	0.0	0.2	0.0	1.1	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	25.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection												
Int Delay, s/veh	1.2											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	12	362	46	3	255	0	35	0	2	2	0	11
Future Vol, veh/h	12	362	46	3	255	0	35	0	2	2	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	13	385	49	3	271	0	37	0	2	2	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	271	0	0	434	0	0	719	713	410	714	737	271
Stage 1	-	-	-	-	-	-	436	436	-	277	277	-
Stage 2	-	-	-	-	-	-	283	277	-	437	460	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1292	-	-	1131	-	-	339	352	633	349	348	773
Stage 1	-	-	-	-	-	-	591	573	-	734	685	-
Stage 2	-	-	-	-	-	-	715	674	-	602	569	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1292	-	-	1131	-	-	330	346	633	344	342	773
Mov Cap-2 Maneuver	-	-	-	-	-	-	330	346	-	344	342	-
Stage 1	-	-	-	-	-	-	583	566	-	724	683	-
Stage 2	-	-	-	-	-	-	702	672	-	592	562	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	17	10.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	339	1292	-	-	1131	-	-	649
HCM Lane V/C Ratio	0.116	0.01	-	-	0.003	-	-	0.021
HCM Control Delay (s)	17	7.8	0	-	8.2	0	-	10.7
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	1.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	49	320	228	9	5	31
Future Vol, veh/h	49	320	228	9	5	31
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	58	381	271	11	6	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	282	0	-	0	774	278
Stage 1	-	-	-	-	277	-
Stage 2	-	-	-	-	497	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1280	-	-	-	370	766
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	615	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1280	-	-	-	349	765
Mov Cap-2 Maneuver	-	-	-	-	349	-
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	615	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1280	-	-	-	656
HCM Lane V/C Ratio	0.046	-	-	-	0.065
HCM Control Delay (s)	7.9	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	2.7					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	197	129	28	157	80	18
Future Vol, veh/h	197	129	28	157	80	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	235	154	33	187	95	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	389	0	565	312
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	253	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1175	-	486	728
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	789	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1175	-	471	728
Mov Cap-2 Maneuver	-	-	-	-	471	-
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	765	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	504	-	-	1175	-
HCM Lane V/C Ratio	0.231	-	-	0.028	-
HCM Control Delay (s)	14.3	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	554	179	172	1579	2434	923
Future Volume (veh/h)	554	179	172	1579	2434	923
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	571	182	177	1628	2509	940
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	587	423	172	2713	2251	1252
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	571	182	177	1628	2509	940
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	19.8	11.9	11.6	24.0	76.0	36.3
Cycle Q Clear(g_c), s	19.8	11.9	11.6	24.0	76.0	36.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	587	423	172	2713	2251	1252
V/C Ratio(X)	0.97	0.43	1.03	0.60	1.11	0.75
Avail Cap(c_a), veh/h	587	423	172	2713	2251	1252
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.63	0.63	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.3	41.7	54.2	6.2	22.0	5.9
Incr Delay (d2), s/veh	23.4	2.0	76.1	0.4	58.5	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	11.4	8.6	6.0	43.5	20.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	79.8	43.7	130.3	6.6	80.5	8.5
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	753			1805	3449	
Approach Delay, s/veh	71.1			18.7	60.9	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.4		95.6			15.6	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.9		91.1			11.1	75.5
Max Q Clear Time (g_c+I1), s		21.8		26.0			13.6	78.0
Green Ext Time (p_c), s		0.0		17.4			0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			49.5
HCM 6th LOS			D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	229	192	62	169	281	109	332	92	433	596	144
Future Volume (veh/h)	147	229	192	62	169	281	109	332	92	433	596	144
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	153	239	175	65	176	63	114	346	88	451	621	71
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	187	255	187	90	381	323	146	410	104	487	899	762
Arrive On Green	0.10	0.26	0.25	0.05	0.20	0.20	0.08	0.29	0.28	0.09	0.16	0.16
Sat Flow, veh/h	1781	993	727	1795	1885	1598	1767	1420	361	1795	1885	1598
Grp Volume(v), veh/h	153	0	414	65	176	63	114	0	434	451	621	71
Grp Sat Flow(s),veh/h/ln	1781	0	1719	1795	1885	1598	1767	0	1781	1795	1885	1598
Q Serve(g_s), s	10.1	0.0	28.3	4.3	9.9	3.9	7.6	0.0	27.5	29.9	37.4	4.6
Cycle Q Clear(g_c), s	10.1	0.0	28.3	4.3	9.9	3.9	7.6	0.0	27.5	29.9	37.4	4.6
Prop In Lane	1.00		0.42	1.00		1.00	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	187	0	442	90	381	323	146	0	514	487	899	762
V/C Ratio(X)	0.82	0.00	0.94	0.72	0.46	0.20	0.78	0.00	0.84	0.93	0.69	0.09
Avail Cap(c_a), veh/h	211	0	444	90	381	323	168	0	514	494	899	762
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.51	0.51	0.51
Uniform Delay (d), s/veh	52.6	0.0	43.7	56.2	42.1	39.8	54.0	0.0	40.2	53.4	42.2	28.4
Incr Delay (d2), s/veh	20.0	0.0	27.5	24.9	0.9	0.3	18.5	0.0	15.6	14.3	2.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	15.2	2.5	4.7	1.6	4.0	0.0	13.8	16.3	19.3	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.6	0.0	71.2	81.1	43.0	40.0	72.4	0.0	55.8	67.8	44.4	28.5
LnGrp LOS	E	A	E	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		567			304			548			1143	
Approach Delay, s/veh		71.6			50.5			59.2			52.7	
Approach LOS		E			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.5	38.6	10.0	34.8	13.9	61.3	16.6	28.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	32.5	33.5	5.5	30.5	10.9	55.1	13.7	22.3
Max Q Clear Time (g_c+I1), s	31.9	29.5	6.3	30.3	9.6	39.4	12.1	11.9
Green Ext Time (p_c), s	0.1	0.9	0.0	0.1	0.0	3.6	0.1	0.8

Intersection Summary			
HCM 6th Ctrl Delay			58.0
HCM 6th LOS			E

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	188	26	0	318	0	45	1	0	1	0	18
Future Vol, veh/h	5	188	26	0	318	0	45	1	0	1	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	211	29	0	357	0	51	1	0	1	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	357	0	0	240	0	0	607	595	228	597	609	359
Stage 1	-	-	-	-	-	-	238	238	-	357	357	-
Stage 2	-	-	-	-	-	-	369	357	-	240	252	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1185	-	-	1309	-	-	411	420	816	418	412	690
Stage 1	-	-	-	-	-	-	770	712	-	665	632	-
Stage 2	-	-	-	-	-	-	655	632	-	768	702	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1185	-	-	1309	-	-	396	417	814	414	410	689
Mov Cap-2 Maneuver	-	-	-	-	-	-	396	417	-	414	410	-
Stage 1	-	-	-	-	-	-	765	708	-	661	632	-
Stage 2	-	-	-	-	-	-	635	632	-	761	698	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	15.5	10.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	396	1185	-	-	1309	-	-	666
HCM Lane V/C Ratio	0.131	0.005	-	-	-	-	-	0.032
HCM Control Delay (s)	15.5	8.1	0	-	0	-	-	10.6
HCM Lane LOS	C	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

12/01/2021

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	177	290	2	3	30
Future Vol, veh/h	15	177	290	2	3	30
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	19	224	367	3	4	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	372	0	-	0	635	371
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	264	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1159	-	-	-	446	679
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	785	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1157	-	-	-	436	678
Mov Cap-2 Maneuver	-	-	-	-	436	-
Stage 1	-	-	-	-	687	-
Stage 2	-	-	-	-	783	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1157	-	-	-	645
HCM Lane V/C Ratio	0.016	-	-	-	0.065
HCM Control Delay (s)	8.2	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	3.9					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	136	44	9	177	116	26
Future Vol, veh/h	136	44	9	177	116	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	172	56	11	224	147	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	228	0	446	200
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	246	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1317	-	570	841
Stage 1	-	-	-	-	834	-
Stage 2	-	-	-	-	795	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1317	-	564	841
Mov Cap-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	834	-
Stage 2	-	-	-	-	787	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	13.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	600	-	-	1317	-
HCM Lane V/C Ratio	0.3	-	-	0.009	-
HCM Control Delay (s)	13.5	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	661	110	99	1923	1253	453
Future Volume (veh/h)	661	110	99	1923	1253	453
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	734	106	110	2137	1392	459
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	836	518	150	2247	1734	1147
Arrive On Green	0.25	0.25	0.09	0.65	0.51	0.51
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	734	106	110	2137	1392	459
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	15.6	3.7	4.6	42.4	25.4	8.0
Cycle Q Clear(g_c), s	15.6	3.7	4.6	42.4	25.4	8.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	836	518	150	2247	1734	1147
V/C Ratio(X)	0.88	0.20	0.73	0.95	0.80	0.40
Avail Cap(c_a), veh/h	836	518	174	2267	1734	1147
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.71	0.71	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	18.0	33.4	12.1	15.3	3.3
Incr Delay (d2), s/veh	9.4	0.6	12.7	9.8	2.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	3.8	2.3	12.4	8.0	4.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.6	18.6	46.1	21.9	18.1	3.5
LnGrp LOS	D	B	D	C	B	A
Approach Vol, veh/h	840			2247	1851	
Approach Delay, s/veh	34.4			23.1	14.5	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		22.4		52.6			10.5	42.1
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		17.5		48.5			7.0	37.0
Max Q Clear Time (g_c+I1), s		17.6		44.4			6.6	27.4
Green Ext Time (p_c), s		0.0		3.7			0.0	6.6

Intersection Summary	
HCM 6th Ctrl Delay	21.8
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	92	64	44	185	343	172	386	28	176	327	71
Future Volume (veh/h)	66	92	64	44	185	343	172	386	28	176	327	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	73	102	29	49	206	57	191	429	27	196	363	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	110	210	60	95	277	232	249	643	40	253	684	580
Arrive On Green	0.07	0.16	0.16	0.05	0.15	0.15	0.14	0.37	0.36	0.15	0.37	0.00
Sat Flow, veh/h	1640	1281	364	1739	1826	1527	1781	1741	110	1739	1826	1547
Grp Volume(v), veh/h	73	0	131	49	206	57	191	0	456	196	363	0
Grp Sat Flow(s),veh/h/ln	1640	0	1646	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.3	1.6	6.5	2.0	6.2	0.0	12.4	6.5	9.3	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.3	1.6	6.5	2.0	6.2	0.0	12.4	6.5	9.3	0.0
Prop In Lane	1.00		0.22	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	110	0	270	95	277	232	249	0	683	253	684	580
V/C Ratio(X)	0.66	0.00	0.49	0.51	0.74	0.25	0.77	0.00	0.67	0.77	0.53	0.00
Avail Cap(c_a), veh/h	150	0	272	162	304	254	285	0	683	290	684	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.90	0.90	0.00
Uniform Delay (d), s/veh	27.3	0.0	22.8	27.6	24.3	22.4	24.9	0.0	15.9	24.7	14.6	0.0
Incr Delay (d2), s/veh	6.7	0.0	1.4	4.2	8.7	0.5	10.4	0.0	5.1	9.8	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.6	0.8	3.2	0.7	3.0	0.0	5.2	3.0	3.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	24.2	31.8	33.0	23.0	35.2	0.0	21.0	34.5	17.3	0.0
LnGrp LOS	C	A	C	C	C	C	D	A	C	C	B	A
Approach Vol, veh/h		204			312			647			559	
Approach Delay, s/veh		27.7			31.0			25.2			23.3	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	26.1	7.3	13.8	12.4	26.5	8.0	13.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	18.0	5.1	9.4	9.1	18.4	5.0	9.5
Max Q Clear Time (g_c+I1), s	8.5	14.4	3.6	6.3	8.2	11.3	4.6	8.5
Green Ext Time (p_c), s	0.1	0.9	0.0	0.2	0.0	1.1	0.0	0.1

Intersection Summary			
HCM 6th Ctrl Delay			25.9
HCM 6th LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	366	47	3	258	0	36	0	2	2	0	11
Future Vol, veh/h	12	366	47	3	258	0	36	0	2	2	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	13	389	50	3	274	0	38	0	2	2	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	274	0	0	439	0	0	726	720	414	721	745	274
Stage 1	-	-	-	-	-	-	440	440	-	280	280	-
Stage 2	-	-	-	-	-	-	286	280	-	441	465	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1289	-	-	1126	-	-	335	349	630	345	345	770
Stage 1	-	-	-	-	-	-	588	571	-	731	683	-
Stage 2	-	-	-	-	-	-	713	672	-	599	566	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1289	-	-	1126	-	-	326	343	630	339	339	770
Mov Cap-2 Maneuver	-	-	-	-	-	-	326	343	-	339	339	-
Stage 1	-	-	-	-	-	-	580	564	-	721	681	-
Stage 2	-	-	-	-	-	-	700	670	-	589	559	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	17.3	10.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	334	1289	-	-	1126	-	-	644
HCM Lane V/C Ratio	0.121	0.01	-	-	0.003	-	-	0.021
HCM Control Delay (s)	17.3	7.8	0	-	8.2	0	-	10.7
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	1.3					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	324	231	9	5	32
Future Vol, veh/h	50	324	231	9	5	32
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	60	386	275	11	6	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	286	0	-	0	787	282
Stage 1	-	-	-	-	281	-
Stage 2	-	-	-	-	506	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1276	-	-	-	363	762
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	610	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1276	-	-	-	341	761
Mov Cap-2 Maneuver	-	-	-	-	341	-
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	610	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1276	-	-	-	652
HCM Lane V/C Ratio	0.047	-	-	-	0.068
HCM Control Delay (s)	8	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Traffic Vol, veh/h	200	129	28	159	80	18
Future Vol, veh/h	200	129	28	159	80	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	238	154	33	189	95	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	392	0	570	315
Stage 1	-	-	-	-	315	-
Stage 2	-	-	-	-	255	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1172	-	483	725
Stage 1	-	-	-	-	740	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1172	-	468	725
Mov Cap-2 Maneuver	-	-	-	-	468	-
Stage 1	-	-	-	-	740	-
Stage 2	-	-	-	-	764	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	501	-	-	1172	-
HCM Lane V/C Ratio	0.233	-	-	0.028	-
HCM Control Delay (s)	14.4	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	555	180	172	1584	2441	925
Future Volume (veh/h)	555	180	172	1584	2441	925
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	572	183	177	1633	2516	942
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	587	423	172	2713	2251	1252
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	572	183	177	1633	2516	942
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	19.8	12.0	11.6	24.1	76.0	36.5
Cycle Q Clear(g_c), s	19.8	12.0	11.6	24.1	76.0	36.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	587	423	172	2713	2251	1252
V/C Ratio(X)	0.97	0.43	1.03	0.60	1.12	0.75
Avail Cap(c_a), veh/h	587	423	172	2713	2251	1252
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.62	0.62	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.4	41.7	54.2	6.2	22.0	5.9
Incr Delay (d2), s/veh	23.5	2.0	76.1	0.4	59.8	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.1	11.4	8.6	6.0	43.9	20.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	79.9	43.7	130.3	6.6	81.8	8.5
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	755			1810	3458	
Approach Delay, s/veh	71.1			18.7	61.8	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.4		95.6			15.6	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.9		91.1			11.1	75.5
Max Q Clear Time (g_c+I1), s		21.8		26.1			13.6	78.0
Green Ext Time (p_c), s		0.0		17.5			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	50.0
HCM 6th LOS	D

Notes
User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	230	194	63	170	283	110	335	93	437	603	145
Future Volume (veh/h)	148	230	194	63	170	283	110	335	93	437	603	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	154	240	177	66	177	66	115	349	89	455	628	73
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	188	247	182	90	367	311	147	417	106	490	912	772
Arrive On Green	0.11	0.25	0.25	0.05	0.19	0.19	0.08	0.29	0.29	0.09	0.16	0.16
Sat Flow, veh/h	1781	989	730	1795	1885	1598	1767	1419	362	1795	1885	1598
Grp Volume(v), veh/h	154	0	417	66	177	66	115	0	438	455	628	73
Grp Sat Flow(s),veh/h/ln	1781	0	1719	1795	1885	1598	1767	0	1781	1795	1885	1598
Q Serve(g_s), s	10.2	0.0	28.8	4.4	10.0	4.2	7.7	0.0	27.6	30.2	37.7	4.7
Cycle Q Clear(g_c), s	10.2	0.0	28.8	4.4	10.0	4.2	7.7	0.0	27.6	30.2	37.7	4.7
Prop In Lane	1.00		0.42	1.00		1.00	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	188	0	430	90	367	311	147	0	523	490	912	772
V/C Ratio(X)	0.82	0.00	0.97	0.74	0.48	0.21	0.78	0.00	0.84	0.93	0.69	0.09
Avail Cap(c_a), veh/h	214	0	430	90	367	311	168	0	523	494	912	772
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.51	0.51	0.51
Uniform Delay (d), s/veh	52.6	0.0	44.7	56.2	43.0	40.6	53.9	0.0	39.7	53.4	41.9	28.0
Incr Delay (d2), s/veh	19.7	0.0	35.6	26.6	1.0	0.3	18.7	0.0	14.7	14.7	2.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	16.3	2.6	4.7	1.7	4.1	0.0	13.8	16.5	19.5	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.3	0.0	80.3	82.8	43.9	40.9	72.7	0.0	54.5	68.1	44.1	28.1
LnGrp LOS	E	A	F	F	D	D	E	A	D	E	D	C
Approach Vol, veh/h		571			309			553			1156	
Approach Delay, s/veh		78.2			51.6			58.3			52.5	
Approach LOS		E			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	36.8	39.2	10.0	34.0	14.0	62.0	16.7	27.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	32.5	34.5	5.5	29.5	10.9	56.1	13.9	21.1
Max Q Clear Time (g_c+I1), s	32.2	29.6	6.4	30.8	9.7	39.7	12.2	12.0
Green Ext Time (p_c), s	0.1	1.1	0.0	0.0	0.0	3.7	0.1	0.7

Intersection Summary			
HCM 6th Ctrl Delay			59.3
HCM 6th LOS			E

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	162	58	8	252	0	132	1	20	1	0	18
Future Vol, veh/h	5	162	58	8	252	0	132	1	20	1	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	182	65	9	283	0	148	1	22	1	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	283	0	0	247	0	0	540	528	217	541	560	285
Stage 1	-	-	-	-	-	-	227	227	-	301	301	-
Stage 2	-	-	-	-	-	-	313	301	-	240	259	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1262	-	-	1302	-	-	456	459	828	455	440	759
Stage 1	-	-	-	-	-	-	780	720	-	712	669	-
Stage 2	-	-	-	-	-	-	702	669	-	768	697	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1262	-	-	1302	-	-	438	453	826	436	434	758
Mov Cap-2 Maneuver	-	-	-	-	-	-	438	453	-	436	434	-
Stage 1	-	-	-	-	-	-	775	716	-	708	664	-
Stage 2	-	-	-	-	-	-	677	664	-	740	693	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	17.1	10.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	467	1262	-	-	1302	-	-	730
HCM Lane V/C Ratio	0.368	0.004	-	-	0.007	-	-	0.029
HCM Control Delay (s)	17.1	7.9	0	-	7.8	0	-	10.1
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.7	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	171	232	2	3	30
Future Vol, veh/h	15	171	232	2	3	30
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	19	216	294	3	4	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	299	0	-	0	554	298
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	256	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1234	-	-	-	497	746
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	791	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1232	-	-	-	486	745
Mov Cap-2 Maneuver	-	-	-	-	486	-
Stage 1	-	-	-	-	743	-
Stage 2	-	-	-	-	789	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1232	-	-	-	711
HCM Lane V/C Ratio	0.015	-	-	-	0.059
HCM Control Delay (s)	8	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	156	18	4	185	50	11
Future Vol, veh/h	156	18	4	185	50	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	197	23	5	234	63	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	220	0	453	209
Stage 1	-	-	-	-	209	-
Stage 2	-	-	-	-	244	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1326	-	565	831
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	797	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1326	-	563	831
Mov Cap-2 Maneuver	-	-	-	-	563	-
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	794	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	598	-	-	1326	-
HCM Lane V/C Ratio	0.129	-	-	0.004	-
HCM Control Delay (s)	11.9	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	671	112	100	1923	1253	457
Future Volume (veh/h)	671	112	100	1923	1253	457
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	746	111	111	2137	1392	462
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	869	534	151	2213	1699	1146
Arrive On Green	0.26	0.26	0.09	0.64	0.50	0.50
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	746	111	111	2137	1392	462
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	15.7	3.8	4.7	43.6	25.9	8.1
Cycle Q Clear(g_c), s	15.7	3.8	4.7	43.6	25.9	8.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	869	534	151	2213	1699	1146
V/C Ratio(X)	0.86	0.21	0.73	0.97	0.82	0.40
Avail Cap(c_a), veh/h	869	534	176	2220	1699	1146
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.71	0.71	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.6	17.5	33.4	12.8	16.0	3.3
Incr Delay (d2), s/veh	8.0	0.6	12.5	12.1	3.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	3.9	2.3	13.6	8.4	4.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.6	18.1	45.9	24.9	19.3	3.5
LnGrp LOS	C	B	D	C	B	A
Approach Vol, veh/h	857			2248	1854	
Approach Delay, s/veh	32.5			25.9	15.4	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.2		51.8			10.5	41.3
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.5		47.5			7.1	35.9
Max Q Clear Time (g_c+I1), s		17.7		45.6			6.7	27.9
Green Ext Time (p_c), s		0.3		1.8			0.0	5.7

Intersection Summary	
HCM 6th Ctrl Delay	23.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	94	64	45	192	355	172	386	28	181	327	71
Future Volume (veh/h)	66	94	64	45	192	355	172	386	28	181	327	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	73	104	29	50	213	58	191	429	27	201	363	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	110	214	60	96	283	237	249	631	40	259	678	575
Arrive On Green	0.07	0.17	0.16	0.06	0.16	0.16	0.14	0.36	0.35	0.15	0.37	0.00
Sat Flow, veh/h	1640	1288	359	1739	1826	1527	1781	1741	110	1739	1826	1547
Grp Volume(v), veh/h	73	0	133	50	213	58	191	0	456	201	363	0
Grp Sat Flow(s),veh/h/ln	1640	0	1647	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.4	1.7	6.7	2.0	6.2	0.0	12.5	6.7	9.4	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.4	1.7	6.7	2.0	6.2	0.0	12.5	6.7	9.4	0.0
Prop In Lane	1.00		0.22	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	110	0	274	96	283	237	249	0	671	259	678	575
V/C Ratio(X)	0.66	0.00	0.48	0.52	0.75	0.25	0.77	0.00	0.68	0.78	0.54	0.00
Avail Cap(c_a), veh/h	150	0	274	162	304	254	285	0	671	293	678	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	27.3	0.0	22.7	27.6	24.2	22.3	24.9	0.0	16.2	24.6	14.8	0.0
Incr Delay (d2), s/veh	6.7	0.0	1.3	4.3	9.4	0.5	10.4	0.0	5.5	10.0	2.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.7	0.8	3.4	0.7	3.0	0.0	5.3	3.1	3.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	24.1	31.8	33.7	22.8	35.2	0.0	21.7	34.6	17.5	0.0
LnGrp LOS	C	A	C	C	C	C	D	A	C	C	B	A
Approach Vol, veh/h		206			321			647			564	
Approach Delay, s/veh		27.6			31.4			25.7			23.6	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.9	25.8	7.3	14.0	12.4	26.3	8.0	13.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.6	17.9	5.1	9.4	9.1	18.4	5.0	9.5
Max Q Clear Time (g_c+I1), s	8.7	14.5	3.7	6.4	8.2	11.4	4.6	8.7
Green Ext Time (p_c), s	0.1	0.8	0.0	0.2	0.0	1.1	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	26.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	293	145	24	213	0	98	0	15	2	0	11
Future Vol, veh/h	12	293	145	24	213	0	98	0	15	2	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	13	312	154	26	227	0	104	0	16	2	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	227	0	0	466	0	0	700	694	389	702	771	227
Stage 1	-	-	-	-	-	-	415	415	-	279	279	-
Stage 2	-	-	-	-	-	-	285	279	-	423	492	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1341	-	-	1101	-	-	349	361	651	355	333	817
Stage 1	-	-	-	-	-	-	607	586	-	732	683	-
Stage 2	-	-	-	-	-	-	714	673	-	613	551	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1341	-	-	1101	-	-	334	347	651	336	320	817
Mov Cap-2 Maneuver	-	-	-	-	-	-	334	347	-	336	320	-
Stage 1	-	-	-	-	-	-	599	578	-	722	665	-
Stage 2	-	-	-	-	-	-	685	655	-	590	544	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.8	20.1	10.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	357	1341	-	-	1101	-	-	670
HCM Lane V/C Ratio	0.337	0.01	-	-	0.023	-	-	0.021
HCM Control Delay (s)	20.1	7.7	0	-	8.3	0	-	10.5
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.5	0	-	-	0.1	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	264	207	9	5	32
Future Vol, veh/h	50	264	207	9	5	32
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	60	314	246	11	6	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	257	0	-	0	686	253
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	434	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1308	-	-	-	416	791
Stage 1	-	-	-	-	795	-
Stage 2	-	-	-	-	658	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1308	-	-	-	393	790
Mov Cap-2 Maneuver	-	-	-	-	393	-
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	658	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1308	-	-	-	695
HCM Lane V/C Ratio	0.046	-	-	-	0.063
HCM Control Delay (s)	7.9	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

HCM 6th TWSC
3: Street A & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	213	56	12	180	35	7
Future Vol, veh/h	213	56	12	180	35	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	254	67	14	214	42	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	321	0	530	288
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	242	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1245	-	510	751
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	798	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1245	-	503	751
Mov Cap-2 Maneuver	-	-	-	-	503	-
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	788	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	12.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	532	-	-	1245	-
HCM Lane V/C Ratio	0.094	-	-	0.011	-
HCM Control Delay (s)	12.5	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	563	182	174	1584	2441	937
Future Volume (veh/h)	563	182	174	1584	2441	937
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	580	185	179	1633	2516	954
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	587	423	172	2713	2251	1252
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	580	185	179	1633	2516	954
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.1	12.1	11.6	24.1	76.0	37.7
Cycle Q Clear(g_c), s	20.1	12.1	11.6	24.1	76.0	37.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	587	423	172	2713	2251	1252
V/C Ratio(X)	0.99	0.44	1.04	0.60	1.12	0.76
Avail Cap(c_a), veh/h	587	423	172	2713	2251	1252
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.57	0.57	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.5	41.8	54.2	6.2	22.0	6.0
Incr Delay (d2), s/veh	25.1	1.9	79.4	0.4	59.8	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.3	11.5	8.8	6.0	43.9	21.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	81.6	43.6	133.6	6.6	81.8	8.8
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	765			1812	3470	
Approach Delay, s/veh	72.5			19.1	61.7	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.4		95.6			15.6	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.9		91.1			11.1	75.5
Max Q Clear Time (g_c+I1), s		22.1		26.1			13.6	78.0
Green Ext Time (p_c), s		0.0		17.5			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	50.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	238	194	64	174	293	110	335	94	451	603	145
Future Volume (veh/h)	148	238	194	64	174	293	110	335	94	451	603	145
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	154	248	177	67	181	73	115	349	90	470	628	73
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	188	251	179	90	367	311	147	404	104	505	912	772
Arrive On Green	0.11	0.25	0.25	0.05	0.19	0.19	0.08	0.29	0.28	0.09	0.16	0.16
Sat Flow, veh/h	1781	1004	717	1795	1885	1598	1767	1415	365	1795	1885	1598
Grp Volume(v), veh/h	154	0	425	67	181	73	115	0	439	470	628	73
Grp Sat Flow(s),veh/h/ln	1781	0	1721	1795	1885	1598	1767	0	1780	1795	1885	1598
Q Serve(g_s), s	10.2	0.0	29.5	4.4	10.3	4.6	7.7	0.0	28.1	31.2	37.7	4.7
Cycle Q Clear(g_c), s	10.2	0.0	29.5	4.4	10.3	4.6	7.7	0.0	28.1	31.2	37.7	4.7
Prop In Lane	1.00		0.42	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	188	0	430	90	367	311	147	0	508	505	912	772
V/C Ratio(X)	0.82	0.00	0.99	0.75	0.49	0.23	0.78	0.00	0.86	0.93	0.69	0.09
Avail Cap(c_a), veh/h	214	0	430	90	367	311	168	0	508	509	912	772
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.49	0.49	0.49
Uniform Delay (d), s/veh	52.6	0.0	44.9	56.2	43.1	40.8	53.9	0.0	40.7	53.3	41.9	28.0
Incr Delay (d2), s/veh	19.7	0.0	40.0	28.4	1.0	0.4	18.7	0.0	17.5	14.2	2.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	17.1	2.7	4.9	1.8	4.1	0.0	14.3	17.0	19.5	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.3	0.0	84.9	84.7	44.1	41.2	72.7	0.0	58.2	67.5	44.0	28.1
LnGrp LOS	E	A	F	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		579			321			554			1171	
Approach Delay, s/veh		81.6			51.9			61.2			52.4	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	37.8	38.2	10.0	34.0	14.0	62.0	16.7	27.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	33.5	33.5	5.5	29.5	10.9	56.1	13.9	21.1
Max Q Clear Time (g_c+I1), s	33.2	30.1	6.4	31.5	9.7	39.7	12.2	12.3
Green Ext Time (p_c), s	0.1	0.8	0.0	0.0	0.0	3.7	0.1	0.7

Intersection Summary	
HCM 6th Ctrl Delay	60.6
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	167	59	8	260	0	134	1	20	1	0	19
Future Vol, veh/h	5	167	59	8	260	0	134	1	20	1	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	188	66	9	292	0	151	1	22	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	292	0	0	254	0	0	556	543	223	557	576	294
Stage 1	-	-	-	-	-	-	233	233	-	310	310	-
Stage 2	-	-	-	-	-	-	323	310	-	247	266	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1253	-	-	1294	-	-	445	450	822	444	431	750
Stage 1	-	-	-	-	-	-	775	716	-	705	663	-
Stage 2	-	-	-	-	-	-	693	663	-	761	692	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1253	-	-	1294	-	-	427	444	820	426	425	749
Mov Cap-2 Maneuver	-	-	-	-	-	-	427	444	-	426	425	-
Stage 1	-	-	-	-	-	-	770	712	-	701	658	-
Stage 2	-	-	-	-	-	-	667	658	-	733	688	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	17.7	10.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	455	1253	-	-	1294	-	-	722
HCM Lane V/C Ratio	0.383	0.004	-	-	0.007	-	-	0.031
HCM Control Delay (s)	17.7	7.9	0	-	7.8	0	-	10.1
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.8	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	176	239	2	3	31
Future Vol, veh/h	16	176	239	2	3	31
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	20	223	303	3	4	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	308	0	-	0	572	307
Stage 1	-	-	-	-	307	-
Stage 2	-	-	-	-	265	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1225	-	-	-	485	738
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	784	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1223	-	-	-	474	737
Mov Cap-2 Maneuver	-	-	-	-	474	-
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	782	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1223	-	-	-	703
HCM Lane V/C Ratio	0.017	-	-	-	0.061
HCM Control Delay (s)	8	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	161	18	4	192	50	11
Future Vol, veh/h	161	18	4	192	50	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	204	23	5	243	63	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	227	0	469	216
Stage 1	-	-	-	-	216	-
Stage 2	-	-	-	-	253	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1318	-	553	824
Stage 1	-	-	-	-	820	-
Stage 2	-	-	-	-	789	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1318	-	551	824
Mov Cap-2 Maneuver	-	-	-	-	551	-
Stage 1	-	-	-	-	820	-
Stage 2	-	-	-	-	786	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	586	-	-	1318	-
HCM Lane V/C Ratio	0.132	-	-	0.004	-
HCM Control Delay (s)	12.1	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	675	112	100	1935	1260	460
Future Volume (veh/h)	675	112	100	1935	1260	460
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	750	111	111	2150	1400	465
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	866	533	151	2216	1701	1146
Arrive On Green	0.25	0.25	0.09	0.64	0.50	0.50
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	750	111	111	2150	1400	465
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	15.8	3.8	4.7	44.2	26.2	8.1
Cycle Q Clear(g_c), s	15.8	3.8	4.7	44.2	26.2	8.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	866	533	151	2216	1701	1146
V/C Ratio(X)	0.87	0.21	0.73	0.97	0.82	0.41
Avail Cap(c_a), veh/h	866	533	176	2220	1701	1146
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.69	0.69	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.7	17.5	33.4	12.9	16.0	3.3
Incr Delay (d2), s/veh	8.2	0.6	12.5	12.9	3.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	3.9	2.3	13.9	8.5	4.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.9	18.1	45.9	25.7	19.4	3.5
LnGrp LOS	C	B	D	C	B	A
Approach Vol, veh/h	861			2261	1865	
Approach Delay, s/veh	32.7			26.7	15.4	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.1		51.9			10.5	41.4
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.5		47.5			7.1	35.9
Max Q Clear Time (g_c+I1), s		17.8		46.2			6.7	28.2
Green Ext Time (p_c), s		0.3		1.2			0.0	5.6

Intersection Summary	
HCM 6th Ctrl Delay	23.5
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	96	65	46	194	361	176	395	28	184	334	72
Future Volume (veh/h)	66	96	65	46	194	361	176	395	28	184	334	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	73	107	31	51	216	60	196	439	27	204	371	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	110	213	62	97	286	239	255	627	39	262	670	568
Arrive On Green	0.07	0.17	0.16	0.06	0.16	0.16	0.14	0.36	0.35	0.15	0.37	0.00
Sat Flow, veh/h	1640	1275	369	1739	1826	1527	1781	1744	107	1739	1826	1547
Grp Volume(v), veh/h	73	0	138	51	216	60	196	0	466	204	371	0
Grp Sat Flow(s),veh/h/ln	1640	0	1645	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.6	1.7	6.8	2.1	6.4	0.0	12.9	6.8	9.7	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.6	1.7	6.8	2.1	6.4	0.0	12.9	6.8	9.7	0.0
Prop In Lane	1.00		0.22	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	110	0	275	97	286	239	255	0	665	262	670	568
V/C Ratio(X)	0.66	0.00	0.50	0.52	0.76	0.25	0.77	0.00	0.70	0.78	0.55	0.00
Avail Cap(c_a), veh/h	150	0	275	162	304	254	291	0	665	296	670	568
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	27.3	0.0	22.8	27.5	24.2	22.2	24.8	0.0	16.5	24.5	15.1	0.0
Incr Delay (d2), s/veh	6.7	0.0	1.4	4.3	9.8	0.5	10.4	0.0	6.1	10.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.7	0.8	3.5	0.7	3.1	0.0	5.6	3.2	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	24.2	31.8	34.0	22.8	35.2	0.0	22.5	34.6	18.0	0.0
LnGrp LOS	C	A	C	C	C	C	D	A	C	C	B	A
Approach Vol, veh/h		211			327			662			575	
Approach Delay, s/veh		27.6			31.6			26.3			23.9	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	25.6	7.4	14.0	12.6	26.0	8.0	13.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.7	17.8	5.1	9.4	9.3	18.2	5.0	9.5
Max Q Clear Time (g_c+I1), s	8.8	14.9	3.7	6.6	8.4	11.7	4.6	8.8
Green Ext Time (p_c), s	0.1	0.7	0.0	0.2	0.0	1.1	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	26.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	302	147	25	220	0	99	0	15	2	0	12
Future Vol, veh/h	13	302	147	25	220	0	99	0	15	2	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	14	321	156	27	234	0	105	0	16	2	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	234	0	0	477	0	0	722	715	399	723	793	234
Stage 1	-	-	-	-	-	-	427	427	-	288	288	-
Stage 2	-	-	-	-	-	-	295	288	-	435	505	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1333	-	-	1090	-	-	337	351	642	344	323	810
Stage 1	-	-	-	-	-	-	598	578	-	724	677	-
Stage 2	-	-	-	-	-	-	705	666	-	604	544	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1333	-	-	1090	-	-	321	336	642	324	309	810
Mov Cap-2 Maneuver	-	-	-	-	-	-	321	336	-	324	309	-
Stage 1	-	-	-	-	-	-	589	569	-	713	658	-
Stage 2	-	-	-	-	-	-	674	647	-	580	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.9	21.1	10.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	344	1333	-	-	1090	-	-	667
HCM Lane V/C Ratio	0.353	0.01	-	-	0.024	-	-	0.022
HCM Control Delay (s)	21.1	7.7	0	-	8.4	0	-	10.5
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1.5	0	-	-	0.1	-	-	0.1

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	272	212	9	6	33
Future Vol, veh/h	52	272	212	9	6	33
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	62	324	252	11	7	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	263	0	-	0	706	259
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	448	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1301	-	-	-	405	785
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	648	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1301	-	-	-	382	784
Mov Cap-2 Maneuver	-	-	-	-	382	-
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	648	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1301	-	-	-	675
HCM Lane V/C Ratio	0.048	-	-	-	0.069
HCM Control Delay (s)	7.9	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

HCM 6th TWSC
3: Street A & S Holcomb Boulevard
12/01/2021

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	221	56	12	186	35	7
Future Vol, veh/h	221	56	12	186	35	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	263	67	14	221	42	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	330	0	546	297
Stage 1	-	-	-	-	297	-
Stage 2	-	-	-	-	249	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1235	-	499	742
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	792	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1235	-	493	742
Mov Cap-2 Maneuver	-	-	-	-	493	-
Stage 1	-	-	-	-	754	-
Stage 2	-	-	-	-	782	-

Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		12.6	
HCM LOS					B	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	522	-	-	1235	-
HCM Lane V/C Ratio	0.096	-	-	0.012	-
HCM Control Delay (s)	12.6	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	566	183	175	1593	2456	942
Future Volume (veh/h)	566	183	175	1593	2456	942
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	584	186	180	1642	2532	960
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	590	423	171	2710	2251	1253
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	584	186	180	1642	2532	960
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.3	12.2	11.5	24.5	76.0	38.1
Cycle Q Clear(g_c), s	20.3	12.2	11.5	24.5	76.0	38.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	590	423	171	2710	2251	1253
V/C Ratio(X)	0.99	0.44	1.05	0.61	1.13	0.77
Avail Cap(c_a), veh/h	590	423	171	2710	2251	1253
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.54	0.54	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.5	41.8	54.3	6.3	22.0	6.0
Incr Delay (d2), s/veh	24.8	1.8	84.0	0.4	62.7	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.4	11.6	8.9	6.1	44.8	21.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	81.3	43.6	138.3	6.7	84.7	8.9
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	770			1822	3492	
Approach Delay, s/veh	72.2			19.7	63.9	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.5		95.5			15.5	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.0		91.0			11.0	75.5
Max Q Clear Time (g_c+I1), s		22.3		26.5			13.5	78.0
Green Ext Time (p_c), s		0.0		17.7			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	51.7
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	242	197	65	177	298	112	343	96	457	616	147
Future Volume (veh/h)	149	242	197	65	177	298	112	343	96	457	616	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	155	252	180	68	184	78	117	357	92	476	642	75
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	189	251	179	90	366	310	149	401	103	509	909	771
Arrive On Green	0.11	0.25	0.25	0.05	0.19	0.19	0.08	0.28	0.28	0.09	0.16	0.16
Sat Flow, veh/h	1781	1004	717	1795	1885	1598	1767	1416	365	1795	1885	1598
Grp Volume(v), veh/h	155	0	432	68	184	78	117	0	449	476	642	75
Grp Sat Flow(s),veh/h/ln	1781	0	1721	1795	1885	1598	1767	0	1780	1795	1885	1598
Q Serve(g_s), s	10.2	0.0	30.0	4.5	10.5	5.0	7.8	0.0	29.0	31.6	38.7	4.8
Cycle Q Clear(g_c), s	10.2	0.0	30.0	4.5	10.5	5.0	7.8	0.0	29.0	31.6	38.7	4.8
Prop In Lane	1.00		0.42	1.00		1.00	1.00		0.20	1.00		1.00
Lane Grp Cap(c), veh/h	189	0	430	90	366	310	149	0	504	509	909	771
V/C Ratio(X)	0.82	0.00	1.00	0.76	0.50	0.25	0.78	0.00	0.89	0.94	0.71	0.10
Avail Cap(c_a), veh/h	214	0	430	90	366	310	171	0	504	509	909	771
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.48	0.48	0.48
Uniform Delay (d), s/veh	52.5	0.0	45.1	56.3	43.2	41.0	53.9	0.0	41.3	53.3	42.4	28.1
Incr Delay (d2), s/veh	20.0	0.0	44.4	30.4	1.1	0.4	18.7	0.0	20.4	14.7	2.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	17.9	2.8	5.0	2.0	4.1	0.0	15.1	17.2	20.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.5	0.0	89.5	86.6	44.3	41.4	72.6	0.0	61.7	68.0	44.6	28.3
LnGrp LOS	E	A	F	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		587			330			566			1193	
Approach Delay, s/veh		85.0			52.3			63.9			52.9	
Approach LOS		F			D			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	38.0	38.0	10.0	34.0	14.1	61.9	16.7	27.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	33.5	33.5	5.5	29.5	11.1	55.9	13.9	21.1				
Max Q Clear Time (g_c+I1), s	33.6	31.0	6.5	32.0	9.8	40.7	12.2	12.5				
Green Ext Time (p_c), s	0.0	0.6	0.0	0.0	0.0	3.7	0.1	0.8				
Intersection Summary												
HCM 6th Ctrl Delay			62.2									
HCM 6th LOS			E									

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	167	66	10	260	0	154	1	24	1	0	19
Future Vol, veh/h	5	167	66	10	260	0	154	1	24	1	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	188	74	11	292	0	173	1	27	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	292	0	0	262	0	0	564	551	227	567	588	294
Stage 1	-	-	-	-	-	-	237	237	-	314	314	-
Stage 2	-	-	-	-	-	-	327	314	-	253	274	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1253	-	-	1285	-	-	439	445	817	437	424	750
Stage 1	-	-	-	-	-	-	771	713	-	701	660	-
Stage 2	-	-	-	-	-	-	690	660	-	756	687	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1253	-	-	1285	-	-	421	438	815	416	417	749
Mov Cap-2 Maneuver	-	-	-	-	-	-	421	438	-	416	417	-
Stage 1	-	-	-	-	-	-	766	709	-	697	653	-
Stage 2	-	-	-	-	-	-	662	653	-	724	683	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	19.3	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	450	1253	-	-	1285	-	-	720
HCM Lane V/C Ratio	0.447	0.004	-	-	0.009	-	-	0.031
HCM Control Delay (s)	19.3	7.9	0	-	7.8	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.3	0	-	-	0	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive
12/01/2021

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	180	241	2	3	31
Future Vol, veh/h	16	180	241	2	3	31
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	20	228	305	3	4	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	310	0	-	0	579	309
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	270	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1223	-	-	-	481	736
Stage 1	-	-	-	-	749	-
Stage 2	-	-	-	-	780	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1221	-	-	-	470	735
Mov Cap-2 Maneuver	-	-	-	-	470	-
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	778	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1221	-	-	-	700
HCM Lane V/C Ratio	0.017	-	-	-	0.061
HCM Control Delay (s)	8	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	165	18	4	194	50	11
Future Vol, veh/h	165	18	4	194	50	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	209	23	5	246	63	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	232	0	477	221
Stage 1	-	-	-	-	221	-
Stage 2	-	-	-	-	256	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1312	-	547	819
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1312	-	545	819
Mov Cap-2 Maneuver	-	-	-	-	545	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	784	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	580	-	-	1312	-
HCM Lane V/C Ratio	0.133	-	-	0.004	-
HCM Control Delay (s)	12.2	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	685	114	101	1935	1260	463
Future Volume (veh/h)	685	114	101	1935	1260	463
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	761	114	112	2150	1400	470
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	866	534	152	2216	1699	1145
Arrive On Green	0.25	0.25	0.09	0.64	0.50	0.50
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	761	114	112	2150	1400	470
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	16.1	3.9	4.7	44.2	26.2	8.3
Cycle Q Clear(g_c), s	16.1	3.9	4.7	44.2	26.2	8.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	866	534	152	2216	1699	1145
V/C Ratio(X)	0.88	0.21	0.74	0.97	0.82	0.41
Avail Cap(c_a), veh/h	866	534	176	2220	1699	1145
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.8	17.5	33.4	12.9	16.0	3.3
Incr Delay (d2), s/veh	8.8	0.6	12.7	12.9	3.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.0	2.3	13.9	8.5	4.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.7	18.1	46.1	25.7	19.5	3.6
LnGrp LOS	D	B	D	C	B	A
Approach Vol, veh/h	875			2262	1870	
Approach Delay, s/veh	33.4			26.7	15.5	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.1		51.9			10.6	41.3
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.5		47.5			7.1	35.9
Max Q Clear Time (g_c+I1), s		18.1		46.2			6.7	28.2
Green Ext Time (p_c), s		0.2		1.2			0.0	5.6

Intersection Summary			
HCM 6th Ctrl Delay			23.7
HCM 6th LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	66	98	65	47	200	373	176	395	28	188	334	72
Future Volume (veh/h)	66	98	65	47	200	373	176	395	28	188	334	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	73	109	32	52	222	62	196	439	27	209	371	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	110	216	63	98	291	243	255	616	38	267	665	563
Arrive On Green	0.07	0.17	0.16	0.06	0.16	0.16	0.14	0.35	0.35	0.15	0.36	0.00
Sat Flow, veh/h	1640	1271	373	1739	1826	1527	1781	1744	107	1739	1826	1547
Grp Volume(v), veh/h	73	0	141	52	222	62	196	0	466	209	371	0
Grp Sat Flow(s),veh/h/ln	1640	0	1644	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.7	1.7	7.0	2.1	6.4	0.0	13.1	6.9	9.7	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.7	1.7	7.0	2.1	6.4	0.0	13.1	6.9	9.7	0.0
Prop In Lane	1.00		0.23	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	110	0	279	98	291	243	255	0	654	267	665	563
V/C Ratio(X)	0.66	0.00	0.51	0.53	0.76	0.26	0.77	0.00	0.71	0.78	0.56	0.00
Avail Cap(c_a), veh/h	150	0	279	162	304	254	291	0	654	301	665	563
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	27.3	0.0	22.7	27.5	24.1	22.1	24.8	0.0	16.8	24.4	15.2	0.0
Incr Delay (d2), s/veh	6.7	0.0	1.5	4.3	10.5	0.5	10.4	0.0	6.5	10.1	3.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.8	0.8	3.6	0.7	3.1	0.0	5.7	3.2	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.0	0.0	24.2	31.8	34.6	22.7	35.2	0.0	23.3	34.6	18.2	0.0
LnGrp LOS	C	A	C	C	C	C	D	A	C	C	B	A
Approach Vol, veh/h		214			336			662			580	
Approach Delay, s/veh		27.5			32.0			26.8			24.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.2	25.2	7.4	14.2	12.6	25.8	8.0	13.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.9	17.6	5.1	9.4	9.3	18.2	5.0	9.5
Max Q Clear Time (g_c+I1), s	8.9	15.1	3.7	6.7	8.4	11.7	4.6	9.0
Green Ext Time (p_c), s	0.1	0.7	0.0	0.2	0.0	1.1	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	27.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	302	172	30	220	0	113	0	18	2	0	12
Future Vol, veh/h	13	302	172	30	220	0	113	0	18	2	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	14	321	183	32	234	0	120	0	19	2	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	234	0	0	504	0	0	746	739	413	748	830	234
Stage 1	-	-	-	-	-	-	441	441	-	298	298	-
Stage 2	-	-	-	-	-	-	305	298	-	450	532	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1333	-	-	1066	-	-	325	340	631	331	308	810
Stage 1	-	-	-	-	-	-	587	570	-	715	671	-
Stage 2	-	-	-	-	-	-	696	660	-	592	529	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1333	-	-	1066	-	-	308	323	631	309	293	810
Mov Cap-2 Maneuver	-	-	-	-	-	-	308	323	-	309	293	-
Stage 1	-	-	-	-	-	-	578	561	-	704	648	-
Stage 2	-	-	-	-	-	-	661	637	-	565	521	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	23.6	10.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	331	1333	-	-	1066	-	-	658
HCM Lane V/C Ratio	0.421	0.01	-	-	0.03	-	-	0.023
HCM Control Delay (s)	23.6	7.7	0	-	8.5	0	-	10.6
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2	0	-	-	0.1	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	275	217	9	6	33
Future Vol, veh/h	52	275	217	9	6	33
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	62	327	258	11	7	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	269	0	-	0	715	265
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	451	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1295	-	-	-	400	779
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	646	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1295	-	-	-	376	778
Mov Cap-2 Maneuver	-	-	-	-	376	-
Stage 1	-	-	-	-	739	-
Stage 2	-	-	-	-	646	-

Approach	EB		WB		SB	
HCM Control Delay, s	1.3		0		10.8	
HCM LOS					B	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1295	-	-	-	668
HCM Lane V/C Ratio	0.048	-	-	-	0.07
HCM Control Delay (s)	7.9	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	224	56	12	191	35	7
Future Vol, veh/h	224	56	12	191	35	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	267	67	14	227	42	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	334	0	556	301
Stage 1	-	-	-	-	301	-
Stage 2	-	-	-	-	255	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1231	-	492	739
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1231	-	486	739
Mov Cap-2 Maneuver	-	-	-	-	486	-
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	778	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	515	-	-	1231	-
HCM Lane V/C Ratio	0.097	-	-	0.012	-
HCM Control Delay (s)	12.7	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	573	185	177	1593	2456	954
Future Volume (veh/h)	573	185	177	1593	2456	954
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	591	188	182	1642	2532	972
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	587	423	172	2713	2251	1252
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	591	188	182	1642	2532	972
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.4	12.4	11.6	24.4	76.0	39.6
Cycle Q Clear(g_c), s	20.4	12.4	11.6	24.4	76.0	39.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	587	423	172	2713	2251	1252
V/C Ratio(X)	1.01	0.44	1.06	0.61	1.13	0.78
Avail Cap(c_a), veh/h	587	423	172	2713	2251	1252
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.52	0.52	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.6	41.8	54.2	6.2	22.0	6.2
Incr Delay (d2), s/veh	28.2	1.8	84.5	0.4	62.7	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.7	11.7	9.0	6.1	44.8	22.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	84.9	43.6	138.7	6.6	84.7	9.4
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	779			1824	3504	
Approach Delay, s/veh	74.9			19.8	63.8	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.4		95.6			15.6	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.9		91.1			11.1	75.5
Max Q Clear Time (g_c+I1), s		22.4		26.4			13.6	78.0
Green Ext Time (p_c), s		0.0		17.7			0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		52.1
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	250	197	66	180	307	112	343	97	471	616	147
Future Volume (veh/h)	149	250	197	66	180	307	112	343	97	471	616	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	155	260	181	69	188	86	117	357	93	491	642	75
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	189	254	177	87	363	307	149	391	102	524	912	773
Arrive On Green	0.11	0.25	0.25	0.05	0.19	0.19	0.08	0.28	0.27	0.10	0.16	0.16
Sat Flow, veh/h	1781	1016	707	1795	1885	1598	1767	1412	368	1795	1885	1598
Grp Volume(v), veh/h	155	0	441	69	188	86	117	0	450	491	642	75
Grp Sat Flow(s),veh/h/ln	1781	0	1723	1795	1885	1598	1767	0	1780	1795	1885	1598
Q Serve(g_s), s	10.2	0.0	30.0	4.6	10.7	5.5	7.8	0.0	29.4	32.6	38.7	4.8
Cycle Q Clear(g_c), s	10.2	0.0	30.0	4.6	10.7	5.5	7.8	0.0	29.4	32.6	38.7	4.8
Prop In Lane	1.00		0.41	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	189	0	431	87	363	307	149	0	492	524	912	773
V/C Ratio(X)	0.82	0.00	1.02	0.80	0.52	0.28	0.78	0.00	0.91	0.94	0.70	0.10
Avail Cap(c_a), veh/h	214	0	431	87	363	307	171	0	492	524	912	773
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.46	0.46	0.46
Uniform Delay (d), s/veh	52.5	0.0	45.1	56.5	43.5	41.4	53.9	0.0	42.1	53.1	42.3	28.0
Incr Delay (d2), s/veh	20.0	0.0	49.5	38.5	1.3	0.5	18.7	0.0	24.0	14.2	2.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	18.5	3.0	5.1	2.2	4.1	0.0	15.6	17.7	20.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.5	0.0	94.6	95.0	44.8	41.9	72.6	0.0	66.0	67.4	44.4	28.2
LnGrp LOS	E	A	F	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		596			343			567			1208	
Approach Delay, s/veh		88.8			54.2			67.4			52.7	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.0	37.2	9.8	34.0	14.1	62.1	16.7	27.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	34.5	32.7	5.3	29.5	11.1	56.1	13.9	20.9
Max Q Clear Time (g_c+I1), s	34.6	31.4	6.6	32.0	9.8	40.7	12.2	12.7
Green Ext Time (p_c), s	0.0	0.4	0.0	0.0	0.0	3.7	0.1	0.8

Intersection Summary	
HCM 6th Ctrl Delay	63.9
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	169	66	10	264	0	155	1	24	1	0	19
Future Vol, veh/h	5	169	66	10	264	0	155	1	24	1	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	190	74	11	297	0	174	1	27	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	297	0	0	264	0	0	571	558	229	574	595	299
Stage 1	-	-	-	-	-	-	239	239	-	319	319	-
Stage 2	-	-	-	-	-	-	332	319	-	255	276	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1247	-	-	1283	-	-	435	441	815	433	420	745
Stage 1	-	-	-	-	-	-	769	711	-	697	657	-
Stage 2	-	-	-	-	-	-	686	657	-	754	685	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1247	-	-	1283	-	-	417	434	813	412	413	744
Mov Cap-2 Maneuver	-	-	-	-	-	-	417	434	-	412	413	-
Stage 1	-	-	-	-	-	-	764	707	-	693	650	-
Stage 2	-	-	-	-	-	-	658	650	-	722	681	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	19.6	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	446	1247	-	-	1283	-	-	715
HCM Lane V/C Ratio	0.453	0.005	-	-	0.009	-	-	0.031
HCM Control Delay (s)	19.6	7.9	0	-	7.8	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.3	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	182	245	2	3	31
Future Vol, veh/h	16	182	245	2	3	31
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	20	230	310	3	4	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	315	0	-	0	586	314
Stage 1	-	-	-	-	314	-
Stage 2	-	-	-	-	272	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1217	-	-	-	476	731
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1215	-	-	-	465	730
Mov Cap-2 Maneuver	-	-	-	-	465	-
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	776	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1215	-	-	-	695
HCM Lane V/C Ratio	0.017	-	-	-	0.062
HCM Control Delay (s)	8	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	167	18	4	198	50	11
Future Vol, veh/h	167	18	4	198	50	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	211	23	5	251	63	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	234	0	484	223
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	261	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1310	-	542	817
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	783	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1310	-	540	817
Mov Cap-2 Maneuver	-	-	-	-	540	-
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	780	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	575	-	-	1310	-
HCM Lane V/C Ratio	0.134	-	-	0.004	-
HCM Control Delay (s)	12.2	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	686	114	101	1940	1264	464
Future Volume (veh/h)	686	114	101	1940	1264	464
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	762	115	112	2156	1404	472
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	865	533	152	2217	1700	1145
Arrive On Green	0.25	0.25	0.09	0.64	0.50	0.50
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	762	115	112	2156	1404	472
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	16.1	3.9	4.7	44.4	26.3	8.3
Cycle Q Clear(g_c), s	16.1	3.9	4.7	44.4	26.3	8.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	865	533	152	2217	1700	1145
V/C Ratio(X)	0.88	0.22	0.74	0.97	0.83	0.41
Avail Cap(c_a), veh/h	865	533	176	2220	1700	1145
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	17.5	33.4	12.9	16.0	3.3
Incr Delay (d2), s/veh	9.0	0.6	12.7	13.2	3.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	4.1	2.3	14.1	8.5	4.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.9	18.2	46.1	26.1	19.5	3.6
LnGrp LOS	D	B	D	C	B	A
Approach Vol, veh/h	877			2268	1876	
Approach Delay, s/veh	33.5			27.1	15.5	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.1		51.9			10.6	41.4
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.5		47.5			7.1	35.9
Max Q Clear Time (g_c+I1), s		18.1		46.4			6.7	28.3
Green Ext Time (p_c), s		0.2		1.0			0.0	5.5

Intersection Summary			
HCM 6th Ctrl Delay			23.9
HCM 6th LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	99	65	48	202	375	178	399	28	189	338	73
Future Volume (veh/h)	67	99	65	48	202	375	178	399	28	189	338	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	74	110	32	53	224	55	198	443	27	210	376	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	111	206	60	99	277	232	257	628	38	268	676	573
Arrive On Green	0.07	0.16	0.15	0.06	0.15	0.15	0.14	0.36	0.35	0.15	0.37	0.00
Sat Flow, veh/h	1640	1274	371	1739	1826	1527	1781	1745	106	1739	1826	1547
Grp Volume(v), veh/h	74	0	142	53	224	55	198	0	470	210	376	0
Grp Sat Flow(s),veh/h/ln	1640	0	1644	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.8	1.8	7.1	1.9	6.4	0.0	13.1	7.0	9.8	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.8	1.8	7.1	1.9	6.4	0.0	13.1	7.0	9.8	0.0
Prop In Lane	1.00		0.23	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	111	0	266	99	277	232	257	0	667	268	676	573
V/C Ratio(X)	0.67	0.00	0.53	0.53	0.81	0.24	0.77	0.00	0.71	0.78	0.56	0.00
Avail Cap(c_a), veh/h	150	0	266	162	277	232	291	0	667	301	676	573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	27.3	0.0	23.1	27.5	24.6	22.4	24.7	0.0	16.5	24.4	15.0	0.0
Incr Delay (d2), s/veh	6.8	0.0	2.1	4.4	16.2	0.5	10.6	0.0	6.2	10.2	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.8	0.8	4.1	0.7	3.1	0.0	5.6	3.3	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	0.0	25.2	31.9	40.8	22.9	35.4	0.0	22.6	34.6	17.9	0.0
LnGrp LOS	C	A	C	C	D	C	D	A	C	C	B	A
Approach Vol, veh/h		216			332			668			586	
Approach Delay, s/veh		28.3			36.4			26.4			23.9	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	25.6	7.4	13.7	12.7	26.2	8.0	13.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.9	18.5	5.1	8.5	9.3	19.1	5.0	8.6
Max Q Clear Time (g_c+I1), s	9.0	15.1	3.8	6.8	8.4	11.8	4.6	9.1
Green Ext Time (p_c), s	0.1	0.9	0.0	0.1	0.0	1.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	27.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	307	173	30	223	0	114	0	18	2	0	12
Future Vol, veh/h	13	307	173	30	223	0	114	0	18	2	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	14	327	184	32	237	0	121	0	19	2	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	237	0	0	511	0	0	755	748	419	758	840	237
Stage 1	-	-	-	-	-	-	447	447	-	301	301	-
Stage 2	-	-	-	-	-	-	308	301	-	457	539	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1330	-	-	1059	-	-	320	336	626	326	304	807
Stage 1	-	-	-	-	-	-	583	567	-	712	669	-
Stage 2	-	-	-	-	-	-	694	658	-	587	525	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1330	-	-	1059	-	-	303	320	626	304	289	807
Mov Cap-2 Maneuver	-	-	-	-	-	-	303	320	-	304	289	-
Stage 1	-	-	-	-	-	-	574	558	-	701	646	-
Stage 2	-	-	-	-	-	-	659	635	-	561	517	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1	24.1	10.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	326	1330	-	-	1059	-	-	653
HCM Lane V/C Ratio	0.431	0.01	-	-	0.03	-	-	0.023
HCM Control Delay (s)	24.1	7.7	0	-	8.5	0	-	10.6
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.1	0	-	-	0.1	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	279	220	9	6	33
Future Vol, veh/h	52	279	220	9	6	33
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	62	332	262	11	7	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	273	0	-	0	724	269
Stage 1	-	-	-	-	268	-
Stage 2	-	-	-	-	456	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1290	-	-	-	396	775
Stage 1	-	-	-	-	782	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1290	-	-	-	373	774
Mov Cap-2 Maneuver	-	-	-	-	373	-
Stage 1	-	-	-	-	736	-
Stage 2	-	-	-	-	643	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	10.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1290	-	-	-	664
HCM Lane V/C Ratio	0.048	-	-	-	0.07
HCM Control Delay (s)	7.9	0	-	-	10.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	228	56	12	194	35	7
Future Vol, veh/h	228	56	12	194	35	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	271	67	14	231	42	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	338	0	564	305
Stage 1	-	-	-	-	305	-
Stage 2	-	-	-	-	259	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1227	-	487	735
Stage 1	-	-	-	-	748	-
Stage 2	-	-	-	-	784	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1227	-	481	735
Mov Cap-2 Maneuver	-	-	-	-	481	-
Stage 1	-	-	-	-	748	-
Stage 2	-	-	-	-	774	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	510	-	-	1227	-
HCM Lane V/C Ratio	0.098	-	-	0.012	-
HCM Control Delay (s)	12.8	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	574	185	178	1598	2463	957
Future Volume (veh/h)	574	185	178	1598	2463	957
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	592	188	184	1647	2539	975
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	579	423	177	2722	2251	1248
Arrive On Green	0.06	0.06	0.10	0.77	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	592	188	184	1647	2539	975
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.1	12.3	11.9	24.3	76.0	40.4
Cycle Q Clear(g_c), s	20.1	12.3	11.9	24.3	76.0	40.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	579	423	177	2722	2251	1248
V/C Ratio(X)	1.02	0.44	1.04	0.61	1.13	0.78
Avail Cap(c_a), veh/h	579	423	177	2722	2251	1248
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.50	0.50	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.7	41.7	54.0	6.1	22.0	6.4
Incr Delay (d2), s/veh	32.4	1.7	79.1	0.4	64.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.9	11.7	9.0	6.0	45.2	22.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	89.0	43.4	133.2	6.5	86.0	9.7
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	780			1831	3514	
Approach Delay, s/veh	78.0			19.2	64.8	
Approach LOS	E			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.1		95.9			15.9	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.6		91.4			11.4	75.5
Max Q Clear Time (g_c+I1), s		22.1		26.3			13.9	78.0
Green Ext Time (p_c), s		0.0		17.8			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	52.9
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	252	199	66	181	309	113	347	98	475	622	148
Future Volume (veh/h)	150	252	199	66	181	309	113	347	98	475	622	148
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	156	262	183	69	189	88	118	361	94	495	648	76
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	190	262	183	87	377	320	150	379	99	524	896	759
Arrive On Green	0.11	0.26	0.25	0.05	0.20	0.20	0.08	0.27	0.26	0.10	0.16	0.16
Sat Flow, veh/h	1781	1015	709	1795	1885	1598	1767	1412	368	1795	1885	1598
Grp Volume(v), veh/h	156	0	445	69	189	88	118	0	455	495	648	76
Grp Sat Flow(s),veh/h/ln	1781	0	1723	1795	1885	1598	1767	0	1780	1795	1885	1598
Q Serve(g_s), s	10.3	0.0	31.0	4.6	10.7	5.6	7.9	0.0	30.2	32.9	39.2	4.9
Cycle Q Clear(g_c), s	10.3	0.0	31.0	4.6	10.7	5.6	7.9	0.0	30.2	32.9	39.2	4.9
Prop In Lane	1.00		0.41	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	190	0	445	87	377	320	150	0	478	524	896	759
V/C Ratio(X)	0.82	0.00	1.00	0.80	0.50	0.28	0.79	0.00	0.95	0.95	0.72	0.10
Avail Cap(c_a), veh/h	214	0	445	87	377	320	171	0	478	524	896	759
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.46	0.46	0.46
Uniform Delay (d), s/veh	52.5	0.0	44.6	56.5	42.7	40.6	53.8	0.0	43.2	53.3	43.1	28.6
Incr Delay (d2), s/veh	20.2	0.0	42.6	38.5	1.0	0.5	19.0	0.0	30.9	15.4	2.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	18.2	3.0	5.1	2.2	4.2	0.0	16.8	18.0	20.3	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.7	0.0	87.2	95.0	43.7	41.1	72.8	0.0	74.1	68.6	45.5	28.7
LnGrp LOS	E	A	F	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		601			346			573			1219	
Approach Delay, s/veh		83.4			53.3			73.9			53.8	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.0	36.2	9.8	35.0	14.2	61.0	16.8	28.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	34.5	31.7	5.3	30.5	11.1	55.1	13.9	21.9
Max Q Clear Time (g_c+I1), s	34.9	32.2	6.6	33.0	9.9	41.2	12.3	12.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.6	0.1	0.8

Intersection Summary	
HCM 6th Ctrl Delay	64.4
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	169	70	11	264	0	167	1	27	1	0	19
Future Vol, veh/h	5	169	70	11	264	0	167	1	27	1	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	190	79	12	297	0	188	1	30	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	297	0	0	269	0	0	576	563	232	580	602	299
Stage 1	-	-	-	-	-	-	242	242	-	321	321	-
Stage 2	-	-	-	-	-	-	334	321	-	259	281	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1247	-	-	1277	-	-	431	438	812	429	416	745
Stage 1	-	-	-	-	-	-	766	709	-	695	655	-
Stage 2	-	-	-	-	-	-	684	655	-	750	682	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1247	-	-	1277	-	-	412	431	810	406	409	744
Mov Cap-2 Maneuver	-	-	-	-	-	-	412	431	-	406	409	-
Stage 1	-	-	-	-	-	-	761	705	-	691	648	-
Stage 2	-	-	-	-	-	-	656	648	-	715	678	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	20.9	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	442	1247	-	-	1277	-	-	714
HCM Lane V/C Ratio	0.496	0.005	-	-	0.01	-	-	0.031
HCM Control Delay (s)	20.9	7.9	0	-	7.8	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.7	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	185	246	2	3	31
Future Vol, veh/h	16	185	246	2	3	31
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	20	234	311	3	4	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	316	0	-	0	591	315
Stage 1	-	-	-	-	315	-
Stage 2	-	-	-	-	276	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1216	-	-	-	473	730
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	775	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1214	-	-	-	462	729
Mov Cap-2 Maneuver	-	-	-	-	462	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	773	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1214	-	-	-	694
HCM Lane V/C Ratio	0.017	-	-	-	0.062
HCM Control Delay (s)	8	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

HCM 6th TWSC
3: Street A & S Holcomb Boulevard

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	170	18	4	199	50	11
Future Vol, veh/h	170	18	4	199	50	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	215	23	5	252	63	14
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	238	0	489	227
Stage 1	-	-	-	-	227	-
Stage 2	-	-	-	-	262	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1306	-	538	812
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	782	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1306	-	536	812
Mov Cap-2 Maneuver	-	-	-	-	536	-
Stage 1	-	-	-	-	811	-
Stage 2	-	-	-	-	779	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		12.3	
HCM LOS					B	

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	571	-	-	1306	-
HCM Lane V/C Ratio	0.135	-	-	0.004	-
HCM Control Delay (s)	12.3	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	692	115	102	1940	1264	466
Future Volume (veh/h)	692	115	102	1940	1264	466
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	769	116	113	2156	1404	474
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	865	534	153	2217	1698	1144
Arrive On Green	0.25	0.25	0.09	0.64	0.50	0.50
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	769	116	113	2156	1404	474
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	16.3	4.0	4.8	44.4	26.3	8.4
Cycle Q Clear(g_c), s	16.3	4.0	4.8	44.4	26.3	8.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	865	534	153	2217	1698	1144
V/C Ratio(X)	0.89	0.22	0.74	0.97	0.83	0.41
Avail Cap(c_a), veh/h	865	534	179	2220	1698	1144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	17.5	33.3	12.9	16.1	3.4
Incr Delay (d2), s/veh	9.5	0.6	12.6	13.2	3.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	4.1	2.3	14.1	8.5	4.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.5	18.1	45.9	26.1	19.6	3.6
LnGrp LOS	D	B	D	C	B	A
Approach Vol, veh/h	885			2269	1878	
Approach Delay, s/veh	34.1			27.1	15.6	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.1		51.9			10.6	41.3
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.5		47.5			7.2	35.8
Max Q Clear Time (g_c+I1), s		18.3		46.4			6.8	28.3
Green Ext Time (p_c), s		0.1		1.0			0.0	5.5

Intersection Summary	
HCM 6th Ctrl Delay	24.0
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	100	65	48	206	382	178	399	28	192	338	73
Future Volume (veh/h)	67	100	65	48	206	382	178	399	28	192	338	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	74	111	32	53	229	55	198	443	27	213	376	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	111	205	59	99	274	229	257	629	38	271	679	575
Arrive On Green	0.07	0.16	0.15	0.06	0.15	0.15	0.14	0.36	0.35	0.16	0.37	0.00
Sat Flow, veh/h	1640	1277	368	1739	1826	1527	1781	1745	106	1739	1826	1547
Grp Volume(v), veh/h	74	0	143	53	229	55	198	0	470	213	376	0
Grp Sat Flow(s),veh/h/ln	1640	0	1645	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.8	1.8	7.3	1.9	6.4	0.0	13.1	7.1	9.8	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.8	1.8	7.3	1.9	6.4	0.0	13.1	7.1	9.8	0.0
Prop In Lane	1.00		0.22	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	111	0	263	99	274	229	257	0	667	271	679	575
V/C Ratio(X)	0.67	0.00	0.54	0.53	0.84	0.24	0.77	0.00	0.70	0.79	0.55	0.00
Avail Cap(c_a), veh/h	150	0	263	162	274	229	291	0	667	290	679	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	27.3	0.0	23.2	27.5	24.8	22.5	24.7	0.0	16.5	24.4	14.9	0.0
Incr Delay (d2), s/veh	6.8	0.0	2.3	4.4	19.7	0.5	10.6	0.0	6.2	11.4	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.9	0.8	4.4	0.7	3.1	0.0	5.6	3.4	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	0.0	25.5	31.9	44.5	23.0	35.4	0.0	22.6	35.8	17.8	0.0
LnGrp LOS	C	A	C	C	D	C	D	A	C	D	B	A
Approach Vol, veh/h		217			337			668			589	
Approach Delay, s/veh		28.4			39.0			26.4			24.3	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	25.6	7.4	13.6	12.7	26.3	8.0	13.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	19.0	5.1	8.4	9.3	19.2	5.0	8.5
Max Q Clear Time (g_c+I1), s	9.1	15.1	3.8	6.8	8.4	11.8	4.6	9.3
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	28.3
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

12/01/2021

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	307	188	33	223	0	123	0	20	2	0	12
Future Vol, veh/h	13	307	188	33	223	0	123	0	20	2	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	14	327	200	35	237	0	131	0	21	2	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	237	0	0	527	0	0	769	762	427	773	862	237
Stage 1	-	-	-	-	-	-	455	455	-	307	307	-
Stage 2	-	-	-	-	-	-	314	307	-	466	555	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1330	-	-	1045	-	-	313	330	619	319	295	807
Stage 1	-	-	-	-	-	-	577	562	-	707	665	-
Stage 2	-	-	-	-	-	-	688	654	-	581	516	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1330	-	-	1045	-	-	295	313	619	295	279	807
Mov Cap-2 Maneuver	-	-	-	-	-	-	295	313	-	295	279	-
Stage 1	-	-	-	-	-	-	568	554	-	696	639	-
Stage 2	-	-	-	-	-	-	651	628	-	553	508	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.1	26.3	10.7
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	318	1330	-	-	1045	-	-	647
HCM Lane V/C Ratio	0.478	0.01	-	-	0.034	-	-	0.023
HCM Control Delay (s)	26.3	7.7	0	-	8.6	0	-	10.7
HCM Lane LOS	D	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.5	0	-	-	0.1	-	-	0.1

HCM 6th TWSC
2: S Holcomb Boulevard & S Barlow Drive

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	281	223	9	6	33
Future Vol, veh/h	52	281	223	9	6	33
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	62	335	265	11	7	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	276	0	-	0	730	272
Stage 1	-	-	-	-	271	-
Stage 2	-	-	-	-	459	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1287	-	-	-	392	772
Stage 1	-	-	-	-	779	-
Stage 2	-	-	-	-	641	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1287	-	-	-	369	771
Mov Cap-2 Maneuver	-	-	-	-	369	-
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	641	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1287	-	-	-	660
HCM Lane V/C Ratio	0.048	-	-	-	0.07
HCM Control Delay (s)	7.9	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	230	56	12	197	35	7
Future Vol, veh/h	230	56	12	197	35	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	274	67	14	235	42	8

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	341	0	571	308
Stage 1	-	-	-	-	308	-
Stage 2	-	-	-	-	263	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1224	-	482	732
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	781	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1224	-	476	732
Mov Cap-2 Maneuver	-	-	-	-	476	-
Stage 1	-	-	-	-	745	-
Stage 2	-	-	-	-	771	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	505	-	-	1224	-
HCM Lane V/C Ratio	0.099	-	-	0.012	-
HCM Control Delay (s)	12.9	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	579	186	179	1598	2463	964
Future Volume (veh/h)	579	186	179	1598	2463	964
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	597	189	185	1647	2539	981
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	423	178	2724	2251	1247
Arrive On Green	0.06	0.06	0.10	0.77	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	597	189	185	1647	2539	981
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.0	12.4	12.0	24.2	76.0	41.3
Cycle Q Clear(g_c), s	20.0	12.4	12.0	24.2	76.0	41.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	576	423	178	2724	2251	1247
V/C Ratio(X)	1.04	0.45	1.04	0.60	1.13	0.79
Avail Cap(c_a), veh/h	576	423	178	2724	2251	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.49	0.49	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.7	41.7	54.0	6.1	22.0	6.5
Incr Delay (d2), s/veh	36.2	1.7	77.9	0.4	64.0	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	11.7	9.0	5.9	45.2	23.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	92.9	43.4	131.9	6.5	86.0	10.0
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	786			1832	3520	
Approach Delay, s/veh	81.0			19.1	64.8	
Approach LOS	F			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.0		96.0			16.0	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.5		91.5			11.5	75.5
Max Q Clear Time (g_c+I1), s		22.0		26.2			14.0	78.0
Green Ext Time (p_c), s		0.0		17.8			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	53.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	256	199	66	184	315	113	347	99	483	622	148
Future Volume (veh/h)	150	256	199	66	184	315	113	347	99	483	622	148
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	156	267	184	69	192	93	118	361	95	503	648	76
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	190	264	182	87	377	320	150	373	98	530	896	759
Arrive On Green	0.11	0.26	0.25	0.05	0.20	0.20	0.08	0.26	0.26	0.10	0.16	0.16
Sat Flow, veh/h	1781	1021	703	1795	1885	1598	1767	1409	371	1795	1885	1598
Grp Volume(v), veh/h	156	0	451	69	192	93	118	0	456	503	648	76
Grp Sat Flow(s),veh/h/ln	1781	0	1724	1795	1885	1598	1767	0	1779	1795	1885	1598
Q Serve(g_s), s	10.3	0.0	31.0	4.6	10.9	5.9	7.9	0.0	30.4	33.4	39.2	4.9
Cycle Q Clear(g_c), s	10.3	0.0	31.0	4.6	10.9	5.9	7.9	0.0	30.4	33.4	39.2	4.9
Prop In Lane	1.00		0.41	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	190	0	445	87	377	320	150	0	471	530	896	759
V/C Ratio(X)	0.82	0.00	1.01	0.80	0.51	0.29	0.79	0.00	0.97	0.95	0.72	0.10
Avail Cap(c_a), veh/h	214	0	445	87	377	320	171	0	471	530	896	759
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.45	0.45	0.45
Uniform Delay (d), s/veh	52.5	0.0	44.6	56.5	42.7	40.8	53.8	0.0	43.6	53.3	43.1	28.6
Incr Delay (d2), s/veh	20.2	0.0	45.8	38.5	1.1	0.5	19.0	0.0	34.0	15.7	2.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	18.7	3.0	5.2	2.4	4.2	0.0	17.3	18.3	20.3	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.7	0.0	90.4	95.0	43.9	41.3	72.8	0.0	77.7	69.0	45.4	28.7
LnGrp LOS	E	A	F	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		607			354			574			1227	
Approach Delay, s/veh		85.9			53.2			76.7			54.0	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.4	35.8	9.8	35.0	14.2	61.0	16.8	28.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	34.9	31.3	5.3	30.5	11.1	55.1	13.9	21.9
Max Q Clear Time (g_c+I1), s	35.4	32.4	6.6	33.0	9.9	41.2	12.3	12.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.6	0.1	0.9

Intersection Summary	
HCM 6th Ctrl Delay	65.6
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	171	70	11	268	0	167	1	27	1	0	19
Future Vol, veh/h	5	171	70	11	268	0	167	1	27	1	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	192	79	12	301	0	188	1	30	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	301	0	0	271	0	0	582	569	234	586	608	303
Stage 1	-	-	-	-	-	-	244	244	-	325	325	-
Stage 2	-	-	-	-	-	-	338	325	-	261	283	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1243	-	-	1275	-	-	427	435	810	425	413	741
Stage 1	-	-	-	-	-	-	764	708	-	692	653	-
Stage 2	-	-	-	-	-	-	681	653	-	748	681	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1243	-	-	1275	-	-	409	428	808	402	406	740
Mov Cap-2 Maneuver	-	-	-	-	-	-	409	428	-	402	406	-
Stage 1	-	-	-	-	-	-	759	704	-	688	646	-
Stage 2	-	-	-	-	-	-	653	646	-	713	677	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	21.1	10.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	439	1243	-	-	1275	-	-	710
HCM Lane V/C Ratio	0.499	0.005	-	-	0.01	-	-	0.032
HCM Control Delay (s)	21.1	7.9	0	-	7.9	0	-	10.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.7	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	187	250	2	3	31
Future Vol, veh/h	16	187	250	2	3	31
Conflicting Peds, #/hr	2	0	0	2	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	0	0
Mvmt Flow	20	237	316	3	4	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	321	0	-	0	599	320
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	279	-
Critical Hdwy	4.17	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.263	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1211	-	-	-	468	725
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	773	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1209	-	-	-	457	724
Mov Cap-2 Maneuver	-	-	-	-	457	-
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	771	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1209	-	-	-	689
HCM Lane V/C Ratio	0.017	-	-	-	0.062
HCM Control Delay (s)	8	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.9					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	170	20	4	199	54	12
Future Vol, veh/h	170	20	4	199	54	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	7	7	6	6	2	2
Mvmt Flow	215	25	5	252	68	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	240	0	490	228
Stage 1	-	-	-	-	228	-
Stage 2	-	-	-	-	262	-
Critical Hdwy	-	-	4.16	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.254	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1304	-	537	811
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	782	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1304	-	535	811
Mov Cap-2 Maneuver	-	-	-	-	535	-
Stage 1	-	-	-	-	810	-
Stage 2	-	-	-	-	779	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	570	-	-	1304	-
HCM Lane V/C Ratio	0.147	-	-	0.004	-
HCM Control Delay (s)	12.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	694	115	102	1940	1264	467
Future Volume (veh/h)	694	115	102	1940	1264	467
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	771	116	113	2156	1404	475
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	865	534	153	2217	1698	1144
Arrive On Green	0.25	0.25	0.09	0.64	0.50	0.50
Sat Flow, veh/h	3401	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	771	116	113	2156	1404	475
Grp Sat Flow(s),veh/h/ln	1700	1560	1739	1735	1706	1522
Q Serve(g_s), s	16.4	4.0	4.8	44.4	26.3	8.4
Cycle Q Clear(g_c), s	16.4	4.0	4.8	44.4	26.3	8.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	865	534	153	2217	1698	1144
V/C Ratio(X)	0.89	0.22	0.74	0.97	0.83	0.42
Avail Cap(c_a), veh/h	865	534	179	2220	1698	1144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	17.5	33.3	12.9	16.1	3.4
Incr Delay (d2), s/veh	9.7	0.6	12.6	13.2	3.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	4.1	2.3	14.1	8.5	4.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	36.7	18.1	45.9	26.1	19.6	3.6
LnGrp LOS	D	B	D	C	B	A
Approach Vol, veh/h	887			2269	1879	
Approach Delay, s/veh	34.2			27.1	15.6	
Approach LOS	C			C	B	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.1		51.9			10.6	41.3
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		18.5		47.5			7.2	35.8
Max Q Clear Time (g_c+I1), s		18.4		46.4			6.8	28.3
Green Ext Time (p_c), s		0.0		1.0			0.0	5.5

Intersection Summary		
HCM 6th Ctrl Delay		24.1
HCM 6th LOS		C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	101	65	48	207	384	178	399	28	193	338	73
Future Volume (veh/h)	67	101	65	48	207	384	178	399	28	193	338	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	74	112	33	53	230	56	198	443	27	214	376	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	111	203	60	99	274	229	257	628	38	272	679	575
Arrive On Green	0.07	0.16	0.15	0.06	0.15	0.15	0.14	0.36	0.35	0.16	0.37	0.00
Sat Flow, veh/h	1640	1270	374	1739	1826	1527	1781	1745	106	1739	1826	1547
Grp Volume(v), veh/h	74	0	145	53	230	56	198	0	470	214	376	0
Grp Sat Flow(s),veh/h/ln	1640	0	1644	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	0.0	4.9	1.8	7.4	1.9	6.4	0.0	13.1	7.1	9.8	0.0
Cycle Q Clear(g_c), s	2.6	0.0	4.9	1.8	7.4	1.9	6.4	0.0	13.1	7.1	9.8	0.0
Prop In Lane	1.00		0.23	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	111	0	263	99	274	229	257	0	666	272	679	575
V/C Ratio(X)	0.67	0.00	0.55	0.53	0.84	0.24	0.77	0.00	0.71	0.79	0.55	0.00
Avail Cap(c_a), veh/h	150	0	263	162	274	229	291	0	666	290	679	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.89	0.89	0.00
Uniform Delay (d), s/veh	27.3	0.0	23.3	27.5	24.8	22.5	24.7	0.0	16.5	24.4	14.9	0.0
Incr Delay (d2), s/veh	6.8	0.0	2.4	4.4	20.2	0.5	10.6	0.0	6.2	11.5	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	1.9	0.8	4.4	0.7	3.1	0.0	5.6	3.4	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	0.0	25.7	31.9	45.0	23.0	35.4	0.0	22.7	35.9	17.8	0.0
LnGrp LOS	C	A	C	C	D	C	D	A	C	D	B	A
Approach Vol, veh/h		219			339			668			590	
Approach Delay, s/veh		28.6			39.3			26.4			24.4	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.4	25.6	7.4	13.6	12.7	26.3	8.0	13.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.5	19.0	5.1	8.4	9.3	19.2	5.0	8.5
Max Q Clear Time (g_c+I1), s	9.1	15.1	3.8	6.9	8.4	11.8	4.6	9.4
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	28.4
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	313	188	33	225	0	123	0	20	2	0	12
Future Vol, veh/h	13	313	188	33	225	0	123	0	20	2	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	14	333	200	35	239	0	131	0	21	2	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	239	0	0	533	0	0	777	770	433	781	870	239
Stage 1	-	-	-	-	-	-	461	461	-	309	309	-
Stage 2	-	-	-	-	-	-	316	309	-	472	561	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1328	-	-	1040	-	-	309	326	614	315	292	805
Stage 1	-	-	-	-	-	-	573	559	-	705	663	-
Stage 2	-	-	-	-	-	-	687	652	-	576	513	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1328	-	-	1040	-	-	292	309	614	292	277	805
Mov Cap-2 Maneuver	-	-	-	-	-	-	292	309	-	292	277	-
Stage 1	-	-	-	-	-	-	564	551	-	694	637	-
Stage 2	-	-	-	-	-	-	650	627	-	548	505	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.1	26.7	10.7
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	315	1328	-	-	1040	-	-	643
HCM Lane V/C Ratio	0.483	0.01	-	-	0.034	-	-	0.023
HCM Control Delay (s)	26.7	7.7	0	-	8.6	0	-	10.7
HCM Lane LOS	D	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.5	0	-	-	0.1	-	-	0.1

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	52	287	225	9	6	33
Future Vol, veh/h	52	287	225	9	6	33
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	62	342	268	11	7	39

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	279	0	-	0	740	275
Stage 1	-	-	-	-	274	-
Stage 2	-	-	-	-	466	-
Critical Hdwy	4.12	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.218	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1284	-	-	-	387	769
Stage 1	-	-	-	-	777	-
Stage 2	-	-	-	-	636	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1284	-	-	-	364	768
Mov Cap-2 Maneuver	-	-	-	-	364	-
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	636	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1284	-	-	-	656
HCM Lane V/C Ratio	0.048	-	-	-	0.071
HCM Control Delay (s)	7.9	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

HCM 6th TWSC
3: Street A & S Holcomb Boulevard

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	230	62	13	197	37	8
Future Vol, veh/h	230	62	13	197	37	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	274	74	15	235	44	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	348	0	576	311
Stage 1	-	-	-	-	311	-
Stage 2	-	-	-	-	265	-
Critical Hdwy	-	-	4.11	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.209	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1216	-	479	729
Stage 1	-	-	-	-	743	-
Stage 2	-	-	-	-	779	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1216	-	472	729
Mov Cap-2 Maneuver	-	-	-	-	472	-
Stage 1	-	-	-	-	743	-
Stage 2	-	-	-	-	768	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	13
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	504	-	-	1216	-
HCM Lane V/C Ratio	0.106	-	-	0.013	-
HCM Control Delay (s)	13	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	580	186	180	1598	2463	967
Future Volume (veh/h)	580	186	180	1598	2463	967
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	598	189	186	1647	2539	985
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	423	178	2724	2251	1247
Arrive On Green	0.06	0.06	0.10	0.77	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	598	189	186	1647	2539	985
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.0	12.4	12.0	24.2	76.0	41.7
Cycle Q Clear(g_c), s	20.0	12.4	12.0	24.2	76.0	41.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	576	423	178	2724	2251	1247
V/C Ratio(X)	1.04	0.45	1.04	0.60	1.13	0.79
Avail Cap(c_a), veh/h	576	423	178	2724	2251	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.7	41.7	54.0	6.1	22.0	6.6
Incr Delay (d2), s/veh	36.5	1.6	79.6	0.4	64.0	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.2	11.7	9.1	5.9	45.2	23.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	93.2	43.4	133.6	6.5	86.0	10.1
LnGrp LOS	F	D	F	A	F	B
Approach Vol, veh/h	787			1833	3524	
Approach Delay, s/veh	81.2			19.4	64.8	
Approach LOS	F			B	E	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.0		96.0			16.0	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.5		91.5			11.5	75.5
Max Q Clear Time (g_c+I1), s		22.0		26.2			14.0	78.0
Green Ext Time (p_c), s		0.0		17.8			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	53.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/03/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	258	199	66	185	316	113	347	99	487	622	148
Future Volume (veh/h)	150	258	199	66	185	316	113	347	99	487	622	148
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	156	269	184	69	193	95	118	361	95	507	648	76
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	190	265	181	87	377	320	150	371	98	533	896	759
Arrive On Green	0.11	0.26	0.25	0.05	0.20	0.20	0.08	0.26	0.26	0.10	0.16	0.16
Sat Flow, veh/h	1781	1024	701	1795	1885	1598	1767	1409	371	1795	1885	1598
Grp Volume(v), veh/h	156	0	453	69	193	95	118	0	456	507	648	76
Grp Sat Flow(s),veh/h/ln	1781	0	1725	1795	1885	1598	1767	0	1779	1795	1885	1598
Q Serve(g_s), s	10.3	0.0	31.0	4.6	10.9	6.1	7.9	0.0	30.5	33.7	39.2	4.9
Cycle Q Clear(g_c), s	10.3	0.0	31.0	4.6	10.9	6.1	7.9	0.0	30.5	33.7	39.2	4.9
Prop In Lane	1.00		0.41	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	190	0	446	87	377	320	150	0	469	533	896	759
V/C Ratio(X)	0.82	0.00	1.02	0.80	0.51	0.30	0.79	0.00	0.97	0.95	0.72	0.10
Avail Cap(c_a), veh/h	214	0	446	87	377	320	171	0	469	533	896	759
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.45	0.45	0.45
Uniform Delay (d), s/veh	52.5	0.0	44.6	56.5	42.8	40.8	53.8	0.0	43.8	53.3	43.1	28.6
Incr Delay (d2), s/veh	20.2	0.0	46.9	38.5	1.2	0.5	19.0	0.0	35.4	16.0	2.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	18.8	3.0	5.2	2.4	4.2	0.0	17.5	18.5	20.3	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.7	0.0	91.5	95.0	43.9	41.3	72.8	0.0	79.3	69.3	45.4	28.7
LnGrp LOS	E	A	F	F	D	D	E	A	E	E	D	C
Approach Vol, veh/h		609			357			574			1231	
Approach Delay, s/veh		86.7			53.1			77.9			54.2	
Approach LOS		F			D			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.6	35.6	9.8	35.0	14.2	61.0	16.8	28.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	35.1	31.1	5.3	30.5	11.1	55.1	13.9	21.9
Max Q Clear Time (g_c+I1), s	35.7	32.5	6.6	33.0	9.9	41.2	12.3	12.9
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	3.6	0.1	0.9

Intersection Summary			
HCM 6th Ctrl Delay			66.1
HCM 6th LOS			E

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th TWSC
1: S Winston Drive & S Holcomb Boulevard 12/01/2021

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	207	37	0	363	0	75	1	5	1	0	19
Future Vol, veh/h	5	207	37	0	363	0	75	1	5	1	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0	2	0	2	2	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	5	5	5	5	5	5	0	0	0	0	0	0
Mvmt Flow	6	233	42	0	408	0	84	1	6	1	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	408	0	0	275	0	0	687	674	256	680	695	410
Stage 1	-	-	-	-	-	-	266	266	-	408	408	-
Stage 2	-	-	-	-	-	-	421	408	-	272	287	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1135	-	-	1271	-	-	364	379	788	368	368	646
Stage 1	-	-	-	-	-	-	744	692	-	624	600	-
Stage 2	-	-	-	-	-	-	614	600	-	738	678	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1135	-	-	1271	-	-	350	377	786	362	366	645
Mov Cap-2 Maneuver	-	-	-	-	-	-	350	377	-	362	366	-
Stage 1	-	-	-	-	-	-	740	688	-	620	600	-
Stage 2	-	-	-	-	-	-	593	600	-	726	674	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	18.2	11
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	363	1135	-	-	1271	-	-	621
HCM Lane V/C Ratio	0.251	0.005	-	-	-	-	-	0.036
HCM Control Delay (s)	18.2	8.2	0	-	0	-	-	11
HCM Lane LOS	C	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	16	145	56	12	185	2	149	0	31	3	0	31
Future Vol, veh/h	16	145	56	12	185	2	149	0	31	3	0	31
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	7	7	7	6	6	6	0	0	0	0	0	0
Mvmt Flow	20	184	71	15	234	3	189	0	39	4	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	239	0	0	255	0	0	545	529	222	549	563	238
Stage 1	-	-	-	-	-	-	260	260	-	268	268	-
Stage 2	-	-	-	-	-	-	285	269	-	281	295	-
Critical Hdwy	4.17	-	-	4.16	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.263	-	-	2.254	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1299	-	-	1287	-	-	452	458	823	450	438	806
Stage 1	-	-	-	-	-	-	749	697	-	742	691	-
Stage 2	-	-	-	-	-	-	727	690	-	730	673	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1297	-	-	1287	-	-	420	443	821	417	424	804
Mov Cap-2 Maneuver	-	-	-	-	-	-	420	443	-	417	424	-
Stage 1	-	-	-	-	-	-	736	684	-	727	681	-
Stage 2	-	-	-	-	-	-	683	680	-	681	661	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.5	20.3	10.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	459	1297	-	-	1287	-	-	743
HCM Lane V/C Ratio	0.496	0.016	-	-	0.012	-	-	0.058
HCM Control Delay (s)	20.3	7.8	0	-	7.8	0	-	10.1
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.7	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	417	81	12	291	0	58	0	4	2	0	12
Future Vol, veh/h	13	417	81	12	291	0	58	0	4	2	0	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	1	1	1	6	6	6	0	0	0
Mvmt Flow	14	444	86	13	310	0	62	0	4	2	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	310	0	0	530	0	0	858	851	487	853	894	310
Stage 1	-	-	-	-	-	-	515	515	-	336	336	-
Stage 2	-	-	-	-	-	-	343	336	-	517	558	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.16	6.56	6.26	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.56	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.554	4.054	3.354	3.5	4	3.3
Pot Cap-1 Maneuver	1250	-	-	1042	-	-	273	293	572	281	283	735
Stage 1	-	-	-	-	-	-	535	528	-	682	645	-
Stage 2	-	-	-	-	-	-	664	635	-	545	515	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1250	-	-	1042	-	-	262	284	572	272	274	735
Mov Cap-2 Maneuver	-	-	-	-	-	-	262	284	-	272	274	-
Stage 1	-	-	-	-	-	-	526	520	-	671	635	-
Stage 2	-	-	-	-	-	-	643	625	-	532	507	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	22.5	11.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	271	1250	-	-	1042	-	-	591
HCM Lane V/C Ratio	0.243	0.011	-	-	0.012	-	-	0.025
HCM Control Delay (s)	22.5	7.9	0	-	8.5	0	-	11.2
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.9	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	52	209	166	37	167	9	103	0	23	6	0	33
Future Vol, veh/h	52	209	166	37	167	9	103	0	23	6	0	33
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	2	2	2	1	1	1	0	0	0	0	0	0
Mvmt Flow	62	249	198	44	199	11	123	0	27	7	0	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	210	0	0	447	0	0	785	770	348	779	864	206
Stage 1	-	-	-	-	-	-	472	472	-	293	293	-
Stage 2	-	-	-	-	-	-	313	298	-	486	571	-
Critical Hdwy	4.12	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.218	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1361	-	-	1119	-	-	313	333	700	316	294	840
Stage 1	-	-	-	-	-	-	576	562	-	719	674	-
Stage 2	-	-	-	-	-	-	702	671	-	566	508	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1361	-	-	1119	-	-	274	298	700	279	263	839
Mov Cap-2 Maneuver	-	-	-	-	-	-	274	298	-	279	263	-
Stage 1	-	-	-	-	-	-	540	527	-	674	644	-
Stage 2	-	-	-	-	-	-	638	641	-	510	477	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	1.5	27.3	11.1
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	308	1361	-	-	1119	-	-	641
HCM Lane V/C Ratio	0.487	0.045	-	-	0.039	-	-	0.072
HCM Control Delay (s)	27.3	7.8	0	-	8.3	0	-	11.1
HCM Lane LOS	D	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2.5	0.1	-	-	0.1	-	-	0.2

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	493	159	151	1506	2232	762
Future Volume (veh/h)	493	159	151	1506	2232	762
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	519	162	159	1585	2349	787
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	570	409	166	2730	2280	1257
Arrive On Green	0.05	0.05	0.09	0.77	0.64	0.64
Sat Flow, veh/h	3456	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	519	162	159	1585	2349	787
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1552
Q Serve(g_s), s	17.9	10.7	10.7	22.4	77.0	23.9
Cycle Q Clear(g_c), s	17.9	10.7	10.7	22.4	77.0	23.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	570	409	166	2730	2280	1257
V/C Ratio(X)	0.91	0.40	0.96	0.58	1.03	0.63
Avail Cap(c_a), veh/h	570	409	166	2730	2280	1257
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.8	41.9	54.2	5.8	21.5	4.6
Incr Delay (d2), s/veh	11.9	1.4	56.8	0.3	27.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.2	10.1	7.2	5.5	33.8	13.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	67.7	43.2	111.0	6.1	48.6	5.5
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	681			1744	3136	
Approach Delay, s/veh	61.9			15.7	37.8	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		23.8		96.2			15.2	81.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.3		91.7			10.7	76.5
Max Q Clear Time (g_c+I1), s		19.9		24.4			12.7	79.0
Green Ext Time (p_c), s		0.0		16.6			0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			33.8
HCM 6th LOS			C

Notes
User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	501	161	154	1506	2232	776
Future Volume (veh/h)	501	161	154	1506	2232	776
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	527	164	162	1585	2349	802
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	567	409	168	2733	2280	1256
Arrive On Green	0.05	0.05	0.09	0.77	0.64	0.64
Sat Flow, veh/h	3456	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	527	164	162	1585	2349	802
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1552
Q Serve(g_s), s	18.2	10.8	10.9	22.3	77.0	24.9
Cycle Q Clear(g_c), s	18.2	10.8	10.9	22.3	77.0	24.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	567	409	168	2733	2280	1256
V/C Ratio(X)	0.93	0.40	0.97	0.58	1.03	0.64
Avail Cap(c_a), veh/h	567	409	168	2733	2280	1256
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	41.9	54.2	5.8	21.5	4.7
Incr Delay (d2), s/veh	13.9	1.4	59.2	0.3	27.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.5	10.2	7.4	5.4	33.8	13.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	69.9	43.3	113.3	6.1	48.6	5.8
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	691			1747	3151	
Approach Delay, s/veh	63.6			16.0	37.7	
Approach LOS	E			B	D	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	23.7	96.3	15.3	81.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.2	91.8	10.8	76.5
Max Q Clear Time (g_c+I1), s	20.2	24.3	12.9	79.0
Green Ext Time (p_c), s	0.0	16.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	34.1
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	505	162	155	1520	2252	783
Future Volume (veh/h)	505	162	155	1520	2252	783
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	532	166	163	1600	2371	809
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	593	423	169	2707	2251	1255
Arrive On Green	0.06	0.06	0.09	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	532	166	163	1600	2371	809
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	18.4	10.9	10.9	23.4	76.0	25.5
Cycle Q Clear(g_c), s	18.4	10.9	10.9	23.4	76.0	25.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	593	423	169	2707	2251	1255
V/C Ratio(X)	0.90	0.39	0.96	0.59	1.05	0.64
Avail Cap(c_a), veh/h	593	423	169	2707	2251	1255
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.5	41.3	54.1	6.2	22.0	4.8
Incr Delay (d2), s/veh	10.3	1.3	58.2	0.3	34.9	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.3	10.3	7.4	5.9	36.1	14.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	65.9	42.6	112.2	6.5	56.9	5.9
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	698			1763	3180	
Approach Delay, s/veh	60.4			16.3	43.9	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.6		95.4			15.4	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.1		90.9			10.9	75.5
Max Q Clear Time (g_c+I1), s		20.4		25.4			12.9	78.0
Green Ext Time (p_c), s		0.0		16.8			0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			37.3
HCM 6th LOS			D

Notes
User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	533	167	164	1520	2252	827
Future Volume (veh/h)	533	167	164	1520	2252	827
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	561	172	173	1600	2371	855
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	423	178	2724	2251	1247
Arrive On Green	0.06	0.06	0.10	0.77	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	561	172	173	1600	2371	855
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	19.5	11.2	11.6	22.9	76.0	29.5
Cycle Q Clear(g_c), s	19.5	11.2	11.6	22.9	76.0	29.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	576	423	178	2724	2251	1247
V/C Ratio(X)	0.97	0.41	0.97	0.59	1.05	0.69
Avail Cap(c_a), veh/h	576	423	178	2724	2251	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.4	41.3	53.8	5.9	22.0	5.3
Incr Delay (d2), s/veh	20.5	1.4	58.8	0.3	34.9	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.6	10.7	7.9	5.6	36.1	16.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	76.9	42.7	112.6	6.3	56.9	6.9
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	733			1773	3226	
Approach Delay, s/veh	68.9			16.6	43.7	
Approach LOS	E			B	D	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	24.0	96.0	16.0	80.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	91.5	11.5	75.5
Max Q Clear Time (g_c+I1), s	21.5	24.9	13.6	78.0
Green Ext Time (p_c), s	0.0	16.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	38.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	534	168	164	1525	2259	829
Future Volume (veh/h)	534	168	164	1525	2259	829
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	562	173	173	1605	2378	857
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	423	178	2724	2251	1247
Arrive On Green	0.06	0.06	0.10	0.77	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	562	173	173	1605	2378	857
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	19.5	11.3	11.6	23.1	76.0	29.6
Cycle Q Clear(g_c), s	19.5	11.3	11.6	23.1	76.0	29.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	576	423	178	2724	2251	1247
V/C Ratio(X)	0.98	0.41	0.97	0.59	1.06	0.69
Avail Cap(c_a), veh/h	576	423	178	2724	2251	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.5	41.3	53.8	6.0	22.0	5.4
Incr Delay (d2), s/veh	20.8	1.4	58.8	0.3	36.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.7	10.7	7.9	5.6	36.5	16.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	77.2	42.7	112.6	6.3	58.0	7.0
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	735			1778	3235	
Approach Delay, s/veh	69.1			16.6	44.5	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.0		96.0			16.0	80.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		19.5		91.5			11.5	75.5
Max Q Clear Time (g_c+I1), s		21.5		25.1			13.6	78.0
Green Ext Time (p_c), s		0.0		17.0			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	39.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	541	170	166	1525	2259	840
Future Volume (veh/h)	541	170	166	1525	2259	840
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	569	175	175	1605	2378	869
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	605	436	178	2695	2221	1247
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	569	175	175	1605	2378	869
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	19.7	11.4	11.8	23.9	75.0	30.6
Cycle Q Clear(g_c), s	19.7	11.4	11.8	23.9	75.0	30.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	605	436	178	2695	2221	1247
V/C Ratio(X)	0.94	0.40	0.98	0.60	1.07	0.70
Avail Cap(c_a), veh/h	605	436	178	2695	2221	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.9	40.7	53.9	6.4	22.5	5.5
Incr Delay (d2), s/veh	14.7	1.3	62.1	0.4	41.3	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.3	10.8	8.1	6.0	37.8	17.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	70.6	42.1	116.0	6.7	63.8	7.2
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	744			1780	3247	
Approach Delay, s/veh	63.9			17.5	48.6	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		25.0		95.0			16.0	79.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.5		90.5			11.5	74.5
Max Q Clear Time (g_c+I1), s		21.7		25.9			13.8	77.0
Green Ext Time (p_c), s		0.0		16.9			0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			41.0
HCM 6th LOS			D

Notes
User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	543	171	167	1534	2273	844
Future Volume (veh/h)	543	171	167	1534	2273	844
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	572	176	176	1615	2393	873
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	576	423	178	2724	2251	1247
Arrive On Green	0.06	0.06	0.10	0.77	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	572	176	176	1615	2393	873
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	19.9	11.5	11.8	23.3	76.0	30.9
Cycle Q Clear(g_c), s	19.9	11.5	11.8	23.3	76.0	30.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	576	423	178	2724	2251	1247
V/C Ratio(X)	0.99	0.42	0.99	0.59	1.06	0.70
Avail Cap(c_a), veh/h	576	423	178	2724	2251	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.6	41.4	53.9	6.0	22.0	5.5
Incr Delay (d2), s/veh	24.4	1.5	63.8	0.3	38.4	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.1	10.9	8.2	5.7	37.2	17.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	81.0	42.8	117.7	6.3	60.4	7.3
LnGrp LOS	F	D	F	A	F	A
Approach Vol, veh/h	748			1791	3266	
Approach Delay, s/veh	72.0			17.3	46.2	
Approach LOS	E			B	D	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	24.0	96.0	16.0	80.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	91.5	11.5	75.5
Max Q Clear Time (g_c+I1), s	21.9	25.3	13.8	78.0
Green Ext Time (p_c), s	0.0	17.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	40.6
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	550	173	169	1534	2273	855
Future Volume (veh/h)	550	173	169	1534	2273	855
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	579	179	178	1615	2393	885
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	605	436	178	2695	2221	1247
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	579	179	178	1615	2393	885
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.1	11.7	12.0	24.2	75.0	31.9
Cycle Q Clear(g_c), s	20.1	11.7	12.0	24.2	75.0	31.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	605	436	178	2695	2221	1247
V/C Ratio(X)	0.96	0.41	1.00	0.60	1.08	0.71
Avail Cap(c_a), veh/h	605	436	178	2695	2221	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	40.8	54.0	6.4	22.5	5.6
Incr Delay (d2), s/veh	17.0	1.4	67.2	0.4	43.8	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.7	11.1	8.5	6.1	38.6	18.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	73.1	42.2	121.2	6.8	66.3	7.5
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	758			1793	3278	
Approach Delay, s/veh	65.8			18.2	50.4	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		25.0		95.0			16.0	79.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.5		90.5			11.5	74.5
Max Q Clear Time (g_c+I1), s		22.1		26.2			14.0	77.0
Green Ext Time (p_c), s		0.0		17.1			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	42.5
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	552	173	169	1539	2279	857
Future Volume (veh/h)	552	173	169	1539	2279	857
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	581	179	178	1620	2399	887
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	605	436	178	2695	2221	1247
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	581	179	178	1620	2399	887
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.1	11.7	12.0	24.3	75.0	32.0
Cycle Q Clear(g_c), s	20.1	11.7	12.0	24.3	75.0	32.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	605	436	178	2695	2221	1247
V/C Ratio(X)	0.96	0.41	1.00	0.60	1.08	0.71
Avail Cap(c_a), veh/h	605	436	178	2695	2221	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.1	40.8	54.0	6.4	22.5	5.6
Incr Delay (d2), s/veh	17.5	1.4	67.2	0.4	44.8	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.8	11.1	8.5	6.1	38.9	18.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	73.7	42.2	121.2	6.8	67.3	7.5
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	760			1798	3286	
Approach Delay, s/veh	66.3			18.1	51.2	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		25.0		95.0			16.0	79.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.5		90.5			11.5	74.5
Max Q Clear Time (g_c+I1), s		22.1		26.3			14.0	77.0
Green Ext Time (p_c), s		0.0		17.2			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	43.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	557	174	170	1539	2279	864
Future Volume (veh/h)	557	174	170	1539	2279	864
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	586	180	179	1620	2399	894
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	605	436	178	2695	2221	1247
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	586	180	179	1620	2399	894
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.3	11.7	12.0	24.3	75.0	32.6
Cycle Q Clear(g_c), s	20.3	11.7	12.0	24.3	75.0	32.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	605	436	178	2695	2221	1247
V/C Ratio(X)	0.97	0.41	1.00	0.60	1.08	0.72
Avail Cap(c_a), veh/h	605	436	178	2695	2221	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.2	40.9	54.0	6.4	22.5	5.7
Incr Delay (d2), s/veh	18.9	1.4	68.7	0.4	44.8	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	11.1	8.5	6.1	38.9	18.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	75.2	42.3	122.7	6.8	67.3	7.7
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	766			1799	3293	
Approach Delay, s/veh	67.4			18.3	51.1	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		25.0		95.0			16.0	79.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.5		90.5			11.5	74.5
Max Q Clear Time (g_c+I1), s		22.3		26.3			14.0	77.0
Green Ext Time (p_c), s		0.0		17.2			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	43.2
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/03/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	558	174	171	1539	2279	867
Future Volume (veh/h)	558	174	171	1539	2279	867
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	587	180	180	1620	2399	899
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	605	436	178	2695	2221	1247
Arrive On Green	0.06	0.06	0.10	0.76	0.63	0.63
Sat Flow, veh/h	3456	1585	1781	3647	3647	1551
Grp Volume(v), veh/h	587	180	180	1620	2399	899
Grp Sat Flow(s),veh/h/ln	1728	1585	1781	1777	1777	1551
Q Serve(g_s), s	20.3	11.7	12.0	24.3	75.0	33.1
Cycle Q Clear(g_c), s	20.3	11.7	12.0	24.3	75.0	33.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	605	436	178	2695	2221	1247
V/C Ratio(X)	0.97	0.41	1.01	0.60	1.08	0.72
Avail Cap(c_a), veh/h	605	436	178	2695	2221	1247
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.2	40.9	54.0	6.4	22.5	5.7
Incr Delay (d2), s/veh	19.2	1.4	70.2	0.4	44.8	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	11.1	8.6	6.1	38.9	18.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	75.5	42.3	124.2	6.8	67.3	7.8
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	767			1800	3298	
Approach Delay, s/veh	67.7			18.6	51.1	
Approach LOS	E			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		25.0		95.0			16.0	79.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.5		90.5			11.5	74.5
Max Q Clear Time (g_c+I1), s		22.3		26.3			14.0	77.0
Green Ext Time (p_c), s		0.0		17.2			0.0	0.0

Intersection Summary			
HCM 6th Ctrl Delay			43.3
HCM 6th LOS			D

Notes

User approved pedestrian interval to be less than phase max green.

S Redland Road at OR-213 (1st Hour)

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

AM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2021 Existing Conditions	33			293	43.3			10.7	75	19			42
2023 Background Conditions	27			271	41.7			11.3	75	15			41
2023 Buildout Conditions (Phase 1)	26			268	41.6			11.4	75	14			41
2026 Background Conditions (Phase 1)	26			268	41.6			11.4	75	14			41
2026 Buildout Conditions (Phase 1-2)	25			262	41.5			11.5	75	14			40
2027 Background Conditions (Phase 1-2)	25			258	41.5			11.5	75	14			40
2027 Buildout Conditions (Phase 1-3)	22			262	40.4			11.6	75	12			41
2029 Background Conditions (Phase 1-3)	22			262	40.4			11.6	75	12			41
2029 Buildout Conditions (Phase 1-4)	22			258	40.4			11.6	75	12			40
2030 Background Conditions (Phase 1-4)	21			258	40.4			11.6	75	11			40
2030 Buildout Conditions (Phase 1-5)	21			259	40.3			11.7	75	11			40
2030 Buildout Conditions (Phase 1-6)	21			259	40.3			11.7	75	11			40

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

AM Peak Hour													
	Critcial Movement		Adjust Flow		Saturated Flow		Adj/Sat Flows				C	L	Xc
			EBL	NBT	EBL	NBT	EBL	NBT	0	Sum			
2021 Existing Conditions	EBL	NBT	609	2087	3401	3561	0.179065	0.586071		0.765136	75	12	0.911
2023 Background Conditions			664	2111	3401	3561	0.195237	0.592811		0.788048	75	12	0.938
2023 Buildout Conditions (Phase 1)			679	2111	3401	3561	0.199647	0.592811		0.792458	75	12	0.943
2026 Background Conditions (Phase 1)			684	2130	3401	3561	0.201117	0.598147		0.799264	75	12	0.952
2026 Buildout Conditions (Phase 1-2)			732	2130	3401	3561	0.215231	0.598147		0.813377	75	12	0.968
2027 Background Conditions (Phase 1-2)			734	2137	3401	3561	0.215819	0.600112		0.815931	75	12	0.971
2027 Buildout Conditions (Phase 1-3)			746	2137	3401	3561	0.219347	0.600112		0.81946	75	12	0.976
2029 Background Conditions (Phase 1-3)			750	2150	3401	3561	0.220523	0.603763		0.824286	75	12	0.981
2029 Buildout Conditions (Phase 1-4)			761	2150	3401	3561	0.223758	0.603763		0.827521	75	12	0.985
2030 Background Conditions (Phase 1-4)			762	2156	3401	3561	0.224052	0.605448		0.8295	75	12	0.987
2030 Buildout Conditions (Phase 1-5)			769	2156	3401	3561	0.22611	0.605448		0.831558	75	12	0.990
2030 Buildout Conditions (Phase 1-6)			771	2156	3401	3561	0.226698	0.605448		0.832146	75	12	0.991

S Redland Road at S Holcomb Boulevard/Abernethy Road

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

AM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2021 Existing Conditions	58	248	6	191	47.1	47	35.5	36.5	60	46	194	4	116
2023 Background Conditions	56	294	6	191	47.6	48	35	36	60	44	235	4	115
2023 Buildout Conditions (Phase 1)	54	312	6	191	47.6	48	35	36	60	43	250	4	115
2026 Background Conditions (Phase 1)	53	321	6	191	48	48	35.6	35.6	60	42	257	4	113
2026 Buildout Conditions (Phase 1-2)	49	379	6	191	46	46	37.6	37.2	60	38	291	4	118
2027 Background Conditions (Phase 1-2)	50	381	6	191	46.1	46	37.5	37.1	60	38	292	4	118
2027 Buildout Conditions (Phase 1-3)	49	394	6	191	46.1	46	37.6	37.1	60	38	302	4	118
2029 Background Conditions (Phase 1-3)	48	401	6	191	46.1	46	37.7	37.3	60	37	307	4	119
2029 Buildout Conditions (Phase 1-4)	47	414	6	191	46.1	46	37.9	37.3	60	36	317	4	119
2030 Background Conditions (Phase 1-4)	46	417	6	191	47	46.9	37	36.4	60	36	326	4	116
2030 Buildout Conditions (Phase 1-5)	46	424	6	191	47.1	47	36.5	36.3	60	36	332	4	116
2030 Buildout Conditions (Phase 1-6)	45	427	6	191	47.1	47	36.5	36.3	60	35	334	4	116

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

AM Peak Hour																					
	Criticial Movement				Adjust Flow				Saturated Flow				Adj/Sat Flows					C	L	Xc
					EBL	WBT	NBTR	SBL	EBL	WBT	NBTR	SBL	EBL	WBT	NBTR	SBL	Sum			
2021 Existing Conditions					41	127	428	143	1640	1826	1853	1739	0.025	0.069551	0.230977	0.082231	0.407759	60	16	0.556
2023 Background Conditions					71	160	434	160	1640	1826	1852	1739	0.043293	0.087623	0.234341	0.092007	0.457264	60	16	0.624
2023 Buildout Conditions (Phase 1)					71	170	434	167	1640	1826	1852	1739	0.043293	0.0931	0.234341	0.096032	0.466766	60	16	0.636
2026 Background Conditions (Phase 1)					72	174	448	171	1640	1826	1852	1739	0.043902	0.09529	0.241901	0.098332	0.479426	60	16	0.654
2026 Buildout Conditions (Phase 1-2)					72	204	450	193	1640	1826	1851	1739	0.043902	0.11172	0.243112	0.110983	0.509717	60	16	0.695
2027 Background Conditions (Phase 1-2)	EBL	WBT	NBTR	SBL	73	206	453	196	1640	1826	1851	1739	0.044512	0.112815	0.244733	0.112708	0.514768	60	16	0.702
2027 Buildout Conditions (Phase 1-3)					73	213	456	201	1640	1826	1851	1739	0.044512	0.116648	0.246353	0.115584	0.523098	60	16	0.713
2029 Background Conditions (Phase 1-3)					73	216	466	204	1640	1826	1851	1739	0.044512	0.118291	0.251756	0.117309	0.531868	60	16	0.725
2029 Buildout Conditions (Phase 1-4)					73	222	466	209	1640	1826	1851	1739	0.044512	0.121577	0.251756	0.120184	0.538029	60	16	0.734
2030 Background Conditions (Phase 1-4)					74	224	470	210	1640	1826	1851	1739	0.045122	0.122673	0.253917	0.120759	0.54247	60	16	0.740
2030 Buildout Conditions (Phase 1-5)					74	229	470	213	1640	1826	1851	1739	0.045122	0.125411	0.253917	0.122484	0.546934	60	16	0.746
2030 Buildout Conditions (Phase 1-6)					74	230	470	214	1640	1826	1851	1739	0.045122	0.125958	0.253917	0.123059	0.548056	60	16	0.747

S Redland Road at OR-213 (1st Hour)

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

PM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2021 Existing Conditions	7			118	85			13.5	120	5			13
2023 Background Conditions	5			103	82			15	120	3			13
2023 Buildout Conditions (Phase 1)	5			98	81			15	120	3			12
2026 Background Conditions (Phase 1)	5			102	81			15.2	120	3			13
2026 Buildout Conditions (Phase 1-2)	4			96	80			15.6	120	3			12
2027 Background Conditions (Phase 1-2)	4			96	80			15.6	120	3			12
2027 Buildout Conditions (Phase 1-3)	4			93	80			15.6	120	3			12
2029 Background Conditions (Phase 1-3)	4			89	80			15.5	120	3			11
2029 Buildout Conditions (Phase 1-4)	4			89	80			15.6	120	3			12
2030 Background Conditions (Phase 1-4)	4			92	80			15.9	120	3			12
2030 Buildout Conditions (Phase 1-5)	4			94	80			16	120	3			13
2030 Buildout Conditions (Phase 1-6)	4			92	80			16	120	3			12

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

PM Peak Hour																
	Criticial Movement			Adjust Flow			Saturated Flow			Adj/Sat Flows				C	L	Xc
				EBL	NBL	SBT	EBL	NBL	SBT	EBL	NBL	SBT	Sum			
2021 Existing Conditions				448	133	2451	3456	1781	3647	0.12963	0.074677	0.672059	0.876366	120	12	0.974
2023 Background Conditions				527	163	2487	3456	1781	3647	0.152488	0.091522	0.68193	0.92594	120	12	1.029
2023 Buildout Conditions (Phase 1)				536	166	2487	3456	1781	3647	0.155093	0.093206	0.68193	0.930229	120	12	1.034
2026 Background Conditions (Phase 1)				540	167	2509	3456	1781	3647	0.15625	0.093768	0.687963	0.93798	120	12	1.042
2026 Buildout Conditions (Phase 1-2)				571	177	2509	3456	1781	3647	0.16522	0.099382	0.687963	0.952565	120	12	1.058
2027 Background Conditions (Phase 1-2)	EBL	NBL	SBT	572	177	2516	3456	1781	3647	0.165509	0.099382	0.689882	0.954774	120	12	1.061
2027 Buildout Conditions (Phase 1-3)				580	179	2516	3456	1781	3647	0.167824	0.100505	0.689882	0.958212	120	12	1.065
2029 Background Conditions (Phase 1-3)				584	180	2532	3456	1781	3647	0.168981	0.101067	0.694269	0.964318	120	12	1.071
2029 Buildout Conditions (Phase 1-4)				591	182	2532	3456	1781	3647	0.171007	0.10219	0.694269	0.967466	120	12	1.075
2030 Background Conditions (Phase 1-4)				592	184	2539	3456	1781	3647	0.171296	0.103313	0.696189	0.970798	120	12	1.079
2030 Buildout Conditions (Phase 1-5)				597	185	2539	3456	1781	3647	0.172743	0.103874	0.696189	0.972806	120	12	1.081
2030 Buildout Conditions (Phase 1-6)				598	186	2539	3456	1781	3647	0.173032	0.104436	0.696189	0.973657	120	12	1.082

S Redland Road at S Holcomb Boulevard/Abernethy Road

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

PM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2021 Existing Conditions	43	215	11	95	88	90.8	76	58.9	120	32	163	7	47
2023 Background Conditions	40	236	11	148	87	98.4	79	60	120	29	194	7	74
2023 Buildout Conditions (Phase 1)	38	248	11	148	86	97.6	80.2	60.2	120	27	202	7	74
2026 Background Conditions (Phase 1)	39	255	11	148	85	96.6	81.2	61.6	120	28	205	7	76
2026 Buildout Conditions (Phase 1-2)	34	284	12	150	85	93.2	82	60.4	120	24	221	8	76
2027 Background Conditions (Phase 1-2)	34	280	12	151	86	94.4	81	59.4	120	24	220	8	75
2027 Buildout Conditions (Phase 1-3)	33	284	12	151	86	94.4	82	59.4	120	24	223	8	75
2029 Background Conditions (Phase 1-3)	33	284	12	151	86	94.4	82	59.6	120	24	223	8	75
2029 Buildout Conditions (Phase 1-4)	32	286	12	152	86	94.6	82.8	59.4	120	23	225	8	75
2030 Background Conditions (Phase 1-4)	32	289	12	149	85	93.6	83.8	60.4	120	23	225	8	75
2030 Buildout Conditions (Phase 1-5)	31	290	12	149	85	93.6	84.2	60.4	120	22	226	8	75
2030 Buildout Conditions (Phase 1-6)	31	289	12	149	85	93.6	84.4	60.4	120	22	225	8	75

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

PM Peak Hour																					
	Criticial Movement				Adjust Flow				Saturated Flow				Adj/Sat Flows					C	L	Xc
					EBTR	WBL	NBTR	SBL	EBTR	WBL	NBTR	SBL	EBTR	WBL	NBTR	SBL	Sum			
2021 Existing Conditions	EBTR	WBL	NBTR	SBL	300	55	414	310	1702	1795	1790	1795	0.176263	0.030641	0.231285	0.172702	0.610891	120	16	0.705
2023 Background Conditions					357	58	412	362	1707	1795	1785	1795	0.209139	0.032312	0.230812	0.201671	0.673934	120	16	0.778
2023 Buildout Conditions (Phase 1)					368	59	415	381	1710	1795	1783	1795	0.215205	0.032869	0.232754	0.212256	0.693084	120	16	0.800
2026 Background Conditions (Phase 1)					379	61	430	392	1710	1795	1783	1795	0.221637	0.033983	0.241167	0.218384	0.715172	120	16	0.825
2026 Buildout Conditions (Phase 1-2)					414	65	434	451	1720	1795	1781	1795	0.240698	0.036212	0.243683	0.251253	0.771846	120	16	0.891
2027 Background Conditions (Phase 1-2)					417	66	438	455	1719	1795	1781	1795	0.242583	0.036769	0.245929	0.253482	0.778763	120	16	0.899
2027 Buildout Conditions (Phase 1-3)					425	67	439	470	1721	1795	1780	1795	0.246949	0.037326	0.246629	0.261838	0.792743	120	16	0.915
2029 Background Conditions (Phase 1-3)					432	68	449	476	1721	1795	1781	1795	0.251017	0.037883	0.252106	0.265181	0.806186	120	16	0.930
2029 Buildout Conditions (Phase 1-4)					441	69	450	491	1723	1795	1780	1795	0.255949	0.03844	0.252809	0.273538	0.820736	120	16	0.947
2030 Background Conditions (Phase 1-4)					445	69	455	495	1724	1795	1780	1795	0.258121	0.03844	0.255618	0.275766	0.827945	120	16	0.955
2030 Buildout Conditions (Phase 1-5)					451	69	456	503	1724	1795	1780	1795	0.261601	0.03844	0.25618	0.280223	0.836444	120	16	0.965
2030 Buildout Conditions (Phase 1-6)					453	69	456	507	1725	1795	1780	1795	0.262609	0.03844	0.25618	0.282451	0.83968	120	16	0.969

S Redland Road at OR-213 (2nd Hour)

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

PM 2nd Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2021 Existing Conditions	-			-	-			-	120	#VALUE!			#VALUE!
2023 Background Conditions	7			114	81			15.2	120	5			14
2023 Buildout Conditions (Phase 1)	7			111	81			15.3	120	5			14
2026 Background Conditions (Phase 1)	6			113	80			15.4	120	5			14
2026 Buildout Conditions (Phase 1-2)	6			111	80			16	120	4			15
2027 Background Conditions (Phase 1-2)	6			111	80			16	120	4			15
2027 Buildout Conditions (Phase 1-3)	6			108	79			16	120	4			14
2029 Background Conditions (Phase 1-3)	6			106	80			16	120	4			14
2029 Buildout Conditions (Phase 1-4)	5			103	79			16	120	3			14
2030 Background Conditions (Phase 1-4)	5			103	79			16	120	3			14
2030 Buildout Conditions (Phase 1-5)	5			102	79			16	120	3			14
2030 Buildout Conditions (Phase 1-6)	5			100	79			16	120	3			13

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

PM 2nd Hour																	
	Criticial Movement			Adjust Flow			Saturated Flow			Adj/Sat Flows				C	L	Xc
				EBL	NBL	SBT	EBL	NBL	SBT	EBL	NBL	SBT	Sum			
2021 Existing Conditions				-	-	-	-	-	-	#VALUE!	#VALUE!	#VALUE!	#VALUE!	120	12	#VALUE!
2023 Background Conditions				519	159	2349	3456	1781	3647	0.150174	0.089276	0.644091	0.88354	120	12	0.982
2023 Buildout Conditions (Phase 1)				527	162	2349	3456	1781	3647	0.152488	0.09096	0.644091	0.88754	120	12	0.986
2026 Background Conditions (Phase 1)				532	163	2371	3456	1781	3647	0.153935	0.091522	0.650123	0.89558	120	12	0.995
2026 Buildout Conditions (Phase 1-2)				561	173	2371	3456	1781	3647	0.162326	0.097136	0.650123	0.909586	120	12	1.011
2027 Background Conditions (Phase 1-2)	EBL	NBL	SBT	562	173	2378	3456	1781	3647	0.162616	0.097136	0.652043	0.911795	120	12	1.013
2027 Buildout Conditions (Phase 1-3)				569	175	2378	3456	1781	3647	0.164641	0.098259	0.652043	0.914943	120	12	1.017
2029 Background Conditions (Phase 1-3)				572	176	2393	3456	1781	3647	0.165509	0.098821	0.656156	0.920486	120	12	1.023
2029 Buildout Conditions (Phase 1-4)				579	178	2393	3456	1781	3647	0.167535	0.099944	0.656156	0.923634	120	12	1.026
2030 Background Conditions (Phase 1-4)				581	178	2399	3456	1781	3647	0.168113	0.099944	0.657801	0.925858	120	12	1.029
2030 Buildout Conditions (Phase 1-5)				586	179	2399	3456	1781	3647	0.16956	0.100505	0.657801	0.927866	120	12	1.031
2030 Buildout Conditions (Phase 1-6)				587	180	2399	3456	1781	3647	0.16985	0.101067	0.657801	0.928717	120	12	1.032

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	694	115	102	1940	1264	467
Future Volume (veh/h)	694	115	102	1940	1264	467
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1841	1826	1826	1796	1796
Adj Flow Rate, veh/h	771	115	113	2156	1404	462
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	7	7
Cap, veh/h	1022	463	157	2290	1717	1080
Arrive On Green	0.07	0.07	0.09	0.66	0.50	0.50
Sat Flow, veh/h	4944	1560	1739	3561	3503	1522
Grp Volume(v), veh/h	771	115	113	2156	1404	462
Grp Sat Flow(s),veh/h/ln	1648	1560	1739	1735	1706	1522
Q Serve(g_s), s	9.2	3.7	3.8	33.5	20.8	7.6
Cycle Q Clear(g_c), s	9.2	3.7	3.8	33.5	20.8	7.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	1022	463	157	2290	1717	1080
V/C Ratio(X)	0.75	0.25	0.72	0.94	0.82	0.43
Avail Cap(c_a), veh/h	1022	463	191	2313	1717	1080
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.67	0.67	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.5	19.0	26.6	9.2	12.6	3.6
Incr Delay (d2), s/veh	3.5	0.9	9.8	8.5	3.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	3.6	1.8	7.4	5.9	2.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	30.0	19.8	36.3	17.7	15.8	3.9
LnGrp LOS	C	B	D	B	B	A
Approach Vol, veh/h	886			2269	1866	
Approach Delay, s/veh	28.7			18.6	12.9	
Approach LOS	C			B	B	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	16.4	43.6	9.4	34.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	11.5	39.5	6.1	28.9
Max Q Clear Time (g_c+I1), s	11.2	35.5	5.8	22.8
Green Ext Time (p_c), s	0.1	3.6	0.0	4.6

Intersection Summary	
HCM 6th Ctrl Delay	18.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	101	65	48	207	384	178	399	28	193	338	73
Future Volume (veh/h)	67	101	65	48	207	384	178	399	28	193	338	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1722	1722	1722	1826	1826	1826	1870	1870	1870	1826	1826	1826
Adj Flow Rate, veh/h	74	112	5	53	230	290	198	443	27	214	376	27
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	12	12	12	5	5	5	2	2	2	5	5	5
Cap, veh/h	111	276	414	99	274	471	257	628	38	272	679	679
Arrive On Green	0.07	0.16	0.15	0.06	0.15	0.15	0.14	0.36	0.35	0.16	0.37	0.37
Sat Flow, veh/h	1640	1722	1423	1739	1826	1527	1781	1745	106	1739	1826	1547
Grp Volume(v), veh/h	74	112	5	53	230	290	198	0	470	214	376	27
Grp Sat Flow(s),veh/h/ln	1640	1722	1423	1739	1826	1527	1781	0	1851	1739	1826	1547
Q Serve(g_s), s	2.6	3.5	0.2	1.8	7.4	9.0	6.4	0.0	13.1	7.1	9.8	0.6
Cycle Q Clear(g_c), s	2.6	3.5	0.2	1.8	7.4	9.0	6.4	0.0	13.1	7.1	9.8	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	111	276	414	99	274	471	257	0	666	272	679	679
V/C Ratio(X)	0.67	0.41	0.01	0.53	0.84	0.62	0.77	0.00	0.71	0.79	0.55	0.04
Avail Cap(c_a), veh/h	150	276	414	162	274	471	291	0	666	290	679	679
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90
Uniform Delay (d), s/veh	27.3	22.6	15.3	27.5	24.8	17.8	24.7	0.0	16.5	24.4	14.9	9.6
Incr Delay (d2), s/veh	6.8	1.0	0.0	4.4	20.2	2.4	10.6	0.0	6.2	11.6	2.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	1.4	0.0	0.8	4.4	3.3	3.1	0.0	5.6	3.4	3.8	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.1	23.6	15.3	31.9	45.0	20.2	35.4	0.0	22.7	36.0	17.8	9.7
LnGrp LOS	C	C	B	C	D	C	D	A	C	D	B	A
Approach Vol, veh/h		191			573			668			617	
Approach Delay, s/veh		27.5			31.2			26.4			23.8	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.4	25.6	7.4	13.6	12.7	26.3	8.0	13.0				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	9.5	19.0	5.1	8.4	9.3	19.2	5.0	8.5				
Max Q Clear Time (g_c+I1), s	9.1	15.1	3.8	5.5	8.4	11.8	4.6	11.0				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.1	0.0	1.2	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			27.1									
HCM 6th LOS			C									

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

12/06/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	580	186	180	1598	2463	967
Future Volume (veh/h)	580	186	180	1598	2463	967
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	598	189	186	1647	2539	985
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	795	409	178	2754	2280	1247
Arrive On Green	0.16	0.16	0.10	0.77	0.64	0.64
Sat Flow, veh/h	5023	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	598	189	186	1647	2539	985
Grp Sat Flow(s),veh/h/ln	1674	1585	1781	1777	1777	1552
Q Serve(g_s), s	13.6	12.0	12.0	23.3	77.0	41.7
Cycle Q Clear(g_c), s	13.6	12.0	12.0	23.3	77.0	41.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	795	409	178	2754	2280	1247
V/C Ratio(X)	0.75	0.46	1.04	0.60	1.11	0.79
Avail Cap(c_a), veh/h	795	409	178	2754	2280	1247
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.65	0.65	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.2	37.5	54.0	5.7	21.5	6.6
Incr Delay (d2), s/veh	4.3	2.4	79.6	0.4	57.9	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	11.2	9.1	5.5	43.6	22.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	52.5	39.9	133.6	6.0	79.4	10.1
LnGrp LOS	D	D	F	A	F	B
Approach Vol, veh/h	787			1833	3524	
Approach Delay, s/veh	49.5			19.0	60.0	
Approach LOS	D			B	E	

Timer - Assigned Phs	2	4	7	8
Phs Duration (G+Y+Rc), s	23.0	97.0	16.0	81.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	18.5	92.5	11.5	76.5
Max Q Clear Time (g_c+I1), s	15.6	25.3	14.0	79.0
Green Ext Time (p_c), s	0.9	17.9	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	46.4
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
5: S Redland Road & S Holcomb Boulevard

12/06/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	258	199	66	185	316	113	347	99	487	622	148
Future Volume (veh/h)	150	258	199	66	185	316	113	347	99	487	622	148
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1885	1885	1885	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	156	269	91	69	193	244	118	361	94	507	648	113
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	1	1	1	3	3	3	1	1	1
Cap, veh/h	182	305	375	99	218	670	157	425	111	545	972	987
Arrive On Green	0.10	0.16	0.16	0.05	0.12	0.12	0.09	0.30	0.30	0.30	0.52	0.52
Sat Flow, veh/h	1781	1870	1546	1795	1885	1598	1767	1412	368	1795	1885	1598
Grp Volume(v), veh/h	156	269	91	69	193	244	118	0	455	507	648	113
Grp Sat Flow(s),veh/h/ln	1781	1870	1546	1795	1885	1598	1767	0	1780	1795	1885	1598
Q Serve(g_s), s	7.8	12.7	4.3	3.4	9.1	9.4	5.9	0.0	21.6	24.7	22.8	2.6
Cycle Q Clear(g_c), s	7.8	12.7	4.3	3.4	9.1	9.4	5.9	0.0	21.6	24.7	22.8	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.21	1.00		1.00
Lane Grp Cap(c), veh/h	182	305	375	99	218	670	157	0	535	545	972	987
V/C Ratio(X)	0.86	0.88	0.24	0.70	0.89	0.36	0.75	0.00	0.85	0.93	0.67	0.11
Avail Cap(c_a), veh/h	182	305	375	112	218	670	181	0	535	559	972	987
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.45	0.45	0.45
Uniform Delay (d), s/veh	39.8	36.8	27.6	41.8	39.2	17.9	40.1	0.0	29.6	30.4	16.1	7.1
Incr Delay (d2), s/veh	31.0	24.7	0.3	15.4	32.3	0.3	14.2	0.0	15.5	12.1	1.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	7.7	1.6	1.9	6.0	3.3	3.1	0.0	10.8	11.6	8.9	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.7	61.6	27.9	57.2	71.6	18.2	54.3	0.0	45.1	42.5	17.7	7.2
LnGrp LOS	E	E	C	E	E	B	D	A	D	D	B	A
Approach Vol, veh/h		516			506			573			1268	
Approach Delay, s/veh		58.4			43.9			47.0			26.7	
Approach LOS		E			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	31.3	31.1	8.9	18.7	12.0	50.4	13.2	14.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.5	25.9	5.1	13.5	8.7	44.7	8.7	9.9
Max Q Clear Time (g_c+I1), s	26.7	23.6	5.4	14.7	7.9	24.8	9.8	11.4
Green Ext Time (p_c), s	0.2	0.6	0.0	0.0	0.0	4.2	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		39.5
HCM 6th LOS		D

Notes

User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
4: OR-213 & S Redland Road

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	558	174	171	1539	2279	867
Future Volume (veh/h)	558	174	171	1539	2279	867
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	587	178	180	1620	2399	897
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	737	396	184	2796	2310	1241
Arrive On Green	0.15	0.15	0.10	0.79	0.65	0.65
Sat Flow, veh/h	5023	1585	1781	3647	3647	1552
Grp Volume(v), veh/h	587	178	180	1620	2399	897
Grp Sat Flow(s),veh/h/ln	1674	1585	1781	1777	1777	1552
Q Serve(g_s), s	13.5	11.4	12.1	21.4	78.0	33.4
Cycle Q Clear(g_c), s	13.5	11.4	12.1	21.4	78.0	33.4
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	737	396	184	2796	2310	1241
V/C Ratio(X)	0.80	0.45	0.98	0.58	1.04	0.72
Avail Cap(c_a), veh/h	737	396	184	2796	2310	1241
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.68	0.68	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.5	38.0	53.7	5.0	21.0	5.9
Incr Delay (d2), s/veh	6.1	2.5	59.7	0.3	29.6	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	10.7	8.2	4.7	34.8	17.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	55.6	40.5	113.3	5.3	50.6	8.0
LnGrp LOS	E	D	F	A	F	A
Approach Vol, veh/h	765			1800	3296	
Approach Delay, s/veh	52.1			16.1	39.0	
Approach LOS	D			B	D	

Timer - Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		21.6		98.4			16.4	82.0
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		17.1		93.9			11.9	77.5
Max Q Clear Time (g_c+I1), s		15.5		23.4			14.1	80.0
Green Ext Time (p_c), s		0.5		17.4			0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	33.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

S Redland Road at OR-213 (1st Hour)

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

AM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2030 Mitigated Conditions (Phase 1-6)	22			287	33.4			10.6	60	12			51

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio

Method:
Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

AM Peak Hour												
			Adjust Flow		Saturated Flow		Adj/Sat Flows					
	Critcial Movement		EBL	NBT	EBL	NBT	EBL	NBT	0	Sum	C	L	Xc
2030 Mitigated Conditions (Phase 1-6)	EBL	NBT	771	2156	4944	3561	0.155947	0.605448		0.761395	60	12	0.952

S Redland Road at S Holcomb Boulevard/Abernethy Road

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

AM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2030 Mitigated Conditions (Phase 1-6)	109	224	6	109	33.3	33	36.5	26.8	60	60	123	4	49

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

AM Peak Hour																				
	Critcial Movement				Adjust Flow				Saturated Flow				Adj/Sat Flows					C	L	Xc
					EBL	WBT	NBTR	SBL	EBL	WBT	NBTR	SBL	EBL	WBT	NBTR	SBL	Sum			
2030 Mitigated Conditions (Phase 1-6)	EBL	WBT	NBTR	SBL	74	230	470	214	1640	1826	1851	1739	0.045122	0.125958	0.253917	0.123059	0.548056	60	16	0.747

S Redland Road at OR-213 (1st Hour)

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

PM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2030 Mitigated Conditions (Phase 1-6)	4			92	81			16	120	3			12

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method:
Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

PM Peak Hour																
	Critcial Movement			Adjust Flow			Saturated Flow			Adj/Sat Flows				C	L	Xc
				EBL	NBL	SBT	EBL	NBL	SBT	EBL	NBL	SBT	Sum			
2030 Mitigated Conditions (Phase 1-6)	EBL	NBL	SBT	598	186	2539	5023	1781	3647	0.119052	0.104436	0.696189	0.919677	120	12	1.022

S Redland Road at S Holcomb Boulevard/Abernethy Road

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

PM Peak Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2030 Mitigated Conditions (Phase 1-6)	207	206	16	154	58.8	43.6	59.6	27.6	110	111	82	9	39

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method: Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

PM Peak Hour																				
	Critcial Movement				Adjust Flow				Saturated Flow				Adj/Sat Flows					C	L	Xc
					EBT	WBL	NBTR	SBL	EBT	WBL	NBTR	SBL	EBT	WBL	NBTR	SBL	Sum			
2030 Mitigated Conditions (Phase 1-6)	EBT	WBL	NBTR	SBL	269	69	455	507	1870	1795	1780	1795	0.14385	0.03844	0.255618	0.282451	0.72036	110	16	0.843

S Redland Road at OR-213 (2nd Hour)

Right Turns on Red
APM Section 13.4.2: RTOR
Equation: vRTOR=sRTOR*(r/C)

PM 2nd Hour													
	sRTOR				r				C	vRTOR			
	EBR	WBR	NBR	SBR	EBR	WBR	NBR	SBR		EBR	WBR	NBR	SBR
2030 Mitigated Conditions (Phase 1-6)	7			107	82			16.4	120	5			15

Intersection v/c
APM Section 13.4.4: Critical Intersection v/c ratio
Method:
Determine Critical Movements in HCM 2000 reports
HCM 6th reports, detemine adjusted and sat flow rates
Adjust Flow/Sat Flow
Sum up Crit Movement Flow Rates
Xc of intersection = sum(crit.move. Flow rates*(C/(C-L))

PM 2nd Hour																
	Critcial Movement			Adjust Flow			Saturated Flow			Adj/Sat Flows				C	L	Xc
				EBL	NBL	SBT	EBL	NBL	SBT	EBL	NBL	SBT	Sum			
2030 Mitigated Conditions (Phase 1-6)	EBL	NBL	SBT	587	180	2399	5023	1781	3647	0.116862	0.101067	0.657801	0.87573	120	12	0.973

Queuing and Blocking Report
2021 Existing Conditions - AM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	220	230	75	131	386	270	272	262	88
Average Queue (ft)	120	133	21	59	157	131	145	122	34
95th Queue (ft)	193	208	53	109	299	226	225	213	70
Link Distance (ft)	797	797	797	1308	1308	1308	1612	1612	1612
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	75	130	62	118	108	154	237	132	175	54
Average Queue (ft)	28	53	18	50	51	75	106	61	90	14
95th Queue (ft)	62	104	45	97	87	130	191	111	154	37
Link Distance (ft)	824	824	537	537	537	692	692	797	797	797
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	325	338	176	284	165	174	1559	1558	1448
Average Queue (ft)	191	205	73	147	91	70	1138	1151	664
95th Queue (ft)	304	317	144	264	145	134	1825	1848	1871
Link Distance (ft)	796	796	796	1349	1349	1349	1668	1668	1668
Upstream Blk Time (%)							7	13	9
Queuing Penalty (veh)							0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	122	360	98	150	101	146	390	375	416	66
Average Queue (ft)	47	192	37	64	47	67	207	203	245	19
95th Queue (ft)	95	324	83	124	82	126	340	321	375	52
Link Distance (ft)	846	846	536	536	536	719	719	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2023 Background Conditions - AM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	252	254	92	180	449	342	273	261	103
Average Queue (ft)	132	147	24	68	194	160	159	137	41
95th Queue (ft)	209	217	64	138	396	297	239	227	83
Link Distance (ft)	797	797	797	1334	1334	1334	1556	1556	1556
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	125	129	82	177	111	175	213	153	215	53
Average Queue (ft)	45	51	24	67	57	79	124	69	104	17
95th Queue (ft)	93	101	60	133	94	140	202	126	181	41
Link Distance (ft)	862	862	552	552	552	728	728	797	797	797
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2023 Background Conditions - PM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	451	460	232	386	180	171	2253	2262	2254
Average Queue (ft)	279	293	86	217	100	79	1883	1899	1671
95th Queue (ft)	460	469	173	425	159	143	2726	2736	3024
Link Distance (ft)	796	796	796	1390	1390	1390	2216	2216	2216
Upstream Blk Time (%)							19	38	30
Queuing Penalty (veh)							0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	201	377	104	175	100	201	434	415	438	69
Average Queue (ft)	99	207	38	85	51	95	232	236	259	28
95th Queue (ft)	171	338	82	154	82	165	380	366	399	55
Link Distance (ft)	876	876	577	577	577	734	734	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	258	256	84	129	332	333	273	260	104
Average Queue (ft)	137	151	25	62	177	154	152	138	41
95th Queue (ft)	221	233	62	113	288	270	225	224	82
Link Distance (ft)	796	796	796	1362	1362	1362	2066	2066	2066
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	118	135	71	141	118	148	238	177	199	53
Average Queue (ft)	43	56	23	64	60	79	126	77	105	18
95th Queue (ft)	90	105	55	117	95	131	212	140	180	40
Link Distance (ft)	872	872	544	544	544	735	735	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	363	384	178	394	169	163	2166	2177	2173
Average Queue (ft)	244	262	81	235	104	82	1945	1958	1776
95th Queue (ft)	384	402	155	438	157	146	2567	2571	2958
Link Distance (ft)	796	796	796	1363	1363	1363	2126	2126	2126
Upstream Blk Time (%)							22	48	39
Queuing Penalty (veh)							0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	213	431	93	204	107	198	415	406	428	80
Average Queue (ft)	102	235	36	95	53	94	244	240	244	32
95th Queue (ft)	183	408	78	180	89	175	385	369	376	63
Link Distance (ft)	880	880	514	514	514	726	726	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2026 Ph.1 Buildout Conditions - AM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	244	270	79	136	342	329	270	250	100
Average Queue (ft)	136	151	25	64	173	153	152	136	44
95th Queue (ft)	212	230	63	117	288	272	235	224	86
Link Distance (ft)	796	796	796	1388	1388	1388	2006	2006	2006
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	120	156	72	171	122	170	241	167	204	60
Average Queue (ft)	45	64	23	74	61	85	129	78	103	19
95th Queue (ft)	91	127	55	140	102	148	216	136	173	45
Link Distance (ft)	906	906	499	499	499	738	738	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2026 Ph.1 Buildout Conditions - PM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	413	439	174	388	189	173	2509	2517	2520
Average Queue (ft)	258	273	81	216	105	82	2102	2119	1919
95th Queue (ft)	427	446	154	405	165	147	3064	3079	3380
Link Distance (ft)	796	796	796	1373	1373	1373	2466	2466	2466
Upstream Blk Time (%)							21	48	44
Queuing Penalty (veh)							0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	218	444	130	203	111	195	470	401	454	84
Average Queue (ft)	102	251	46	100	56	97	246	237	265	34
95th Queue (ft)	185	415	99	179	92	174	410	355	410	67
Link Distance (ft)	867	867	559	559	559	724	724	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	285	287	85	140	458	362	273	253	101
Average Queue (ft)	159	173	29	63	182	153	154	136	45
95th Queue (ft)	252	258	68	123	352	283	229	221	83
Link Distance (ft)	796	796	796	1375	1375	1375	1996	1996	1996
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	117	141	71	185	142	183	269	188	206	56
Average Queue (ft)	46	62	23	83	69	85	141	84	110	21
95th Queue (ft)	95	117	55	153	115	149	233	153	181	45
Link Distance (ft)	878	878	546	546	546	747	747	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2026 Ph.1-2 Buildout Conditions - PM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	512	534	349	389	188	181	1946	1954	1958
Average Queue (ft)	347	363	117	231	111	87	1801	1810	1701
95th Queue (ft)	603	618	332	413	167	153	2269	2272	2582
Link Distance (ft)	796	796	796	1389	1389	1389	1902	1902	1902
Upstream Blk Time (%)	0	0	0				24	46	35
Queuing Penalty (veh)	0	0	0				0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	348	634	130	216	122	258	531	456	450	86
Average Queue (ft)	137	381	48	107	59	106	287	276	260	32
95th Queue (ft)	372	736	104	189	100	234	499	404	397	65
Link Distance (ft)	864	864	539	539	539	733	733	796	796	796
Upstream Blk Time (%)	0	1				0	1			
Queuing Penalty (veh)	0	0				0	0			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2027 Ph.1-2 Buildout Conditions - AM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	254	270	86	144	417	393	271	258	110
Average Queue (ft)	143	160	29	66	188	165	163	138	46
95th Queue (ft)	223	241	69	122	344	328	242	234	87
Link Distance (ft)	796	796	796	1344	1344	1344	1772	1772	1772
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	115	154	80	190	177	181	265	189	219	57
Average Queue (ft)	45	65	25	73	68	86	147	86	112	19
95th Queue (ft)	91	123	60	142	127	148	239	154	184	44
Link Distance (ft)	853	853	469	469	469	731	731	796	796	796
Upstream Blk Time (%)				0	0					
Queuing Penalty (veh)				0	0					
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2027 Ph.1-2 Buildout Conditions - PM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	410	433	240	388	196	168	2533	2547	2540
Average Queue (ft)	274	291	98	230	111	84	2200	2212	2021
95th Queue (ft)	479	496	241	420	170	151	3038	3054	3368
Link Distance (ft)	796	796	796	1354	1354	1354	2490	2490	2490
Upstream Blk Time (%)							21	52	48
Queuing Penalty (veh)							0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	491	736	111	214	132	172	472	492	440	133
Average Queue (ft)	166	459	44	103	61	90	274	310	254	33
95th Queue (ft)	511	807	95	182	99	151	438	463	390	90
Link Distance (ft)	883	883	503	503	503	735	735	796	796	796
Upstream Blk Time (%)	2	4								
Queuing Penalty (veh)	0	0								
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	266	280	90	233	549	500	301	295	103
Average Queue (ft)	152	166	29	67	221	193	179	152	44
95th Queue (ft)	234	249	70	163	458	420	271	253	82
Link Distance (ft)	796	796	796	1341	1341	1341	1562	1562	1562
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	126	151	78	179	147	176	296	177	190	67
Average Queue (ft)	47	65	24	83	71	83	148	88	105	19
95th Queue (ft)	99	124	59	151	121	146	242	151	167	46
Link Distance (ft)	868	868	515	515	515	715	715	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2027 Ph.1-3 Buildout Conditions - PM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	517	531	316	393	184	168	1938	1937	1940
Average Queue (ft)	342	358	110	215	109	86	1834	1849	1782
95th Queue (ft)	585	599	303	401	167	152	2184	2179	2418
Link Distance (ft)	797	797	797	1386	1386	1386	1892	1892	1892
Upstream Blk Time (%)	0	0	0				25	48	38
Queuing Penalty (veh)	1	1	1				0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	444	769	133	210	115	337	610	518	471	88
Average Queue (ft)	137	470	51	116	62	109	341	316	250	33
95th Queue (ft)	373	827	110	201	100	239	584	490	397	69
Link Distance (ft)	874	874	540	540	540	746	746	797	797	797
Upstream Blk Time (%)	1	2				0	1			
Queuing Penalty (veh)	0	0				0	0			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 2

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	282	277	100	172	463	442	306	293	119
Average Queue (ft)	155	171	31	72	218	199	166	152	45
95th Queue (ft)	242	253	73	142	392	377	260	251	86
Link Distance (ft)	796	796	796	1337	1337	1337	2012	2012	2012
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	105	151	78	179	161	170	301	183	209	57
Average Queue (ft)	46	66	24	82	74	88	160	86	111	19
95th Queue (ft)	90	125	56	149	129	152	270	159	185	44
Link Distance (ft)	845	845	522	522	522	707	707	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2029 Ph.1-3 Buildout Conditions - PM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	574	589	359	451	190	202	2022	2031	2028
Average Queue (ft)	388	406	115	271	114	92	1860	1877	1768
95th Queue (ft)	619	634	298	513	172	164	2389	2395	2721
Link Distance (ft)	797	797	797	1349	1349	1349	1978	1978	1978
Upstream Blk Time (%)		0	0				23	49	37
Queuing Penalty (veh)		0	0				0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	495	756	125	235	147	284	594	486	449	82
Average Queue (ft)	213	481	48	115	66	105	331	296	257	35
95th Queue (ft)	641	857	104	201	114	207	547	447	396	68
Link Distance (ft)	860	860	499	499	499	712	712	797	797	797
Upstream Blk Time (%)	6	10					0			
Queuing Penalty (veh)	0	0					0			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2029 Ph.1-4 Buildout Conditions - AM Peak Hour 12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	285	298	81	207	604	568	300	282	114
Average Queue (ft)	161	177	29	68	238	215	175	144	45
95th Queue (ft)	252	270	66	157	488	462	262	239	84
Link Distance (ft)	796	796	796	1376	1376	1376	1520	1520	1520
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	123	152	74	192	156	189	318	176	235	53
Average Queue (ft)	49	69	26	83	74	86	163	85	115	19
95th Queue (ft)	104	128	59	152	127	149	271	145	193	42
Link Distance (ft)	886	886	507	507	507	726	726	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2029 Ph.1-4 Buildout Conditions - PM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	569	579	453	364	204	189	1809	1816	1809
Average Queue (ft)	397	413	174	206	117	93	1733	1744	1690
95th Queue (ft)	744	754	535	363	179	163	1985	1984	2247
Link Distance (ft)	796	796	796	1341	1341	1341	1758	1758	1758
Upstream Blk Time (%)	1	1	1				25	48	35
Queuing Penalty (veh)	1	4	3				0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	651	806	130	240	161	428	607	506	506	101
Average Queue (ft)	288	551	52	122	70	162	372	319	260	34
95th Queue (ft)	804	945	112	210	124	462	648	495	422	74
Link Distance (ft)	856	856	530	530	530	718	718	796	796	796
Upstream Blk Time (%)	12	17				4	7			
Queuing Penalty (veh)	0	0				0	0			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 8

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	259	273	78	134	611	611	290	281	101
Average Queue (ft)	149	164	27	63	258	239	169	152	44
95th Queue (ft)	228	243	64	111	524	509	258	255	83
Link Distance (ft)	796	796	796	1394	1394	1394	1870	1870	1870
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	107	166	75	225	197	224	274	200	205	59
Average Queue (ft)	48	76	25	92	74	98	148	89	111	22
95th Queue (ft)	92	141	56	171	129	184	242	158	180	48
Link Distance (ft)	875	875	546	546	546	738	738	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2030 Ph.1-4 Buildout Conditions - PM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	632	639	580	388	311	186	2415	2427	2421
Average Queue (ft)	404	421	139	226	118	90	2202	2218	2119
95th Queue (ft)	703	710	412	419	256	161	2805	2806	3097
Link Distance (ft)	796	796	796	1377	1377	1377	2368	2368	2368
Upstream Blk Time (%)	0	0	0		0		24	58	51
Queuing Penalty (veh)	0	0	1		0		0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	540	829	127	218	154	277	646	566	499	163
Average Queue (ft)	234	568	56	111	65	103	400	340	264	37
95th Queue (ft)	706	956	118	190	116	220	643	547	431	121
Link Distance (ft)	872	872	504	504	504	732	732	796	796	796
Upstream Blk Time (%)	7	11					0		0	0
Queuing Penalty (veh)	0	0					0		0	0
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 1

Queuing and Blocking Report
2030 Ph.1-5 Buildout Conditions - AM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	319	324	84	169	552	436	291	287	132
Average Queue (ft)	168	182	29	76	222	200	171	154	51
95th Queue (ft)	286	297	67	146	413	359	259	250	100
Link Distance (ft)	797	797	797	1368	1368	1368	1814	1814	1814
Upstream Blk Time (%)					0				
Queuing Penalty (veh)					0				
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	104	156	88	202	166	156	278	211	243	68
Average Queue (ft)	45	69	26	91	76	83	149	99	117	21
95th Queue (ft)	88	130	62	167	127	139	243	179	199	49
Link Distance (ft)	861	861	508	508	508	707	707	797	797	797
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Queuing and Blocking Report
2030 Ph.1-5 Buildout Conditions - PM Peak Hour

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	687	698	642	398	180	179	1937	1943	1937
Average Queue (ft)	470	484	213	236	110	86	1844	1855	1800
95th Queue (ft)	795	805	619	446	169	152	2140	2145	2383
Link Distance (ft)	796	796	796	1369	1369	1369	1888	1888	1888
Upstream Blk Time (%)	0	2	3				25	49	38
Queuing Penalty (veh)	1	5	7				0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	636	794	140	222	172	472	682	536	430	79
Average Queue (ft)	256	606	53	115	73	179	432	329	261	31
95th Queue (ft)	726	965	118	199	141	515	720	499	398	64
Link Distance (ft)	859	859	522	522	522	722	722	796	796	796
Upstream Blk Time (%)	5	11				5	10			
Queuing Penalty (veh)	0	0				0	0			
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 14

Queuing and Blocking Report
2030 Total Buildout Conditions - AM Peak Hour

12/04/2021

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	306	328	99	139	525	492	326	300	135
Average Queue (ft)	159	177	31	65	226	201	176	149	47
95th Queue (ft)	263	277	71	120	436	411	281	260	97
Link Distance (ft)	796	796	796	1369	1369	1369	1644	1644	1644
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	105	175	83	194	163	202	277	181	204	59
Average Queue (ft)	44	69	27	90	77	93	153	88	110	20
95th Queue (ft)	86	135	62	165	127	163	244	152	182	46
Link Distance (ft)	860	860	546	546	546	719	719	796	796	796
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 0

Intersection: 4: OR-213 & S Redland Road

Movement	EB	EB	EB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	T	T	T	T	R
Maximum Queue (ft)	704	703	570	491	195	173	1951	1956	1963
Average Queue (ft)	461	475	201	282	109	84	1809	1821	1715
95th Queue (ft)	792	796	590	557	168	148	2267	2267	2566
Link Distance (ft)	796	796	796	1354	1354	1354	1910	1910	1910
Upstream Blk Time (%)	0	1	1				21	45	34
Queuing Penalty (veh)	1	4	4				0	0	0
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 5: S Redland Road & S Holcomb Boulevard

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	T	R	L	TR	L	T	R
Maximum Queue (ft)	579	776	139	215	158	470	668	555	509	88
Average Queue (ft)	273	533	56	113	74	187	452	349	265	34
95th Queue (ft)	778	934	114	186	133	553	761	548	444	71
Link Distance (ft)	852	852	554	554	554	734	734	796	796	796
Upstream Blk Time (%)	11	16				7	12	0	0	
Queuing Penalty (veh)	0	0				0	0	1	0	
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Network Summary

Network wide Queuing Penalty: 9

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

March 18, 2022
Project No. 20-5600

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SUBJECT: PRELIMINARY GEOTECHNICAL ENGINEERING REPORT
PARK PLACE CROSSING GENERAL DEVELOPMENT PLAN / MASTER PLAN
TERMINUS OF SOUTH LIVESAY ROAD
OREGON CITY, OREGON

This report presents the results of a geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our investigation was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-7453C, dated September 17, 2020, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*. The site is mapped by Oregon City as being within a designated Geologic Hazard Zone. This preliminary geotechnical engineering report is intended to address the current overall master plan. Further investigations and reports will likely be provided at the time of each respective detailed development plan, as necessary.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is located at the terminus of South Livesay Road in Oregon City, Clackamas County, Oregon (Figure 1). The site is located north of the portion of South Livesay Road which runs east-west and south of Holcomb Boulevard. The site consists of 13 tax lots that total approximately 92 acres in size. While GeoPacific has not yet performed geotechnical explorations on Tax Lots 200, 300, 301, 303, or 502, they are considered part of the master plan. Vegetation on the site is highly variable. Overall, vegetation in the western portion the site consists of grass, vegetation in the central portion of the site consists of grass, shrubs, and trees, and vegetation in the eastern portion of the site consists of small to large trees. The site is currently occupied by a number of residences and several outbuildings.

Overall, topography on the site slopes down to the west at grades of 25 percent or less. However, Oregon City Webmaps identifies several isolated areas in the middle of the site with steeper than 25 percent. There is a drainage in the northwest portion of the site which runs northeast to southwest and the side slopes are inclined at average grades of about 50 percent (Figures 2 and 3). There are also drainages near the southwest corner of the site and in the southern-central portion of the site, with side slopes inclined at average grades of about 50 percent. Two landslides are mapped by the Oregon Department of Geology and Mineral Industries (DOGAMI) within the drainage in the northwest portion of the site (Figure 2). The large slide is classified as prehistoric (greater than 150 years old) and the small earthflow is considered historic with movement occurring in the last 150 years.

It is our understanding that the planned development will consist of approximately 477 lots for single family attached/detached homes, neighborhood commercial, new streets, stormwater management facilities, associated underground utilities, and open space. We anticipate maximum cuts will be on the order of about 24 feet and fills up to 30 feet. Utilities may be planned in areas with about 24 feet of cut, resulting in depths of about 30 feet below existing grade. Based on conversation with the project civil engineer, some utilities may be planned to depths of up to 30 feet below existing grades.

REGIONAL AND LOCAL GEOLOGIC SETTING

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins.

The southwestern portion of the subject site is underlain by the Quaternary age (last 1.6 million years) Willamette Formation, a catastrophic flood deposit associated with repeated glacial outburst flooding of the Willamette Valley (Yeats et al., 1996). The last of these outburst floods occurred about 10,000 years ago. These deposits typically consist of horizontally layered, micaceous, silt to coarse sand forming poorly-defined to distinct beds less than 3 feet thick.

Portions of the site above 360 feet elevation are underlain by the Boring Lava lithologic unit which consists of basaltic and basaltic andesite lava flows erupted from a series of local volcanic vents during Plio-Pleistocene time (about 600,000 thousand to 2.6 million years ago) (Schlicker and Finlayson, 1979; Madin, 2009). The total thickness of the Boring Lava unit ranges from greater than 600 feet near vents to less than 50 feet on the outer margins.

The Willamette Formation in the southwestern portion of the site and the Boring Lava Formation in the northeastern portion of the site are underlain by the Pliocene to Pleistocene aged (about 200,00 to 2 million years ago) Springwater Formation, which consists of fluvial conglomerate, volcaniclastic sandstone, siltstone and debris flows comprised by sediment derived from the Cascade Range deposited by the ancestral Clackamas River (Madin, 1994; Yeats et al., 1996; Madin, 2009). The Springwater Formation consists primarily of deeply weathered conglomerate including well-rounded pebbles to cobbles of basalt, andesite and dacite with a sand matrix composed of feldspathic and volcanic lithics. Siltstone units typically consist of quartzofeldspathic silt, volcanic ash and clay. The consistency of the Springwater Formation is generally hard where decomposed to clayey silt and medium-dense to very dense where highly weathered and can be 100 to 150 feet in thickness (Madin, 2009).

Underlying the Springwater Formation is the Miocene to Pliocene aged (2-65 million years ago) Troutdale formation - a partially cemented conglomerate, sandstone, and mudstone deposited by the ancestral Columbia River (Trimble, 1963; Madin, 2009). Regionally, the Troutdale Formation is informally divided into an upper and a lower member (Phillips, 1987). Lithologies in the upper member include lenticular layers of volcaniclastic (vitric) sand, quartzite-bearing gravel, fine-grained sand, silt and clay, micaceous quartz-rich sand, and conglomerate with a cumulative average thickness of 100 to 150 feet. The lower member consists primarily of laminated silty clay and sand with reported thicknesses in water well logs of up to 880 feet and is the equivalent of the Sandy River Mudstone.

REGIONAL SEISMIC SETTING

At least four potential source zones capable of generating damaging earthquakes are thought to exist in the region. These include the Portland Hills Fault Zone, the Grant Butte and Damascus-Tickle Creek Fault Zones, the Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone, as discussed below.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3.5 and 5.0 miles. The combined three faults vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills and is approximately 1 mile northeast of the site. The East Bank Fault occurs along the eastern margin of the Willamette River, and is located approximately 10.8 miles north of the site. The Oatfield Fault occurs along the western side of the Portland Hills and is approximately 0.5 miles southwest of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000). No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

Grant Butte and Damascus-Tickle Creek Fault Zones

The Grant Butte fault zone was mapped along the north side of Mt. Scott and Powell Butte by Madin (1990). It was also extended eastward to Grant Butte on the basis of mapping by CH2M Hill and others (1991) and informally named the Grant Butte fault (Cornforth and Geomatrix, 1992). The Damascus-Tickle Creek fault zone displaces Pliocene and possibly Pleistocene sediments in the vicinity of Boring, Oregon (Madin, 1992; Lite, 1992). Relatively short faults define a 17-km-long fault zone that is apparently linked to the Grant Butte fault on the basis of stratigraphic relationships showing middle and late Pleistocene activity. Geomatrix (1995) assigns a probability of 0.5 for activity on structures within these fault zones. The nearest portion of the Grant Butte and Damascus-Tickle Creek Fault Zone is approximately 2.3 miles east of the subject site.

Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies approximately 19.9 miles southwest of the subject site. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment (Yeats et al., 1996; Werner et al., 1992). A geologic reconnaissance and photogeologic analysis study conducted for the Scoggins Dam site in the Tualatin Basin revealed no evidence of deformed geomorphic surfaces along the structural zone

(Unruh et al., 1994). No seismicity has been recorded on the Gales Creek Fault or Newberg Fault; however, these faults are considered to be potentially active because they may connect with the seismically active Mount Angel Fault and the rupture plane of the 1993 M5.6 Scotts Mills earthquake (Werner et al. 1992; Geomatrix Consultants, 1995).

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies approximately 50 miles west of the Portland Basin at depths of between 20 and 40 kilometers below the surface.

FIELD EXPLORATION

Our site-specific explorations for this report were conducted in October, 2020 and consisted of test pits and borings. On October 6, 7, 8, 2020, twenty four exploratory test pits were excavated with a medium or large sized trackhoe to depths of 15 to 29 feet at the approximate locations presented on Figure 3. Five exploratory borings were drilled to depths of 70.4 to 81.5 feet with an all-terrain drill rig at the approximate locations presented on Figure 3 on October 20, 21, and 22, 2020. It should be noted that exploration locations were located in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

The boreholes were drilled using a drill rig and mud rotary methods operated by Western States Soil Conservation, Inc. of Hubbard, Oregon. At each boring location, SPT (Standard Penetration Test) sampling was performed in general accordance with ASTM D1586 using a 2-inch outside diameter split-spoon sampler and a 140-pound pneumatic hammer. During the test, a sample is obtained by driving the sampler 18 inches into the soil with the hammer free-falling 30 inches. The number of blows for each 6 inches of penetration is recorded. The Standard Penetration Resistance (“N-value”) of the soil is calculated as the number of blows required for the final 12 inches of penetration. If 50 or more blows are recorded within a single 6-inch interval, the test is terminated, and the blow count is recorded as 50 blows for the number of inches driven. This resistance, or N-value, provides a measure of the relative density of granular soils and the relative consistency of cohesive soils. At the completion of the borings, the holes were backfilled with bentonite.

A GeoPacific Engineering Geologist continuously monitored the field exploration program and logged the test pits. Soils observed in the explorations were classified in general accordance with the Unified Soil Classification System (USCS). Rock hardness was classified in accordance with Table 1, modified from the ODOT Rock Hardness Classification Chart. During exploration, our geologist also noted geotechnical conditions such as soil consistency, moisture and groundwater conditions. Logs of test pits are attached to this report. The following report sections are based on the exploration program and summarize subsurface conditions encountered at the site.

Table 1. Rock Hardness Classification Chart

ODOT Rock Hardness Rating	Field Criteria	Unconfined Compressive Strength	Typical Equipment Needed For Excavation
Extremely Soft (R0)	Indented by thumbnail	<100 psi	Small excavator
Very Soft (R1)	Scratched by thumbnail, crumbled by rock hammer	100-1,000 psi	Small excavator
Soft (R2)	Not scratched by thumbnail, indented by rock hammer	1,000-4,000 psi	Medium excavator (slow digging with small excavator)
Medium Hard (R3)	Scratched or fractured by rock hammer	4,000-8,000 psi	Medium to large excavator (slow to very slow digging), typically requires chipping with hydraulic hammer or mass excavation)
Hard (R4)	Scratched or fractured w/ difficulty	8,000-16,000 psi	Slow chipping with hydraulic hammer and/or blasting
Very Hard (R5)	Not scratched or fractured after many blows, hammer rebounds	>16,000 psi	Blasting

Undocumented Fill: Undocumented fill was not encountered in our explorations; however, it is likely that areas of undocumented fill may exist in the vicinity existing access driveways and structures.

Topsoil Horizon: The ground surface in test pits TP-1 through TP-24 and soil borings B-1 through B-5 was directly underlain by a topsoil horizon. The brown topsoil horizon consisted of silt (OL-ML), was loose, and contained trace fine roots throughout. The topsoil horizon typically had a low to high organic content and extended to a depth of 7 to 16 inches.

Landslide Debris: Landslide debris was encountered beneath the topsoil horizon in test pits TP-20 and TP-21. The landslide debris generally consisted of silt (ML) with clay or sand, silty clay (CL) with or without gravel, and zones of fat clay (CH). The landslide debris had a medium stiff to stiff consistency, was highly fractured, and extended to a depth of 24 feet in test pit TP-20 and to 20 feet in test pit TP-21.

> ***Fat Clay:*** Fat clay (CH) was encountered within the landslide debris in test pits TP-20 and TP-21. The fat clay was stiff to very stiff, gray in color, and extended to depths of 14 to 16 feet. This material was not sampled for laboratory testing; however, it is likely highly expansive.

Willamette Formation: Underlying the topsoil horizon in test pits TP-1 through TP-3, TP-16 through TP-19, TP-22, and TP-23 and soil borings B-1 through B-5 was material belonging to the Willamette Formation. In explorations, the Willamette Formation soils generally consisted of light brown, clayey silt (ML) characterized by a stiff to very stiff consistency, soft to stiff sandy silt, and loose silty sand (SM). Willamette Formation materials tend to be highly moisture sensitive. Soils belonging to the Willamette Formation extended to depths of approximately 3 to 25 feet in test pits TP-1 through TP-3, TP-19, and TP-23 and soil borings B-1 through B-5 and beyond the maximum depth of exploration in test pits TP-16 through TP-18 and TP-22 (15 to 15.5 feet).

Residual Soil of Boring Lava Formation: Underlying the topsoil horizon in test pits TP-4 through TP-14 was residual soil derived from in place weathering of the underlying Boring Lava Formation. These soils generally consisted of light reddish brown to gray clayey silt (ML) to silty clay (CL) with basalt fragments typically exhibiting a stiff to very stiff consistency and silty gravel boulders (GM) that had a medium dense to dense relative density. The residual soil of the Boring Lava Formation extended to depths of 3 to 5 feet in test pits TP-4 through TP-14.

Boring Lava Formation: The residual soil of the Boring Lava in test pits TP-4 through TP-14 and the topsoil horizon in test pit TP24 was underlain by weathered basalt belonging to the Boring Lava Formation. In test pits TP-4 through TP-14 and TP-24, the gray to brown basalt contained trace silty clay to clayey silt matrix and was weathered to extremely soft (R0) to soft (R2) according to the ODOT Rock Hardness Chart (Table 1). Occasionally, less weathered boulders that were medium hard (R3) to hard (R4) were encountered. Excavation was generally achievable in Boring Lava material to depths of 15 to 25 feet; however, practical refusal was encountered with a large sized trackhoe on these boulders in test pits TP-7 and TP-14 at depths of 19 and 21 feet, respectively. Basalt belonging to the Boring Lava Formation extended to a depth of 2 feet in test pit TP-24 and beyond the maximum depth of exploration in test pits TP-4 through TP-14 (15 to 25 feet). The depth at which rock belonging to the Boring Lava Formation was first encountered and the depth at which practical refusal was achieved is presented in Table 2.

Table 2. Depth of Basalt Bedrock Encountered in Explorations

Test Pit	Depth Rock First Encountered (feet)	Depth of Practical Refusal on Medium Hard (R3) to Hard (R4) Basalt (feet)
TP-4	5	>25
TP-5	3.5	>15
TP-6	3.5	>15
TP-7	3.5	19 (R3 Boulder)
TP-8	4	>25
TP-9	3.5	>15
TP-10	3.5	>16.5
TP-11	3.5	>15
TP-12	3	>15
TP-13	3.5	>24
TP-14	4	21 (R3 to R4 Boulder)
TP-24	1	Springwater Formation materials encountered below 2’

Springwater Formation: Underlying the topsoil horizon in test pit TP-15; the landslide debris in test pits TP-20 and TP-21; the Willamette Formation in test pits TP-1 through TP-3, TP-19, and TP-23 and soil borings B-1 through B-5; and the Boring Lava Formation in test pit TP-24 was material belonging to the Springwater Formation. This material generally consisted of light brown to gray silty clay (CL), clayey silt (ML), fat clay (CH), silty sand (SM), silty gravel (GM), and gravel conglomerate (GP) with a medium dense relative density or medium stiff to very stiff consistency. The Springwater Formation extended to a depth of approximately 35 to 50 feet in soil borings B-3 through B-5 and beyond the maximum depth of exploration in test pits TP-1 through TP-3, TP-15, TP-19 through TP-21, TP-23, and TP-24 (15 to 29 feet) and soil borings B-1 and B-2 (51.5 feet).

> ***Fat Clay:*** Fat clay (CH) was encountered within and underlying the Springwater Formation in test pits TP-2, TP-23, and TP-24. The fat clay was stiff to very stiff, gray in color, and extended to depths of 12 to 15 feet in test pits TP-2 and TP-24 and beyond the depth of exploration in test pits TP-23 (18 feet). Laboratory testing of a sample of the fat clay from test pit TP-2 at a depth of 12 to 13 feet indicates the clay is very highly expansive with an expansion index of 132. Results of laboratory testing are attached at the end of this report.

Weathered Troutdale Formation: Weathered Troutdale Formation soils were encountered beneath the Springwater Formation in soil borings B-3 through B-5. These soils generally consisted of light reddish brown to dark gray, well graded sand (SW) and silty sand (SM). The Troutdale Formation materials were loose to medium dense to very dense with depth. In borings B-3 through B-5, soils belonging to the Troutdale Formation extended beyond the maximum depth of exploration (70.4 to 81.5 feet).

Soil Moisture and Groundwater

Soils encountered in test pits were moist to very moist on October 6, 7, 8, 2020. Perched groundwater seepage was encountered in test pit TP-1 at a depth of 12 feet. Discharge was visually estimated at approximately 1/4 gallon per minute. Mud rotary methods utilized during drilling inhibited the observation of groundwater conditions. Regional groundwater mapping indicates static groundwater is present at a depth of 120 to 280 feet below the existing ground surface (Snyder, 2008). Experience has shown that temporary perched storm-related groundwater conditions often occur within the surface soils over fine-grained native deposits such as those beneath the site, particularly during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors.

INFILTRATION TESTING

Soil infiltration testing was performed using the open hole infiltration method in test pits TP-1, TP-3, TP-7, and TP-9 at depths of 15, 19, and 20 feet. The soil was pre-saturated for a period of over 3 hours. The water level was measured to the nearest tenth of an inch every fifteen minutes to half hour with reference to the ground surface. Table 3 presents the results of our falling head infiltration testing.

Table 3. Summary of Infiltration Test Results

Test Pit	Depth (feet)	Soil Type	Infiltration Rate (in/hr)	Hydraulic Head Range (inches)
TP-1	20	Sandy SILT (ML)	0	27-28
TP-3	20	Sandy SILT (ML), trace clay	0	28-29
TP-7	19	Weathered BASALT, trace silt to clay matrix	0	15
TP-9	15	Weathered BASALT, trace silt to clay matrix	0	9

Slope Stability

The subject site is designated as being within a Geohazard Zone by the City of Oregon City (OCWebMaps, 2022). Slopes exceeding 25% grade are mapped along the southwest facing central portion of the site and along the tributary drainages in the southern and western portions of the site. Landslide areas are mapped in the northwestern portion of the site.

For the purpose of evaluating slope stability, we reviewed 1:24,000 scale topographic mapping by the U.S. Geological Survey (Figure 1), Lidar based high resolution digital elevation maps (Figure 2), and 1:720 scale topographic mapping provided by AKS Engineering and Forestry, LLC. (Figure 3), reviewed published geologic mapping and the Oregon Department of Geology and Mineral Industries (DOGAMI) Landslide Database (Figure 2), performed a field reconnaissance, and explored subsurface conditions at the site with twenty four exploratory test pits and five exploratory borings, the locations of which are presented on Figure 3.

Landslide inventory mapping of the Oregon City Quadrangle and the statewide landslide database indicate three mapped landslides are present at the site (Madin and Burns, 2006; Burns and Madin, 2009; Madin, 2009; Burns and Mickelson, 2010; DOGAMI Slido, 2022). Two prehistoric (greater than 150 years old) landslides are mapped along a tributary drainage of Tour Creek in the western portion of the site, as presented on Figure 2 (Madin and Burns, 2006; Burns and Madin, 2009; Madin, 2009; Burns and Mickelson, 2010; DOGAMI Slido, 2022). This landslide complex is identified as Oregon_City_272 and 290 and are both classified as being earth slide rotational slides with an earth flow component, and having a failure depth of 25 and 35 feet (DOGAMI Slido, 2022). Another smaller earth flow type slide (identified as Oregon_City_274) that is considered to be historic in age (with movement in the last 150 years) is present along the Tour Creek tributary drainage to the southwest of the larger landslide (DOGAMI Slido, 2022). DOGAMI estimates the slide to be shallow with a failure depth of 7 feet; however, our explorations indicate a failure depth of 20 feet. We observed that the downslope portion of this landslide has experienced relatively recent reactivation, as evidenced by a scarp about 4 feet tall and approximately 40 feet across near the bottom of the east side of the drainage (Figure 3). Our observations indicate that erosion has been occurring at the toe of this landslide and that the landslide is marginally stable at best.

On the slopes of the northwest drainage, we observed many signs of slope creep and instability even outside of the areas of existing landslides. We observed many leaning and bowed trees. We also observed that several of the drainages leading down the western slopes to the bottom of the larger drainage were incised by erosion.

Our reconnaissance and review of Lidar based high resolution digital elevation maps (DOGAMI, 2022) indicate slopes on either side of the Tour Creek tributary drainage exhibit geomorphology indicative of prior, shallow instability and slope creep. We observed the presence of a previously unmapped landslide on the west side of the drainage. This landslide appears to extend all the way down to the bottom of the drainage. The approximate location of this previously unmapped landslide is shown on Figure 3. A small tributary drainage to Abernethy Creek is located in the southern portion of the site and some evidence of shallow slope creep was observed along the drainage. Elsewhere on the property, away from the drainages, topography is smooth and uniform. In these areas, away from the drainages, no evidence of recent movement (ground cracks, scarps, or hummocky topography) was observed during our reconnaissance.

Subsurface exploration indicates that the ground surface in the portions of the site above an elevation of 360 feet mean sea level is underlain by residual soil and basalt rock of the Boring Lava Formation. Topography in Boring Lava areas is flat to moderately sloping with grades up to 20 percent. Pocket penetrometer measurements of the residual soil of the Boring Lava Formation indicate an approximate unconfined compressive strength of 1.5 to 4.5 tons/ft^2 which correlates to a stiff to very stiff consistency. The residual soil of the Boring Lava was underlain by weathered, basalt bedrock in test pits TP-4 through TP-14 to the maximum depth of exploration (15 to 25 feet). Boring Lava Formation materials are considered to have moderate to high shear strength and a moderate to high resistance to slope instability along moderately steep slopes.

The moderately sloping, southwest facing slope in the central portion of the site is underlain by soils belonging to the Springwater Formation. Slope areas exceeding 25% grade are present in the central portion of the site (OCWebMaps, 2022). The fluvial depositional nature of this formation result in variable soil types consisting of silt, clay, gravel conglomerate, highly weathered volcanic rock, and sand. Fine grained soils encountered in explorations were medium stiff to very stiff with some soft to medium stiff soil zones encountered at depth. Granular materials were medium dense to dense. Two wetland areas were observed to the south of test pit TP-24 indicating the presence of perched groundwater conditions. The Springwater Formation is considered to have a moderate shear strength and moderate resistance to slope instability along moderate slopes.

The Troutdale Formation, which underlies the site at depth, includes a thick sequence of weak sedimentary strata that are prone to instability on moderate to steep slopes. Regionally, many large landslides are mapped within the Troutdale Formation primarily on the side slopes of drainages where stream erosion has deeply incised the formation and created oversteepened slopes (Schlicker and Finlayson, 1979; Madin, 1994; Madin and Burns, 2006). In areas where the Troutdale Formation is capped by Boring Lava, these landslides are known to propagate upslope by undermining large blocks of Boring Lava Formation. At the Park Place Subdivision, the Troutdale and Boring Lava Formations are separated by an intermediary Springwater Formation material; however the large landslide mass in the along the northwestern tributary drainage likely resulted from failure of steeply sloping exposures of the Troutdale Formation.

Surficial soils in the southwestern portion of the site are underlain by silt belonging to the Willamette Formation. These materials are moisture sensitive and become medium stiff as moisture levels increase and soft soils were encountered in several explorations adjacent to the tributary drainages (test pit TP-1 and soil borings B-1, B-3, and B-5). Willamette Formation soils are considered moderately resistant to slope instability on gentle slopes.

In our opinion, the slope instability hazard at the majority of the subject site, away from incised drainages, is low. Underlying geologic conditions are suitable for development providing our recommendations in this report are followed. Existing Boring Lava and Springwater Formation materials underlying sloping areas are stiff to very stiff or medium dense to dense. Willamette Formation materials on gently sloping areas are medium stiff to very stiff. No evidence of recent landslide movement was observed outside drainage areas. It is our opinion that the potential instability from neighboring properties will have a low probability to negatively impact the proposed development.

CONCLUSIONS AND RECOMMENDATIONS

Our investigation indicates that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Noteworthy geotechnical issues associated with this site include:

1) It is our understanding that some relatively small, isolated areas with slopes steeper than 25 percent have been identified on OCWebmaps. One of these areas is located in the central portion of the site and the others are located in the southeast portion of the site. Soil conditions near the slope area in the central portion of the site will be investigated at a later date. Mass grading in these portions of the site will generally involve the construction of engineered fill slopes in these areas, although a few cut slopes are also proposed. Fill slopes will likely be constructed of native soils and will be graded no steeper than 2H:1V (Horizontal to Vertical). Cut slopes will be excavated into native soils and will be graded no steeper than 2H:1V. At these gradients, constructed of the appropriate materials, keyed, benched, and with proper drainage measures installed, cut and fill slopes should remain grossly and surficially stable. Based on our understanding of the proposed grading in the vicinities of the subject slope areas, which are currently steeper than 25 percent, it is our opinion that the proposed cuts and fills are generally practicable and adequate factors of safety will be maintained. We anticipate that stability of these areas of existing slopes will be adequate to support the proposed design/layout.

2) The presence of existing landslides and soft soils, and evidence of slope creep, in the drainage in the northwest portion of the site. We confirmed the presence of mapped landslide Oregon_City_272, 290, and 274 and landslide debris was encountered in test pits TP-20 and TP-21 to depths of 20 and 24 feet. Recent reactivation was observed at the toe of Oregon_City_274 and a previously unmapped landslide was observed on the west side of the drainage. Signs of soil creep and instability including leaning and bowed trees were observed along the northwest drainage outside previously mapped slide areas. Active erosion is occurring along the western slope of the drainage, which may be caused by soft soils underlying the slope. Very soft to soft soils were encountered in borings B-3 and B-5 located adjacent to the drainage.

   Our quantitative slope stability analysis indicates adequate factors of safety can be maintained with slope setbacks for residences and fill placement adjacent to the northwest drainage. As shown on Figure 3, the slope setback line for the northwest drainage can be shifted to accommodate the proposed design/layout, provided that a slope stabilization system is installed for the relevant lots. For preliminary planning purpose, the slope stabilization system is to include soldier pile walls with tiebacks.

   The planned design/layout appears to meet the slope setback requirements, provided that the slope stabilization system is installed along the relevant portion of the northwest drainage.

3) Slopes in the drainage in the southeast portion of the site are marginally stable in their existing condition. Unless remedial measures are implemented, setback distances for fill placement and for residences should be maintained. The planned design/layout appears to meet the slope setback requirements for the drainage in the southeast portion of the site.

4) The presence of soft soils near the drainage in the southeast portion of the site.

5) The presence of large boulders in the native Boring Lava Formation in the central and northeastern portions of the site. Weathered basalt bedrock was encountered throughout the site at elevations above 350 feet msl. Basalt was first encountered at depths of 3 to 5 feet and practical refusal was achieved with a large excavator on medium hard (R3) to hard (R4) basalt boulders at depths of 19 and 21 feet in test pits TP-7 and TP-14, respectively. Difficult excavating conditions should be expected at depth.

6) Low permeability soils. The results of our infiltration testing indicate on site soils exhibit low permeability with a high probability of silting up over time.

7) The potential to encounter highly expansive, fat clay soils. Fat clay soils were encountered in test pits TP-2, TP-20, TP-21, TP-23, and TP-24. Laboratory testing of the fat clay from test pit TP-2 indicates the soil has a very high expansion potential; however, areas of highly expansive soils may be encountered in other areas of the site. If encountered, the recommendations for fat clay soils determined to be highly expansive in structural areas are as follows: (1) remove the material and replace it with low to medium expansivity soil/engineered fill, (2) separate footings from the expansive soils by ensuring there is at least 5 feet of engineered fill and/or native, low to medium expansivity soil overlying the highly expansive clay, (3) chemically stabilize the soils with hydrated lime or alternate chemical additives such as Condor SS, or (4) blend with low expansivity soils. Expansive soils can remain beneath flexible pavement areas and backyards where expansion will have a minor impact on improvements.

While some areas of the site may require additional study to evaluate proposed grading, stormwater ponds, retaining walls, etc., it is our opinion that the proposed cuts and fills are generally practicable.

Slope Stability

A reconnaissance of the site was performed on October 6-8, 2020. The subject site generally slopes to the southwest, towards a tributary drainage to Tour Creek, which is located along the western property line (Figures 1 and 2). A tributary drainage to Abernethy Creek is located in the southern portion of the site. Slope geomorphology is characterized by gently to moderately sloping topography with grades of about 5 to 25 percent with short slopes up to approximately 50 percent grade adjacent to the drainages. A wetland area indicating the potential presence of a spring was observed in the central portion of the site to the south of test pit TP-24.

Three landslides are mapped by DOGAMI in the northwestern portion of the site (Figure 2). Subsurface explorations indicate that the landslides have failure depths of 20 to 24 feet where explored in test pits TP-20 and TP-21. Slope geomorphology observed in the tributary drainage included arcuate shaped scarps, subtle benches, and slightly hummocky topography indicative of prior slope movement that had not been previously mapped.

Explorations conducted in the northeastern portion of the site above an elevation of 360 feet msl encountered weathered basalt rock belonging to the Boring Lava Formation, which have a moderate to high resistance to slope instability (Figure 2). The moderately sloping central portion of the site is underlain by Springwater Formation material, which has a moderate resistance to slope instability along moderately sloping topography. The low lying western portion of the site is underlain by Willamette Formation soils that are moderately resistant to slope instability along gentle slopes. Visual reconnaissance and review of Lidar based high resolution digital elevation maps (Figure 2) of the areas of the site away from drainages indicate slopes are generally smooth and uniform (DOGAMI, 2022).

It is our opinion that areas mapped as slope hazard zones can safely be graded, provided that our recommendations are implemented. Our slope stability analysis indicates adequate factors of safety can be maintained around landslide areas by maintaining a setback for structures and fill placement.

Quantitative Slope Stability Modeling

Quantitative slope stability modeling and analyses were performed to evaluate slope stability on the sides of the drainages in the northwest and southwest portions of the site using the SLOPE/W computer program developed by Geo-Slope International of Calgary, Canada. This numerical analysis program utilizes a two-dimensional limiting equilibrium method to calculate the factor of safety of a potential slip surface and incorporates search routines to identify the most critical potential failure surfaces for the cases analyzed. Factors of safety were calculated using Morgenstern-Price method of analysis.

Slope topography, subsurface geometry, and other conditions modeled in the analyses are based on our subsurface explorations, geologic cross sections A-A', B-B', C-C', and D-D' and results of laboratory testing. Shear strength parameters used in the models were selected based on SPT N-value correlations, laboratory testing, and our local experience with similar soil and geologic conditions. The parameters assumed in the stability calculations including parameters for engineered fill are summarized in Table 4.

Table 4. Summary of Estimated Soil Strength Parameters

Geologic Unit	Unit Weight (pcf)	Friction Angle	Cohesion (psf)
Stiff Willamette Formation	120	28°	0
Willamette Formation	125	22°	0
Soft-Medium Stiff Springwater Formation	125	24°	0
Stiff Springwater Formation	125	36°	300
Loose Troutdale Formation	120	30°	150
Medium Dense – Very Dense Troutdale Formation	125	36°	200

Based on the results of our slopes stability analyses, our recommended setback distances for the existing conditions (without remediation) are summarized on Table 5 and shown on Figures 3 and 4.

Table 5. Recommended Setback Distances for Existing Conditions

Area of Site	Minimum Setback Distance for Residences and/or Fill Placement (ft)
Section B-B' Vicinity of Soil Boring B-3	100
Section C-C' Vicinity of Soil Boring B-4 and Landslide Oregon_City_274	80
Section D-D' Vicinity of Soil Boring B-5	60
Vicinity of Landslides Oregon_City_272 and _290	100

With the implementation of slope stabilizations measures, the setback distances can be decreased. It is our understanding that soldier pile retaining walls with tiebacks are proposed on the side of the northwest drainage in the vicinity of section B-B'. At this time, it is our understanding that no slope stabilization measures are proposed in the vicinities of sections A-A', C-C', or D-D'. The reduced setback distance for section B-B' after the implementation of slope stabilization measures is presented on Table 6 and is shown on Figure 3.

Table 6. Recommended Setback Distances for Existing Conditions

Area of Site	Minimum Setback Distance for Residences and/or Fill Placement after Implementation of Slope Stabilization Measures (ft)
Section B-B' Vicinity of Soil Boring B-3	40

<u>Slope Stabilization Systems Lots Near B-3</u>

Based on consultation with the project civil engineer, AKS Engineering & Forestry, it is our understanding that a trail and sewer utility line are proposed across the drainage in the northwest portion of the site in the same alignment, and will connect to an existing development to the east of the drainage.

Since the slopes of the drainage in the northwest portion of the site do not have adequate factors of safety for slope stability in their existing condition, slope stabilization systems are necessary to support the construction of the trail and the installation of the sewer utility line. Permanent soldier pile retaining walls are recommended to provide adequate factors of safety for the proposed sewer line.

The utilization of slope stabilization systems to support the construction of the trail and the installation of the sewer utility line would also sufficiently increase the factor of safety for slope stability on many lots in the vicinity of soil boring B-3. The adjusted slope setback line is shown on Figure 3.

Site Preparation

Areas of proposed buildings, streets, and areas to receive fill should be cleared of vegetation and any organic and inorganic debris. Encountered undocumented fills and any subsurface structures (dry wells, drainage tiles, old utility lines, septic leach fields, etc.) should be removed and the excavations backfilled with engineered fill. Undocumented fill was not encountered in our test pit explorations; however, areas of fill may be present outside our explorations, especially in the vicinity of the existing access driveways.

Organic-rich topsoil should then be stripped from native soil areas of the site. The estimated depth range necessary for removal of topsoil in cut and fill areas is approximately 6 to 9 inches, respectively. Greater stripping depths may be necessary in the southern portion of the site, which was formerly densely treed. The final depth of soil removal will be determined on the basis of a site inspection after the stripping/ excavation has been performed. Stripped topsoil should preferably be removed from the site due to the high density of the proposed development. Any remaining topsoil should be stockpiled only in designated areas and stripping operations should be observed and documented by the geotechnical engineer or his representative.

Once topsoil stripping and removal of organic and inorganic debris and undocumented fill soils are approved in a particular area, the area must be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of engineered fill or crushed aggregate base for pavement. Exposed subgrade soils should be evaluated by the geotechnical engineer. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition, over-excavated and replaced with engineered fill (as described below), or stabilized with rock prior to placement of engineered fill. The depth of overexcavation, if required, should be evaluated by the geotechnical engineer at the time of construction.

Engineered Fill

In general, we anticipate that soils from planned cuts and utility trench excavations will be suitable for use as engineered fill provided they are adequately moisture conditioned prior to compacting. All grading for the proposed construction should be performed as engineered grading in accordance with the applicable building code at time of construction with the exceptions and additions noted herein. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 95% of the maximum dry density determined by ASTM D698 (Standard Proctor) or equivalent. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency.

Site earthwork will be impacted by soil moisture and shallow groundwater conditions. Earthwork in wet weather would likely require extensive use of cement or lime treatment, or other special measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

Excavating Conditions and Utility Trenches

We anticipate that on-site soils can be excavated using conventional heavy equipment such as scrapers and trackhoes. The Boring Lava Formation is known for large, hard boulders that may hamper deep excavations such as utility trenching. Highly weathered basalt bedrock was encountered in test pits above an elevation of 360 feet msl at depths of 3 to 5 feet. The large excavator utilized for test pits TP-4 through TP-14 was able to achieve depths of 24 to 25 feet; however, practical refusal was encountered on medium hard (R3) to hard (R4) basalt boulders at depths of 19 and 21 feet in test pits TP-7 and TP-14, respectively. Difficult excavating conditions should be expected.

All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926) or be shored. The existing native, near surface soils are classified as Type B Soils and temporary excavation side slope inclinations as steep as 1.5H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above groundwater seepage zones only. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions.

Medium stiff, sandy silt that was very moist was encountered in Willamette Formation soils (test pits TP-1, TP-16 through TP-19, TP-22, and TP-23 and soil borings B-1 and B-5) and caving of the test pit walls was observed. Adequate shoring should be maintained. Soft, saturated soils and groundwater may be encountered in utility trenches, particularly during the wet season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of perched groundwater. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater. Trench bottom stabilization, such as one to two feet of compacted crushed aggregate base, may be necessary in deeper trenches.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that trench backfill be compacted to at least 95% of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. Initial backfill lift thickness for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion except in areas of moderately to steeply sloping topography. In our opinion, the primary concern regarding erosion potential will occur during construction, in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw wattles and silt fences. If used, these erosion control devices should be in place and remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

Wet Weather Earthwork

Soils underlying the site are likely to be moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than 5 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and

- Straw wattles and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

Spread Foundations

Slope setbacks of are necessary to maintain adequate factors of safety under static and pseudostatic conditions for home construction in the western portion of the site, as previously discussed. The proposed residential structures may likely be supported on shallow foundations bearing on competent undisturbed, native low expansivity soils and/or engineered fill, appropriately designed and constructed as recommended in this report. Very highly expansive soils were encountered at depths below 8 to 16 feet in test pits TP-2, TP-20, TP-21, TP-23 and TP-24. If encountered, the recommendations for fat clay soils determined to be highly expansive in structural areas are as follows: (1) remove the material and replace it with low to medium expansivity soil/engineered fill, (2) separate footings from the expansive soils by ensuring there is at least 5 feet of engineered fill and/or native, low to medium expansivity soil overlying the highly expansive clay, (3) chemically stabilize the soils with hydrated lime or alternate chemical additives such as Condor SS, or (4) blend with low expansivity soils. Expansive soils can remain beneath flexible pavement areas and backyards where expansion will have a minor impact on improvements.

Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 12 inches below exterior grade. The recommended minimum widths for continuous footings supporting wood-framed walls without masonry are 12 inches for single-story, 15 inches for two-story, and 18 inches for three-story structures. Minimum foundation reinforcement should consist of a No. 4 bar at the top of the stem walls, and a No. 4 bar at the bottom of the footings. Concrete slab-on-grade reinforcement should consist of No. 4 bars placed on 24-inch centers in a grid pattern.

The anticipated allowable soil bearing pressure is 1,500 lbs/ft^2 for footings bearing on competent, nonexpansive native soil and/or engineered fill. A maximum chimney and column load of 40 kips is recommended for the site. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. For heavier loads, the geotechnical engineer should be consulted. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.42, which includes no factor of safety. The maximum anticipated total and differential footing movements (generally from soil expansion and/or settlement) are 1 inch and ¾ inch over a span of 20 feet, respectively. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied. Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings.

Footing excavations should penetrate through topsoil and any loose soil to competent subgrade that is suitable for bearing support. All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require overexcavation of footings and backfill with compacted, crushed aggregate.

Our recommendations are for house construction incorporating raised wood floors and conventional spread footing foundations. If living space of the structures will incorporate basements, a geotechnical engineer should be consulted to make additional recommendations for retaining walls, water-proofing, underslab drainage and wall subdrains. After site development, a Final Soil Engineer's Report should either confirm or modify the above recommendations.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation and Undocumented Fill Removal* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock.

For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 150 kcf (87 pci) should be assumed for the medium stiff native silt soils anticipated at subgrade depth. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of crushed rock of 8 inches beneath the slab.

Interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of ODOT open graded aggregate per ODOT Standard Specifications 02630-2. The minimum recommended thickness of capillary break materials on re-compacted soil subgrade is 8 inches. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90% of its maximum dry density as determined by ASTM D1557 or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

Permanent Below-Grade Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater.

If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained wall, an at-rest equivalent fluid pressure of 55 pcf should be used in design, again assuming level backfill against the wall. These values assume that drainage provisions are incorporated, free draining gravel backfill is used, and hydrostatic or expansive soil pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 6.5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 320 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and GeoPacific should be contacted for additional recommendations.

A coefficient of friction of 0.42 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build-up. This can be accomplished by placing a 12 to 18-inch wide zone of sand and gravel containing less than 5 percent passing the No. 200 sieve against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a suitable discharge point to remove water in this zone of sand and gravel. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging.

Wall drains are recommended to prevent detrimental effects of surface water runoff on foundations – not to dewater groundwater. Drains should not be expected to eliminate all potential sources of water entering a basement or beneath a slab-on-grade. An adequate grade to a low point outlet drain in the crawlspace is required by code. Underslab drains are sometimes added beneath the slab when placed over soils of low permeability and shallow, perched groundwater.

Water collected from the wall drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the wall drains in order to reduce the potential for clogging. The drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building.

GeoPacific should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Structures should be located a horizontal distance of at least 1.5H away from the back of the retaining wall, where H is the total height of the wall. GeoPacific should be contacted for additional foundation recommendations where structures are located closer than 1.5H to the top of any wall.

Pavement Design

For design purposes, we used an estimated resilient modulus of 7,500 for compacted native soil. Table 7 presents our recommended minimum dry-weather pavement section for light-duty public streets. For streets subjected to loading from traffic other than passenger cars and occasional emergency vehicles and delivery vehicles, GeoPacific should be consulted to provide additional recommendations.

Table 7. Recommended Minimum Dry-Weather Pavement Section for Light-Duty Streets

Material Layer	Section Thickness (in)	Compaction Standard
Asphaltic Concrete (AC)	3	92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾”-0 (leveling course)	2	95% of Modified Proctor AASHTO T-180
Crushed Aggregate Base 1½”-0	8	95% of Modified Proctor AASHTO T-180
Subgrade	12	95% of Standard Proctor AASHTO T-99 or equivalent

Any pockets of organic debris or loose fill encountered during ripping or tilling should be removed and replaced with engineered fill (see *Site Preparation* Section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving. If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The moisture sensitive subgrade soils make the site a difficult wet weather construction project.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one asphalt compaction test is performed for every 100 to 200 linear feet of paving.

Seismic Design

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2022 Statewide GeoHazards Viewer indicates that the site is in an area where *very strong* ground shaking is anticipated during an earthquake. Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2018 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2019). We recommend Site Class D be used for design as defined in ASCE 7, Chapter 20, Table 20.3-1. Design values determined for the site using the ATC (Applied Technology Council) *ASCE7-16 Hazards by Location online Tool* website are summarized in Table 8.

Table 8. Recommended Earthquake Ground Motion Parameters (ATC 2022)

Parameter	Value
Location (Lat, Long), degrees	45.367, -122.563
Mapped Spectral Acceleration Values (MCE):	
Peak Ground Acceleration PGA_M	0.454 g
Short Period, S_s	0.821 g
1.0 Sec Period, S_1	0.367 g
Soil Factors for Site Class D:	
F_a	1.172
F_v	1.933*
$SD_s = 2/3 \times F_a \times S_s$	0.641 g
$SD_1 = 2/3 \times F_v \times S_1$	0.473 g*
Seismic Design Category	D

* The F_v value reported in the above table is a straight-line interpolation of mapped spectral response acceleration at 1-second period, S_1 per Table 1613.2.3(2) of OSSC 2019 with the assumption that Exception 2 of ASCE 7-16 Chapter 11.4.8 is met. SD_1 is based on the F_v value. The structural engineer should evaluate exception 2 and determine whether or not the exception is met. If Exception 2 is not met, and the long-period site coefficient (F_v) is required for design, GeoPacific Engineering can be consulted to provide a site-specific procedure as per ASCE 7-16, Chapter 21.

Soil Liquefaction

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2022 Statewide GeoHazards Viewer indicates that the site is considered to not have a risk for soil liquefaction. Our explorations indicate that the soils underlying the site are not susceptible to liquefaction.

Other Potential Seismic Impacts

Other potential seismic impacts include fault rupture potential. However, based on our review of available geologic literature, we are not aware of any mapped active (demonstrating movement in the last 10,000 years) faults on the site. During our field investigation, we did not observe any evidence of surface rupture or recent faulting. Therefore, we conclude that the potential for fault rupture on site is very low.

Footing and Roof Drains

Construction should include typical measures for controlling subsurface water beneath the homes, including positive crawlspace drainage to an adequate low-point drain exiting the foundation, visqueen covering the expose ground in the crawlspace, and crawlspace ventilation (foundation vents). The homebuyers should be informed and educated that some slow flowing water in the crawlspaces is considered normal and not necessarily detrimental to the home given these other design elements incorporated into its construction. Appropriate design professionals should be consulting regarding crawlspace ventilation, building material selection and mold prevention issues, which are outside GeoPacific's area of expertise.

Down spouts and roof drains should collect roof water in a system separate from the footing drains to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point and storm system well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

If the proposed structures will have a raised floor, and no concrete slab-on-grade floors in living spaces are used, perimeter footing drains would not be required based on soil conditions encountered at the site and experience with standard local construction practices. Where it is desired to reduce the potential for moist crawl spaces, footing drains may be installed. If concrete slab-on-grade floors are used, perimeter footing drains should be installed as recommended below.

Where necessary, perimeter footing drains should consist of 3 or 4-inch diameter, perforated plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. In our opinion, footing drains may outlet at the curb, or on the back sides of lots where sufficient fall is not available to allow drainage to meet the street.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.

Beth K. Rapp, C.E.G.
Senior Engineering Geologist

Benjamin G. Anderson, P.E.
Associate Engineer

Attachments:
- References
- Figure 1 – Vicinity Map
- Figure 2 – Lidar Based Vicinity Map – With Mapped Landslides
- Figure 3 – Site Plan, Geologic Map, and Exploration Locations
- Test Pit Logs (TP-1 through TP-24)
- Boring Logs (B-1 through B-5)
- Laboratory Test Results – Expansion Index of Soils
- Slope Stability Analyses – Graphical Plots

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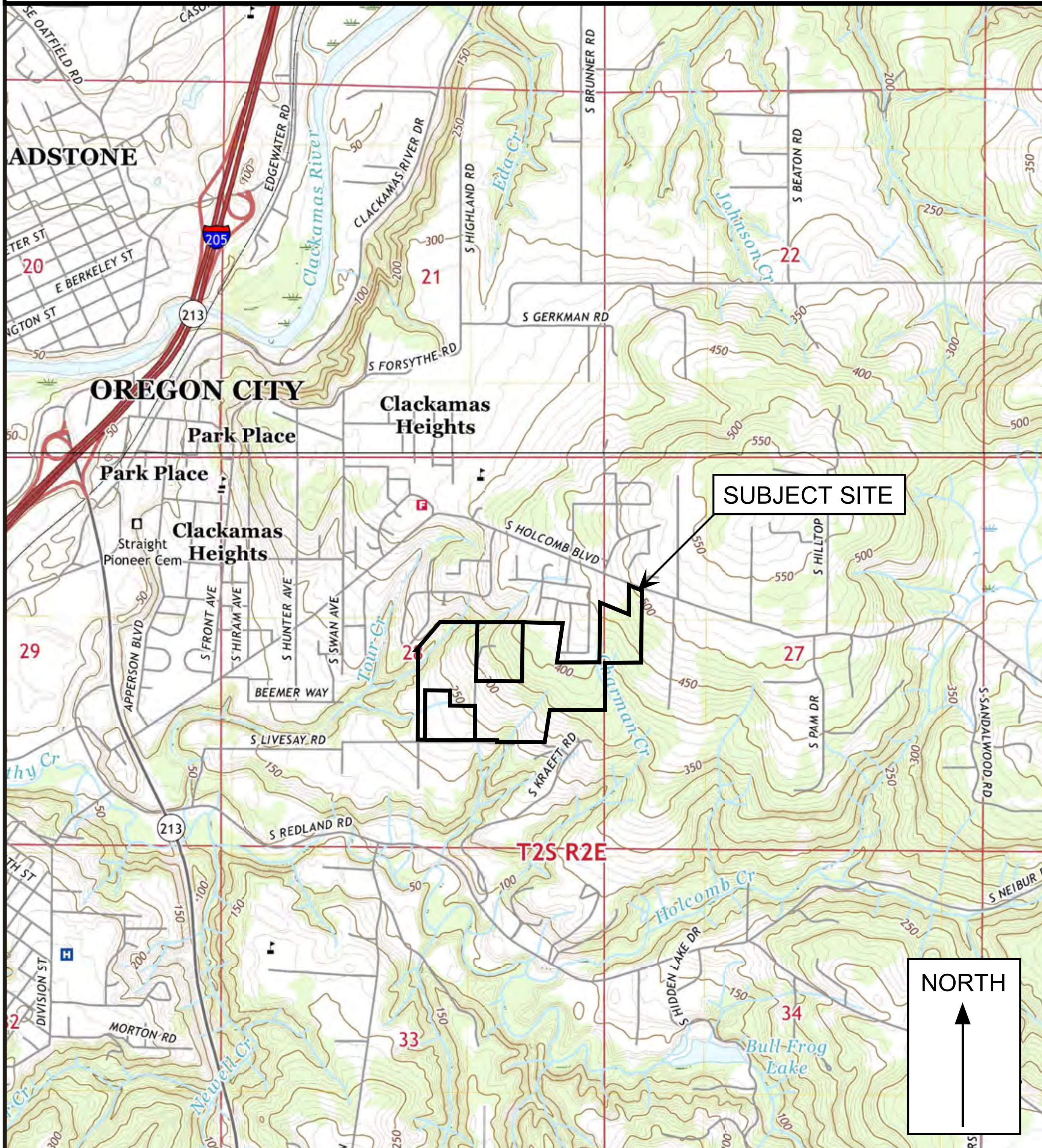
VICINITY MAP



Legend

Approximate Scale 1 in = 2,000 feet

Date: 02/24/22
Drawn by: EKR/BGA

Base map: U.S. Geological Survey 7.5 minute Topographic Map Series, Gladstone, Oregon Quadrangle, 2020 and Oregon City, Oregon Quadrangle, 2020.

Project: Park Place Crossing General Development Plan Oregon City, Oregon	Project No. 20-5600	FIGURE 1

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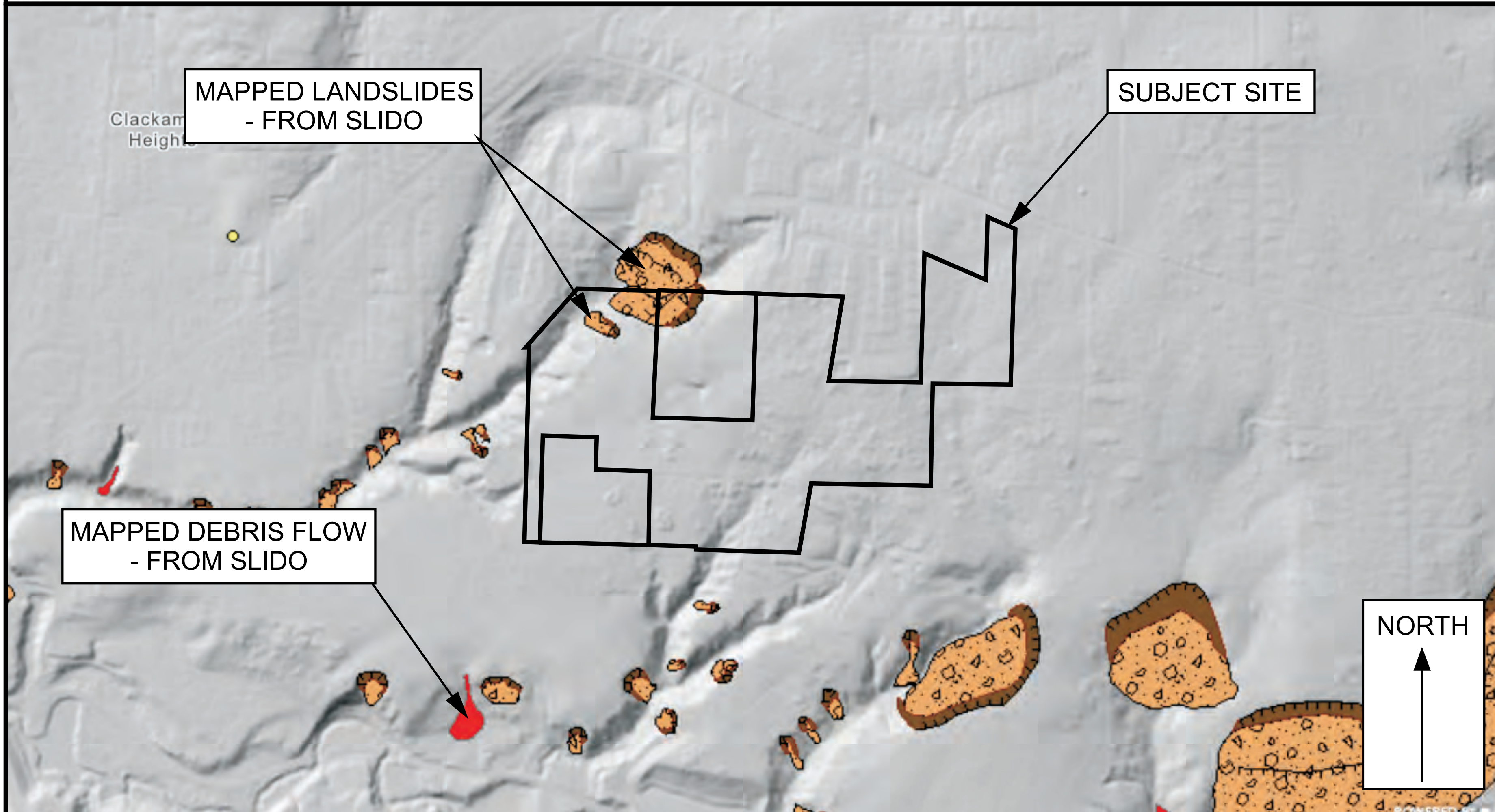
LIDAR BASED VICINITY MAP - WITH MAPPED LANDSLIDES



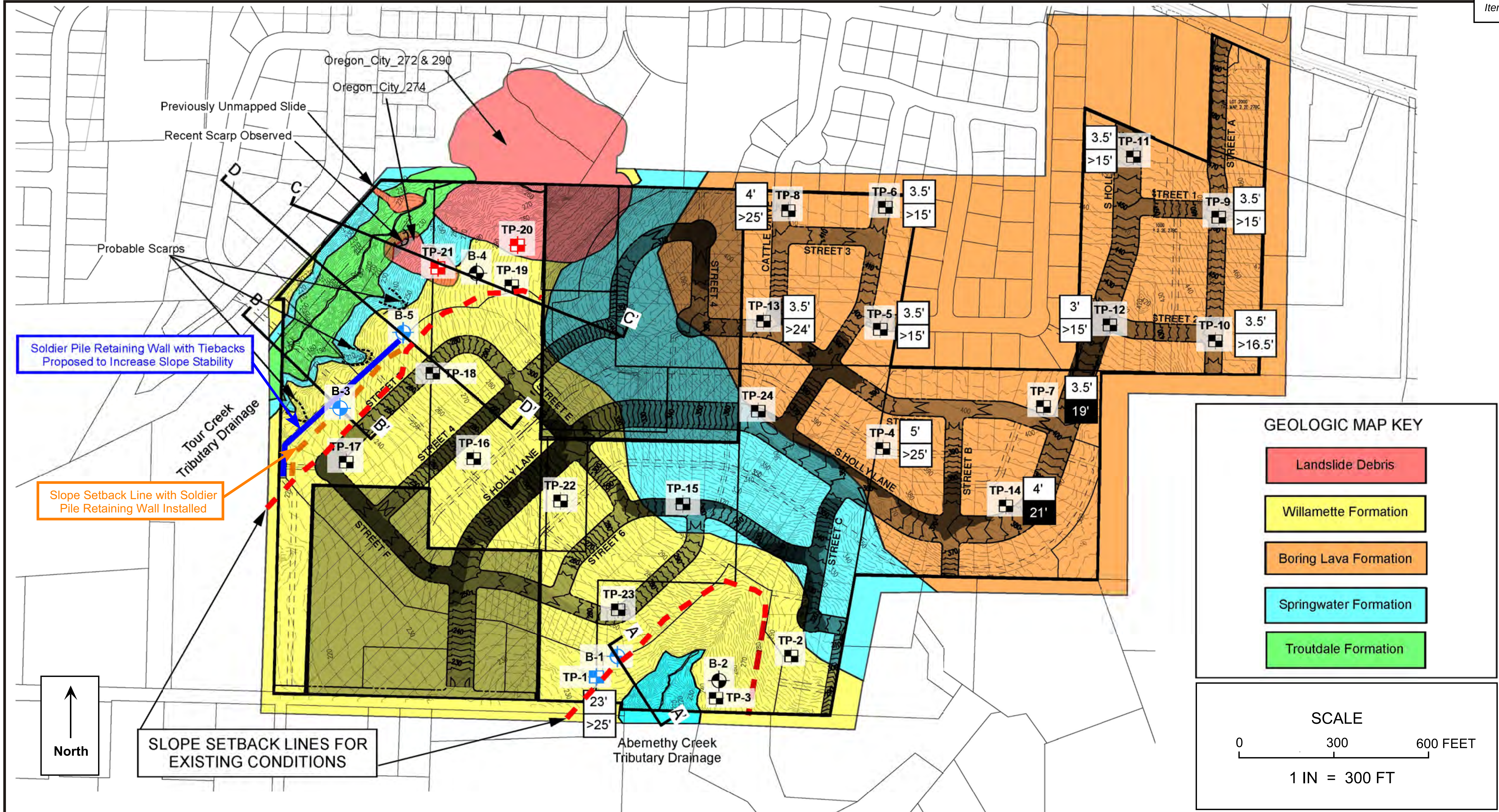
Legend

Approximate Scale 1 in = 1,000 ft

Date: 5/28/2021
Drawn by: EKR

Base map: Oregon Department of Geology and Mineral Industries, 2021, Statewide Landslide Information Database for Oregon (SLIDO): https://gis.dogami.oregon.gov/maps/slido/

Project: Park Place Crossing General Development Plan Oregon City, Oregon	Project No. 20-5600	FIGURE 2



Legend

TP-1 Test Pit Designation and Approximate Location

B-1 Boring Designation and Approximate Location

Landslide Debris Encountered

Soft Soils Encountered

3.5' = Depth at Which Rock is First Encountered

15.5' = Depth of Practical Refusal on Rock

>25'= Depth is Beyond Maximum Exploration Depth

19' = Depth of Practical Refusal on Boulder

Note: Location of all geotechnical information is approximate.

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SITE PLAN, GEOLOGIC MAP, AND EXPLORATION LOCATIONS

Project: Park Place Crossing General Development Plan, Oregon City, Oregon

Project No. 20-5600

FIGURE 3

Item #1.

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-1**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.5					Moderately organic, SILT (OL-ML), dark brown, trace roots throughout, loose, moist (Topsoil Horizon)
2	4.0					Stiff to very stiff, clayey SILT (ML), light brown, micaceous, strong orange and gray mottling, trace black staining, moist (Willamette Formation)
3	4.0					
4	4.5					
5						
6						Medium stiff to very stiff, sandy SILT (ML), light brown, micaceous, subtle orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
7						
8						
9						
10						
11						
12					💧	Moderate sidewall caving below 12 feet.
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						Blue gray below 22 feet.
23						
24						Very soft (R1) to soft (R2), GRAVEL CONGLOMERATE, with siltstone and sandstone matrix, yellow brown, strong orange and gray mottling, cobbles up to 6 inches in diameter, trace black staining, moist (Springwater Formation)
25						
26						Test Pit Terminated at 25 Feet.
27						Note: Perched groundwater seepage encountered at 12 feet. Discharge visually estimated at 1/4 gallon per minute.
28						
29						
30						

LEGEND

100 to 1,000 g	5 Gal. Bucket	▯	💧	▨	▽
Bag Sample	Bucket Sample	Shelby Tube Sample	Seepage	Water Bearing Zone	Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

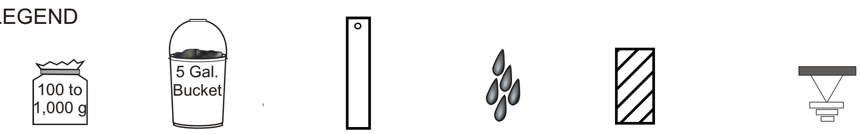
Project: Park Place
Oregon City, Oregon

Project No. 20-5600

Test Pit No. **TP-2**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
1	0.5					Moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, damp (Topsoil Horizon)
2	3.0					
3	3.0					
4	4.5					
5						
6						Medium stiff to very stiff, clayey SILT (ML), light brown, micaceous, strong orange and gray mottling, trace black staining, moist (Willamette Formation)
7						
8						
9						
10						
11						
12						
13						Stiff, FAT CLAY (CH), light brown, sticky, strong orange mottling, trace black staining, damp to moist (Springwater Formation-Very Highly Expansive)
14						
15						
16						Test Pit Terminated at 15 Feet.
17						Note: No seepage or groundwater encountered.
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

LEGEND



Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

Item #1.

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	**Material Description**
1						Moderately organic, SILT (OL-ML), dark brown, trace roots throughout, loose, moist (Topsoil Horizon)
2						
3						
4						
5						
6						Medium stiff to very stiff, sandy SILT (ML), light brown, micaceous, subtle orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						Stiff, FAT CLAY (CH), light brown, sticky, strong orange mottling, trace black staining, with ash fragments, moist (Springwater Formation-Likely Very Highly Expansive)
17						
18						
19						Stiff to very stiff, sandy SILT (ML), trace clay, light brown, strong orange and gray mottling, sugary texture, massive, micaceous, moist (Highly Weathered Springwater Formation)
20						
21						
22						
23						Extremely soft (R0) to very soft (R1), SILTSTONE, yellow brown, horizontal bedding planes preserved, black mineralization, moist (Springwater Formation)
24						
25						
26						Stiff, clayey SILT (ML), gray brown, subtle orange and gray mottling, massive, micaceous, moist (Springwater Formation)
27						
28						
29						Test Pit Terminated at 29 Feet.
30						Note: No groundwater or seepage encountered.

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 10/6-8/2020
Logged By: B. Rapp
Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1	4.5					Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, damp to moist (Topsoil Horizon)
1–5	4.5 4.5 4.5					Medium dense to dense, BOULDERS (GM), with light reddish brown silty clay to clayey silt matrix, gray to brown, trace black staining, boulders are soft (R2) to medium hard (R3) and up to 3 foot diameter, moist (Residual Soil)
5–25						Dense to very dense, very soft (R1) to soft (R2), BASALT, trace reddish brown silty clay to clayey silt matrix, gray brown to red, with medium hard (R3) boulders up to 5 feet diameter, difficult excavating conditions due to large boulders, trace black staining, moist (Boring Lava Formation)
25–30						Test Pit Terminated at 25 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) · Bucket Sample (5 Gal. Bucket) · Shelby Tube Sample · Seepage · Water Bearing Zone · Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-5**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–0.7						Moderately organic, SILT (OL-ML), brown, roots throughout, loose, damp (Topsoil Horizon)
1	3.5					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
2	4.5					
3	4.5					
4	4.5					Stiff to very stiff, extremely soft (R0) to very soft (R1), BASALT, trace reddish brown silty clay to clayey silt matrix, gray to brown, with soft (R2) to medium hard (R3) boulders, trace black staining, moist (Boring Lava Formation)
15						Test Pit Terminated at 15 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) · Bucket Sample (5 Gal. Bucket) · Shelby Tube Sample · Seepage · Water Bearing Zone · Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. TP-6

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–0.7						Moderately organic, SILT (OL-ML), brown, roots throughout, loose, damp (Topsoil Horizon)
1	3.0					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
2	3.5					
3	4.5					
4	4.5					Stiff to very stiff, extremely soft (R0) to very soft (R1), BASALT, trace reddish brown silty clay to clayey silt matrix, trace sand, gray to brown, trace black staining, moist (Boring Lava Formation)
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						Test Pit Terminated at 15 Feet. Note: No seepage or groundwater encountered.
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 10/6-8/2020
Logged By: B. Rapp
Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-7**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately to highly organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
1–3	4.0 (2), 1.5 (3)					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
3–7	4.5 (4)					Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, trace reddish brown silty clay to clayey silt matrix, gray brown to red, trace black staining, moist (Boring Lava Formation)
7–19						Dense to very dense, very soft (R1) to soft (R2), BASALT, trace reddish brown silty clay to clayey silt matrix, gray brown to red, with medium hard (R3) boulders up to 3 feet diameter, difficult excavating conditions due to large boulders, trace black staining, moist (Boring Lava Formation)
19–30						Practical Refusal on Medium Hard (R3) Boulder at 19 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) · Bucket Sample (5 Gal. Bucket) · Shelby Tube Sample · Seepage · Water Bearing Zone · Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-8**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	1.5					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
2	2.0					
3	4.5					
4	4.5					Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, trace reddish brown silty clay to clayey silt matrix, gray brown to red, trace black staining, moist (Boring Lava Formation)
10						With medium hard (R3) boulders up to 3 feet diameter below 10 feet.
23						Dense to very dense, very soft (R1) to soft (R2), BASALT, trace reddish brown silty clay to clayey silt matrix, gray brown to red, with medium hard (R3) boulders, moist (Boring Lava Formation)
25						Test Pit Terminated at 25 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) · Bucket Sample (5 Gal. Bucket) · Shelby Tube Sample · Seepage · Water Bearing Zone · Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-9**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.5					Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
2	2.5					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
3	4.5					
4						
5						
6						Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, with soft (R2) to medium hard (R3) boulders up to 2 feet diameter, trace reddish brown silty clay to clayey silt matrix, trace black staining, moist (Boring Lava Formation)
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						Test Pit Terminated at 15 Feet.
17						Note: No seepage or groundwater encountered.
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 10/6-8/2020
Logged By: B. Rapp
Surface Elevation:

Item #1.

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TEST PIT LOG

Project: Park Place Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-10**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone
1	4.5				
2	4.5				
3	4.5				
4	4.5				

Material Description

Moderately to highly organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)

Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, moist (Residual Soil)

Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, with soft (R2) to medium hard (R3) boulders up to 2 feet diameter, trace reddish brown silty clay to clayey silt matrix, trace black staining, moist (Boring Lava Formation)

Test Pit Terminated at 16.5 Feet.

Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) | Bucket Sample (5 Gal. Bucket) | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-11**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	2.0					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
2	2.5					
3	4.0					
4–15						Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, with soft (R2) to medium hard (R3) boulders up to 1.5 feet diameter, trace reddish brown silty clay to clayey silt matrix, trace black staining, moist (Boring Lava Formation)
10						Very soft (R1) to soft (R2) below 10 feet.
15–30						Test Pit Terminated at 15 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) | Bucket Sample (5 Gal. Bucket) | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. TP-12

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	1.5					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
2	4.5					
3	4.5					Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, with soft (R2) boulders up to 1.5 feet diameter, trace reddish brown silty clay to clayey silt matrix, trace black staining, moist (Boring Lava Formation)
4–14						
15						Test Pit Terminated at 15 Feet. Note: No seepage or groundwater encountered.
16–30						

LEGEND

- 100 to 1,000 g — Bag Sample
- 5 Gal. Bucket — Bucket Sample
- Shelby Tube Sample
- Seepage
- Water Bearing Zone
- Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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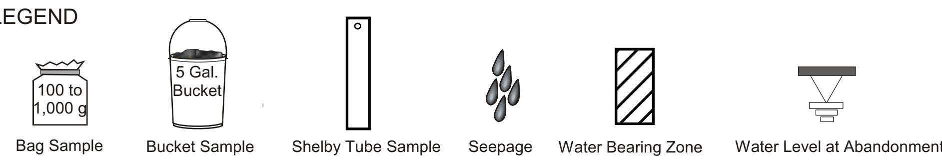
TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-13**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	2.0					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel, light reddish brown, trace black staining, trace roots, moist (Residual Soil)
2	4.5					
3	4.5					
4	4.5					Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, with soft (R2) to medium hard (R3) boulders up to 3 feet diameter, trace reddish brown silty clay to clayey silt matrix, trace black staining, moist (Boring Lava Formation)
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						Test Pit Terminated at 24 Feet. Note: No seepage or groundwater encountered.
25						
26						
27						
28						
29						
30						

LEGEND



Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-14**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (OL-ML), with gravel, brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	4.5					Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with gravel up to 2 feet, light reddish brown, trace black staining, damp to moist (Residual Soil)
2	4.5					
3	4.5					
4	4.5					
4–21						Dense to very dense, extremely soft (R0) to very soft (R1), BASALT, with soft (R2) to medium hard (R3) boulders up to 4 feet diameter, trace reddish brown silty clay to clayey silt matrix, trace black staining, damp to moist (Boring Lava Formation)
21–30						Practical Refusal on Large Medium Hard (R3) to Hard (R4) Boulder at 21 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) | Bucket Sample (5 Gal. Bucket) | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-15**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Low to moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, damp (Topsoil Horizon)
1	3.0					
2	4.5					Stiff to very stiff, clayey SILT (ML), with gravel, light brown, subtle orange and gray mottling, moist (Springwater Formation)
3	4.5					
4	4.5					
4–14						Medium dense to dense, silty GRAVEL (GM), with silty clay to clayey silt matrix, with sand, yellow brown, gravel is subrounded and up to 6 inches in diameter, trace black staining, moist (Springwater Formation)
14–16						Stiff, clayey SILT (ML) to silty CLAY (CL), light brown to gray, bedding planes preserved, micaceous, soapy texture, moist (Springwater Formation)
16						Test Pit Terminated at 16 Feet.
						Note: No seepage or groundwater encountered.

Depth scale: 1–30 ft.

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-16**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1	4.0					Low to moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1–3.5	4.5, 4.5					Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), gray, micaceous, strong orange and gray mottling, trace black staining, moist (Willamette Formation)
3.5–15.5	3.5					Stiff to very stiff, sandy SILT (ML), light brown, micaceous, subtle orange and gray mottling, trace black staining, moist (Willamette Formation) Medium stiff and very moist below 10 feet.
15.5–30						Test Pit Terminated at 15.5 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) | Bucket Sample (5 Gal. Bucket) | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-17**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1	3.5					Low to moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1–3.5	3.0 4.5					Stiff to very stiff, clayey SILT (ML), light brown to gray, micaceous, strong orange and gray mottling, trace black staining, trace fine roots, damp to moist (Willamette Formation)
3.5–15.5	4.5					Stiff, sandy SILT (ML), brown, micaceous, subtle orange and gray mottling, trace black staining, moist (Willamette Formation) Medium stiff and very moist below 10 feet.
15.5–30						Test Pit Terminated at 15.5 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) | Bucket Sample (5 Gal. Bucket) | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

Item #1.

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TEST PIT LOG

Project: Park Place
Oregon City, Oregon

Project No. 20-5600

Test Pit No. **TP-18**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	**Material Description**
						Moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	2.0					
2	4.0					Stiff to very stiff, clayey SILT (ML), light brown to gray, micaceous, strong orange and gray mottling, trace black staining, moist (Willamette Formation)
3	4.5					
4	3.5					
5						
6						Stiff, sandy SILT (ML), brown, micaceous, subtle orange and gray mottling, trace black staining, moist (Willamette Formation)
7						
8						
9						
10						
11						
12						Medium stiff and very moist below 12 feet.
13						
14						
15						
16						Test Pit Terminated at 15 Feet.
17						Note: No seepage or groundwater encountered.
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-19**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Low to moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	3.0					Stiff to very stiff, clayey SILT (ML), gray, micaceous, strong orange and gray mottling, trace black staining, damp to moist (Willamette Formation)
2	4.5					
3	4.5					Stiff to very stiff, sandy SILT (ML), light brown, micaceous, subtle to strong orange and gray mottling, trace black staining, moist (Willamette Formation)
4	4.5					
5–12						
12–15.5						Stiff to very stiff, silty CLAY (CL), gray, micaceous, massive, with ash fragments, moist (Springwater Formation)
16–30						Test Pit Terminated at 15.5 Feet. Note: No seepage or groundwater encountered.

LEGEND

Bag Sample (100 to 1,000 g) | Bucket Sample (5 Gal. Bucket) | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-20**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
						Moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	0.5					
2	3.5					Medium stiff, clayey SILT (ML), light brown, fractured texture, moist (Landslide Debris)
3	4.5					Stiff, clayey SILT (ML), gray brown, strong mottling, moist (Landslide Debris)
4	4.0					
5						Medium stiff to stiff, clayey SILT (ML), light brown, minor spalling of sidewall, micaceous, moist (Landslide Debris)
6						
7						
8						
9						
10						
11						
12						
13						
14						Stiff, FAT CLAY (CH), light brown, sticky, strong orange mottling, trace black staining, moist (Landslide Debris-Likely Very Highly Expansive)
15						
16						
17						
18						
19						Medium stiff, silty CLAY (CL), trace subrounded gravel, gray, highly fractured texture/crumbly, strong orange and gray mottling, moist (Landslide Debris)
20						
21						
22						
23						
24						
25						Stiff to very stiff, clayey SILT (ML), trace sand, light brown, micaceous, massive, moist (Springwater Formation)
26						Test Pit Terminated at 25 Feet.
27						
28						Note: No seepage or groundwater encountered.
29						
30						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 10/6-8/2020
Logged By: B. Rapp
Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. TP-21

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1	1.5					Moderately organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1–3.5	1.5, 4.5					Medium stiff, clayey SILT (ML), light brown, fractured texture, strong orange and gray mottling, micaceous, moist (Landslide Debris)
3.5–8	4.5					Stiff, SILT (ML), trace sand, light brown, subtle orange and gray mottling, micaceous, moist (Landslide Debris)
8–10						Stiff, sandy SILT (ML), with gravel, gray brown, strong red mottling, micaceous, moist (Landslide Debris)
10–14						Stiff, FAT CLAY (CH), gray, sticky, strong orange mottling, with ash fragments, trace black staining, moist (Landslide Debris-Likely Very Highly Expansive)
14–20						Medium stiff, silty CLAY (CL), gray, highly fractured texture/crumbly, strong orange and gray mottling, moist (Landslide Debris)
20–22						Stiff to very stiff, silty CLAY (CL), gray, micaceous, massive, waxy texture, moist (Springwater Formation)

Test Pit Terminated at 22 Feet.

Note: No seepage or groundwater encountered.

LEGEND: Bag Sample (100 to 1,000 g); Bucket Sample (5 Gal. Bucket); Shelby Tube Sample; Seepage; Water Bearing Zone; Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. **TP-22**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–0.8						Low organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	1.5					Stiff to very stiff, clayey SILT (ML), light brown to gray, micaceous, strong orange and gray mottling, trace black staining, damp to moist (Willamette Formation)
2	4.0					
3	4.5					
4	4.5					Stiff, sandy SILT (ML), brown, micaceous, subtle orange and gray mottling, trace black staining, moist (Willamette Formation)
5						
6						
7						
8						
9						
10						
11						Medium stiff and very moist below 11 feet.
12						
13						
14						
15						Test Pit Terminated at 15 Feet. Note: No seepage or groundwater encountered.
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

LEGEND

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Test Pit No. TP-23

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	In-Situ Dry Density (lb/ft³)	Moisture Content (%)	Water Bearing Zone	Material Description
0–0.5						Low organic, SILT (OL-ML), brown, trace roots throughout, loose, moist (Topsoil Horizon)
1	0.5					Stiff to very stiff, clayey SILT (ML), light brown, micaceous, strong orange and gray mottling, trace black staining, trace fine roots, moist (Willamette Formation)
2	2.0					
3	2.5					
4	3.5					Stiff, sandy SILT (ML), brown, micaceous, subtle orange and gray mottling, trace black staining, moist (Willamette Formation)
12						Medium stiff and very moist below 12 feet.
16						Stiff, FAT CLAY (CH), gray, sticky, strong orange mottling, trace ash fragments, trace black staining, moist (Springwater Formation-Likely Very Highly Expansive)
18						Test Pit Terminated at 18 Feet.

Note: No seepage or groundwater encountered.

LEGEND: 100 to 1,000 g Bag Sample; 5 Gal. Bucket Bucket Sample; Shelby Tube Sample; Seepage; Water Bearing Zone; Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

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TEST PIT LOG

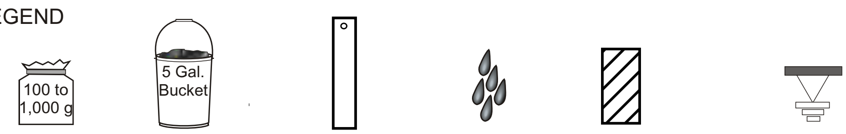
Project: Park Place
Oregon City, Oregon

Project No. 20-5600

Test Pit No. **TP-24**

Depth (ft)	Pocket Penetrometer (tons/ft^2)	Sample Type	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (OL-ML), brown, with gravel, trace roots throughout, loose, damp (Topsoil Horizon)
1	4.5					Loose, silty GRAVEL (GM), gray, with roots, moist (Boring Lava Formation)
2	4.5					Very stiff, CLAY (CL), trace sand, gray, subtle orange and gray mottling, slight blocky texture to 3 feet, trace black staining, moist (Springwater Formation)
3	4.5					
4	4.5					
5						
6						
7						
8						Stiff, FAT CLAY (CH), light brown to gray, sticky, trace black staining, moist (Springwater Formation-Likely Very Highly Expansive)
9						
10						
11						
12						Very stiff, CLAY (CL), light brown to gray, massive, micaceous, soapy texture, damp (Springwater Formation) FAT CLAY (CH) zone at 16 to 17 feet.
13						
14						
15						
16						
17						
18						
19						
20						
21						Very stiff, SILT (ML), trace sand, light brown, massive, micaceous, subtle orange and gray mottling, damp (Springwater Formation)
22						
23						
24						
25						
26						Test Pit Terminated at 26 Feet. Note: No seepage or groundwater encountered.
27						
28						
29						
30						

LEGEND



Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 10/6-8/2020

Logged By: B. Rapp

Surface Elevation:

Item #1.

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-1**

Depth (ft)	Sample Type	N-Value	Well Con-struction	Moisture Content (%)	Water Bearing Zone	Material Description
						Moderately organic, SILT (ML), brown, with roots, moist (Topsoil Horizon)
		18				Stiff to very stiff, SILT (ML), trace fine grained sand, light brown, micaceous, subtle to strong orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
5		10				
		4				Soft to medium stiff, SILT (ML), trace fine grained sand, light brown, micaceous, subtle to strong orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
10		4				
		3				
15						
		11				Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), with zones of fine grained sand, light brown to blue gray, strong to subtle orange and gray mottling, sugary texture, micaceous, damp to moist (Highly Weathered Springwater Formation)
20		12				
25		10				
30		18				
35		19				
40		26				
						Very stiff, sandy SILT (ML) to very dense silty SAND (SM), gray, sand is fine grained, damp to moist (Highly Weathered Springwater Formation)

LEGEND

100 to 1,000 g
Bag Sample

Split-Spoon

Shelby Tube Sample

Static Water Table at Drilling

10-20-99
Static Water Table

Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-1**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
45	Split-Spoon	47				Very stiff, sandy SILT (ML) to very dense silty SAND (SM), gray, sand is fine grained, sugary texture, damp to moist (Highly Weathered Springwater Formation)
50	Split-Spoon	50				
55						Boring Terminated at 51.5 feet. Groundwater could not be determined due to mud rotary drilling methods.
60						
65						
70						
75						
80						
85						

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Static Water Table at Drilling | Static Water Table (10-20-99) | Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place Oregon City, Oregon	Project No. 20-5600	Boring No. **B-2**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (ML), brown, with roots, moist (Topsoil Horizon)
1–13	Split-Spoon	20, 17, 9, 9				Stiff to very stiff, SILT (ML), light brown, micaceous, subtle to strong orange and gray mottling, moist (Willamette Formation)
13–17.5	Split-Spoon	11, 20				Stiff to very stiff, clayey SILT (ML), trace sand, with zones of fine grained gravel, light gray brown, strong orange and gray mottling, sugary texture, trace mineralization, micaceous, moist (Highly Weathered Springwater Formation)
17.5–25	Split-Spoon	8, 13				Stiff to very stiff, sandy SILT (ML) interbedded with loose to medium dense, silty SAND (SM), gray to brown, sand is fine to medium grained, moist to very moist (Highly Weathered Springwater Formation)
25–45	Split-Spoon	10, 12, 17, 20				Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), light brown to blue gray, strong to subtle orange and gray mottling, subtle bedding planes preserved, micaceous, damp to moist (Highly Weathered Springwater Formation)

LEGEND

100 to 1,000 g
Bag Sample | Split-Spoon | Shelby Tube Sample | Static Water Table at Drilling | 10-20-99 Static Water Table | Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-2**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
45	Split-Spoon	19				Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), light brown to blue gray, strong to subtle orange and gray mottling, subtle bedding planes preserved, micaceous, damp to moist (Highly Weathered Springwater Formation)
50	Split-Spoon	45				
55						Boring Terminated at 51.5 feet. Groundwater could not be determined due to mud rotary drilling methods.
60						
65						
70						
75						
80						
85						

LEGEND

100 to 1,000 g Bag Sample | Split-Spoon | Shelby Tube Sample | Static Water Table at Drilling | 10-20-99 Static Water Table | Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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Item #1.

BORING LOG

Project: Park Place
Oregon City, Oregon

Project No. 20-5600

Boring No. **B-3**

Depth (ft)	Sample Type	N-Value	Well Con-struction	Moisture Content (%)	Water Bearing Zone	Material Description
						Moderately organic, SILT (ML), brown, with roots, moist (Topsoil Horizon)
		16				Very stiff, SILT (ML), trace fine grained sand, light brown, micaceous, subtle to strong orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
5		14				
		5				Soft to medium stiff, SILT (ML), trace fine grained sand, light brown, micaceous, subtle to strong orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
10		3				
		1				
15		(Shelby Tube empty)				Very soft to medium stiff, sandy SILT (ML) to very loose to loose, silty SAND (SM), light brown, micaceous, subtle mottling, moist to very moist (Willamette Formation)
		1				
20		5				
25		4				Soft to medium stiff, silty CLAY (CL), gray, subtle orange and gray mottling, trace black staining, moist (Highly Weathered Springwater Formation)
30		13				Medium dense, silty SAND (SM), trace clay, brown to red, highly decomposed volcanic rock, wet (Highly Weathered Springwater Formation)
35		9				
40		34				Loose to dense, silty SAND (SM), brown, sand is fine to coarse grained, subtle cross bedding, weakly cemented zones, micaceous, damp to moist (Troutdale Formation)

LEGEND

100 to 1,000 g — Bag Sample; Split-Spoon; Shelby Tube Sample; Static Water Table at Drilling; 10-20-99 Static Water Table; Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-3**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
45	Split-Spoon	85				Very dense, silty SAND (SM), brown to dark gray, sand is fine to coarse grained, subtle cross bedding, micaceous, damp to moist (Troutdale Formation)
50	Split-Spoon	92				
55	Split-Spoon	50 for 5"				
60	Split-Spoon	90				
65	Split-Spoon	84				
70	Split-Spoon	50 for 5"				Very dense, silty SAND (SM), trace gravel, brown to dark gray, sand is fine to coarse grained, subtle cross bedding, micaceous, damp to moist (Troutdale Formation)
75	Split-Spoon	50 for 5.5"				
80	Split-Spoon	68				
85						Boring Terminated at 81.5 feet. Groundwater could not be determined due to mud rotary drilling methods.

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Static Water Table at Drilling | Static Water Table (10-20-99) | Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. B-4

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (ML), brown, with roots, moist (Topsoil Horizon)
1–7	Split-Spoon	16				Very stiff, SILT (ML), trace sand, light brown, micaceous, strong orange and gray mottling, trace black staining, moist to very moist (Willamette Formation)
5	Split-Spoon	8				
7–17.5	Split-Spoon	6				Medium stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), with highly weathered volcanic gravel, trace sand, brown to gray, trace red and black staining, ashy, micaceous, moist (Highly Weathered Springwater Formation)
10	Split-Spoon	17				
	Split-Spoon	24				
15	Split-Spoon	29				
17.5–43	Split-Spoon	28				Stiff to very stiff, clayey SILT (ML) to silty CLAY (CL), with sand, light brown to gray, trace red and black staining, ashy, micaceous, subtle orange mottling, damp to moist (Highly Weathered Springwater Formation)
20	Split-Spoon	31				
25	Split-Spoon	11				
30	Split-Spoon	26				
35	Split-Spoon	35				
40	Split-Spoon	29				
43–						Very stiff, clayey SILT (ML) to silty CLAY (CL), with highly weathered volcanic gravel, brown to gray, moist (Highly Weathered Springwater Formation)

LEGEND

100 to 1,000 g

Bag Sample | Split-Spoon | Shelby Tube Sample | Static Water Table at Drilling | 10-20-99 Static Water Table | Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-4**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
45	Split-Spoon	50 for 5"				Very stiff, clayey SILT (ML) to silty CLAY (CL), with highly weathered volcanic gravel, trace sand, brown to gray, damp to moist (Highly Weathered Springwater Formation)
50	Split-Spoon	50 for 5.5"				Very dense, SAND (SW), yellow brown to dark gray, sand is fine to coarse grained, well graded, trace black staining, damp to moist (Troutdale Formation)
55	Split-Spoon	73				
60	Split-Spoon	50 for 5"				
65	Split-Spoon	50 for 4"				
70	Split-Spoon	50 for 5"				
75						Boring Terminated at 70.9 feet. Groundwater could not be determined due to mud rotary drilling methods.
80						
85						

LEGEND

Bag Sample (100 to 1,000 g) | Split-Spoon | Shelby Tube Sample | Static Water Table at Drilling | Static Water Table (10-20-99) | Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

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BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-5**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
0–1						Moderately organic, SILT (ML), brown, with roots, moist (Topsoil Horizon)
1–8.5	Split-Spoon	11				Medium stiff to stiff, SILT (ML), light brown, micaceous, strong orange and gray mottling, trace black staining, damp to moist (Willamette Formation)
5	Split-Spoon	7				
	Split-Spoon	4				
8.5–20						Soft to medium stiff, clayey SILT (ML) to silty CLAY (CL), trace sand, brown to gray, trace black staining, ashy, micaceous, subtle orange and gray mottling, moist (Highly Weathered Springwater Formation)
10	Split-Spoon	2				
	Shelby Tube Sample					
15	Split-Spoon	8				
	Split-Spoon	8				
20	Split-Spoon	9				
20–40						Stiff to very stiff, silty CLAY (CL) to clayey SILT (ML), with sand, with zones of highly weathered volcanic rock, brown to gray, sugary texture, orange and gray mottling, moist (Highly Weathered Springwater Formation)
25	Split-Spoon	50 for 5.5"				
30	Split-Spoon	26				
35	Split-Spoon	33				
40	Split-Spoon	37				Medium dense to very dense, SAND (SW), trace silt, yellow brown to dark gray, sand is fine to very coarse grained, cross bedded, trace black staining, damp to moist (Troutdale Formation)

LEGEND

Bag Sample (100 to 1,000 g) — Split-Spoon — Shelby Tube Sample — Static Water Table at Drilling — Static Water Table (10-20-99) — Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

GEOPACIFIC
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

BORING LOG

Project: Park Place, Oregon City, Oregon	Project No. 20-5600	Boring No. **B-5**

Depth (ft)	Sample Type	N-Value	Well Construction	Moisture Content (%)	Water Bearing Zone	Material Description
45	Split-Spoon	30				Medium dense to very dense, SAND (SP), trace silt, yellow brown to dark gray, sand is fine to very coarse grained, cross bedded, trace black staining, damp to moist (Troutdale Formation)
50	Split-Spoon	43				
55	Split-Spoon	88				
60	Split-Spoon	77				
65	Split-Spoon	50 for 6"				
70	Split-Spoon	50 for 5"				
75						Boring Terminated at 70.4 feet. Groundwater could not be determined due to mud rotary drilling methods.
80						
85						

LEGEND

Bag Sample (100 to 1,000 g)	Split-Spoon	Shelby Tube Sample	Static Water Table at Drilling	Static Water Table (10-20-99)	Water Bearing Zone

Date Drilled: 10/20-22/2020
Logged By: B. Rapp
Surface Elevation:

Project Name:	Park Place Subdivision		
Project #: 20-5600	Sample ID: S20-249	Depth:	12'-13'
Material Type:	Fat Clay		
Material Source:	TP-2		

EXPANSION INDEX ASTM D4829

Initial Height (0.001 in.)	1.000
Initial Moisture Content (0.1%)	18.4
Initial Dry Unit Weight (0.1 lbf/cu.ft.)	82.7
Initial Degree of Saturation (50.0+/-2%)	48.0
Initial Dial Reading (0.001 in.)	0.2495
Final Dial Reading (0.001 in.)	0.1178
Final Moisture Content (0.1%)	40.8
Expansion Index	**132**

Sampled By:	EKR	Tested By:	SJC
Sample Date:	10/6/2020	Tested Date:	10/16/2020

Expansion Index, EI	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

Moisture Content from Trimmings

Pan #	12	Tare Wt. =	88.65	Moist Wt. + Tare=	136.77
Moisture=	18.4			Dry Wt. + Tare=	129.3

Expansion Ring

2 inch Radius x 1 inch Height= 5.08 cm Radius x 2.54 cm Height
Volume = 205.9 cm^3

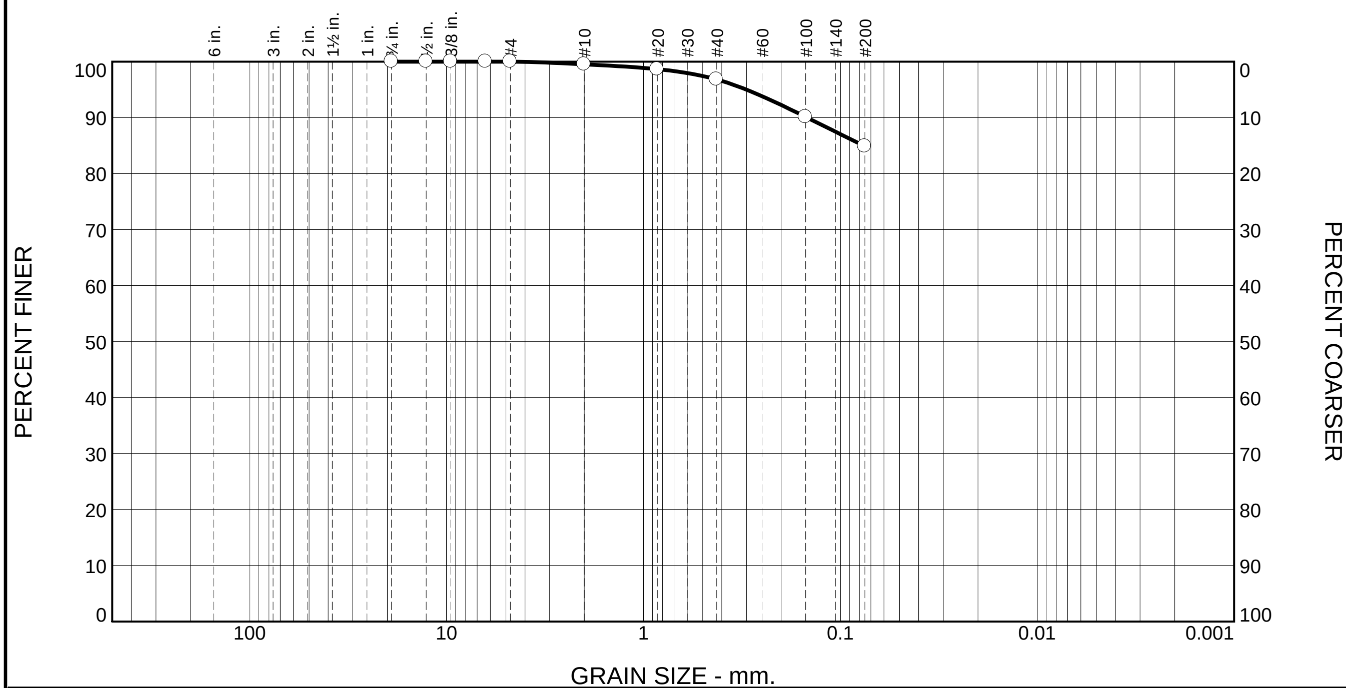
Ring Wt. (g) =	368.6	**Moist Density** (g/cm^3) =	1.6
Ring + Sample (g) =	691.5	**Dry Density** (g/cm^3) =	1.3
		Dry Unit Wt. (lb/ft^3) =	82.7

Degree of Saturation = 48.0

Final Moisture =	40.8	Ring + Sample after soaking (g) =	753.7
		Sample after soaking (g)	385.1
		Ring + Sample oven dry (g)=	642.2
		Sample oven dry (g)	273.6

Expansion Index =	132	Initial Dial Reading (0.001 in.) =	0.2495
		Final Dial Reading (0.001 in.) =	0.1178

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	2.7	11.9	84.9	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	99.5		
#20	98.6		
#40	96.8		
#100	90.1		
#200	84.9		

* (no specification provided)

Material Description

Silt with Sand

Atterberg Limits (ASTM D 4318)

PL= 23.6 **LL=** 29.5 **PI=** 5.9

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(5)

Coefficients

D_{90}= 0.1475 D_{85}= 0.0764 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 29.5%

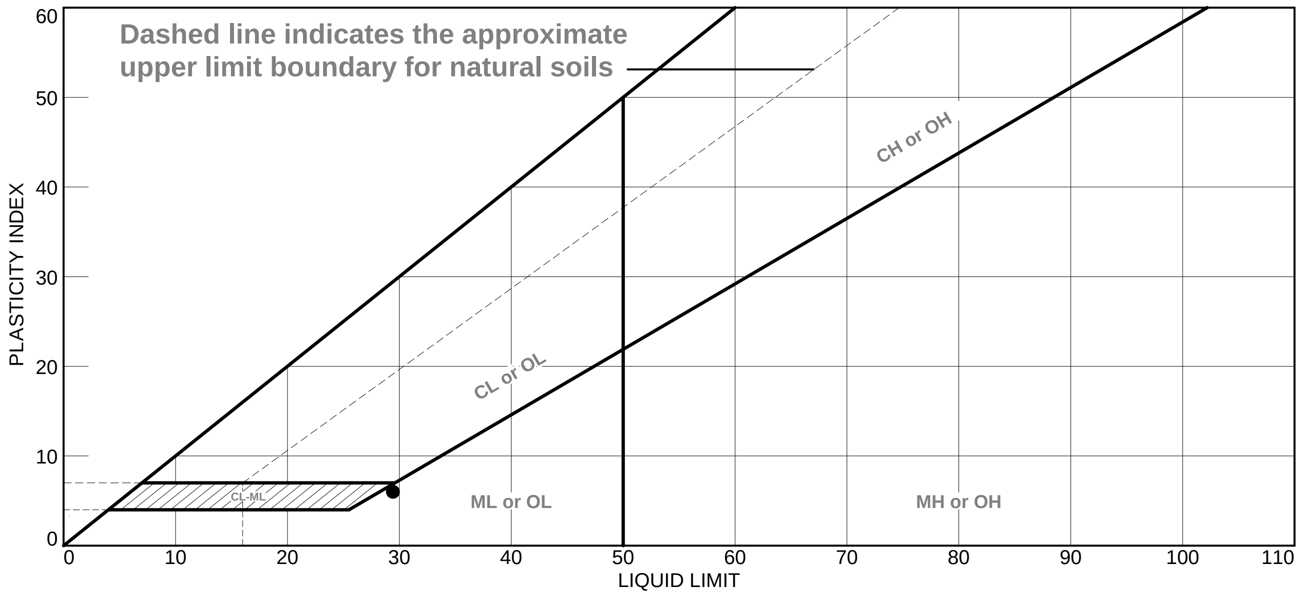
Date Received: ____ **Date Tested:** 11/17/2020
Tested By: SJC
Checked By:
Title:

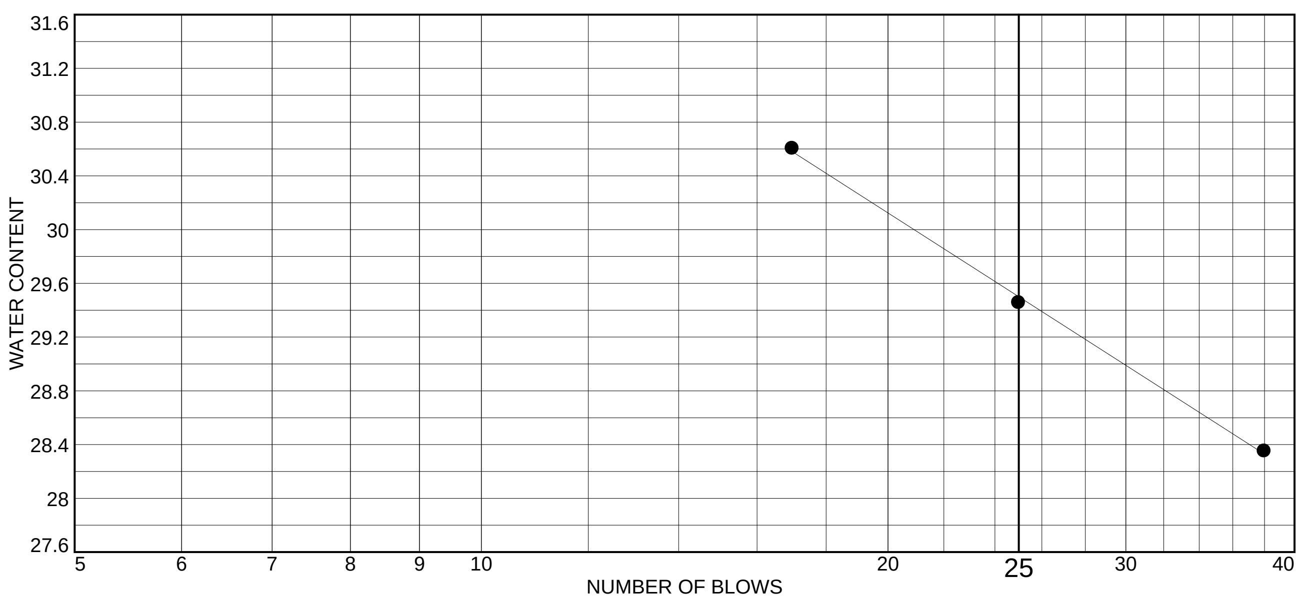
Location: B-1
Sample Number: S20-272 **Depth:** 15'
Date Sampled: 10/22/2020

GEOPACIFIC ENGINEERING, INC.

Client: Hidden Falls Development LLC
Project: Park Place Subdivision
Project No: 20-5600 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt with Sand	29.5	23.6	5.9	96.8	84.9	ML

Project No. 20-5600 **Client:** Hidden Falls Development LLC

Project: Park Place Subdivision

Location: B-1

Sample Number: S20-272 **Depth:** 15'

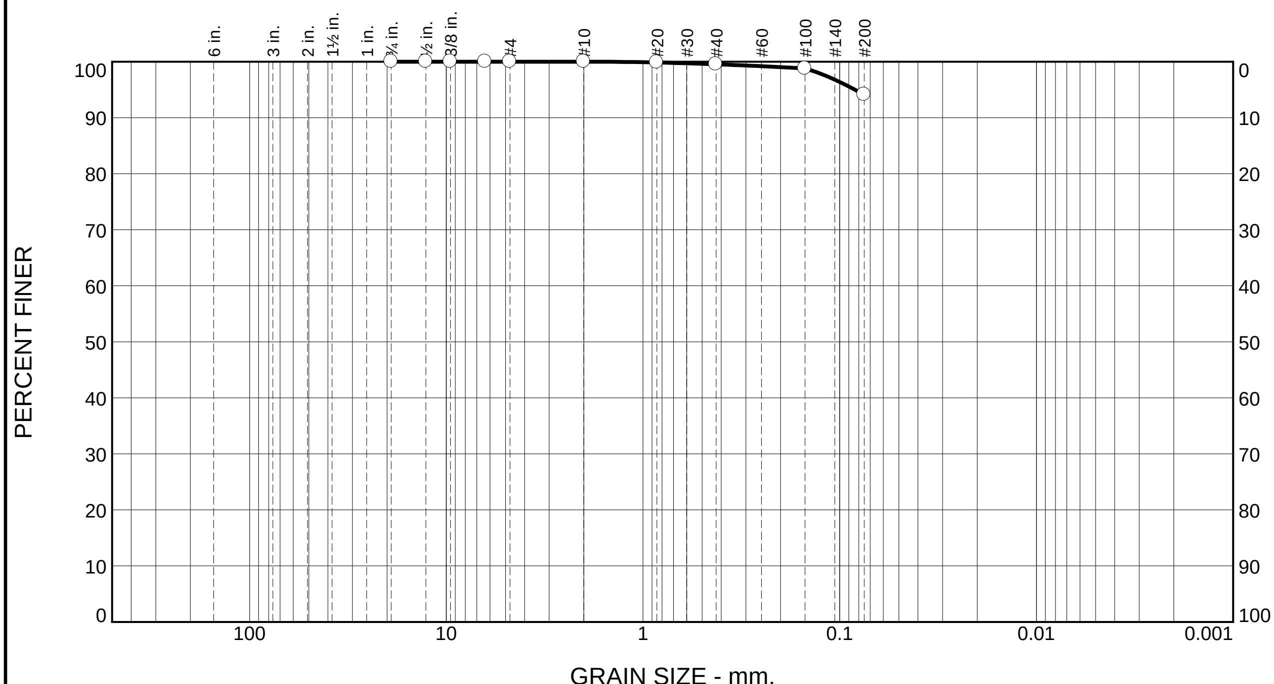
Remarks:

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	5.4	94.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.5		
#100	98.8		
#200	94.1		

* (no specification provided)

Material Description

Silt

Atterberg Limits (ASTM D 4318)

PL= 29.2 **LL=** 33.5 **PI=** 4.3

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(6)

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 33.4%

Date Received: **Date Tested:** 11/17/2020

Tested By: SJC

Checked By:

Title:

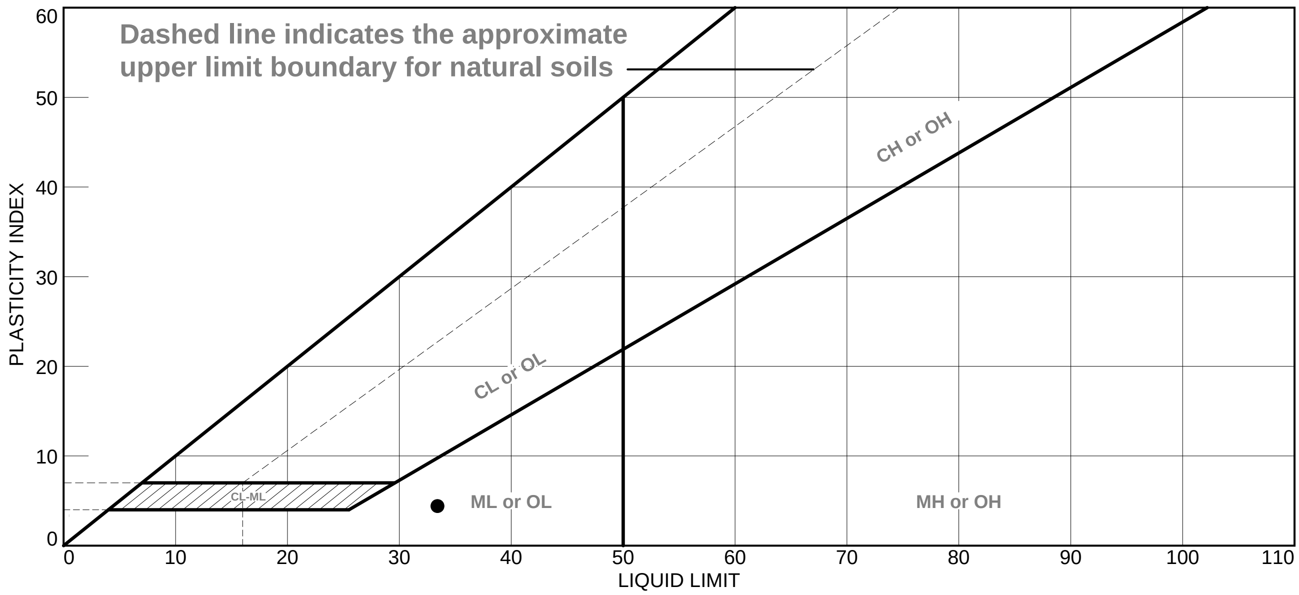
Location: B-5
Sample Number: S20-273 **Depth:** 12.5' **Date Sampled:** 10/22/2020

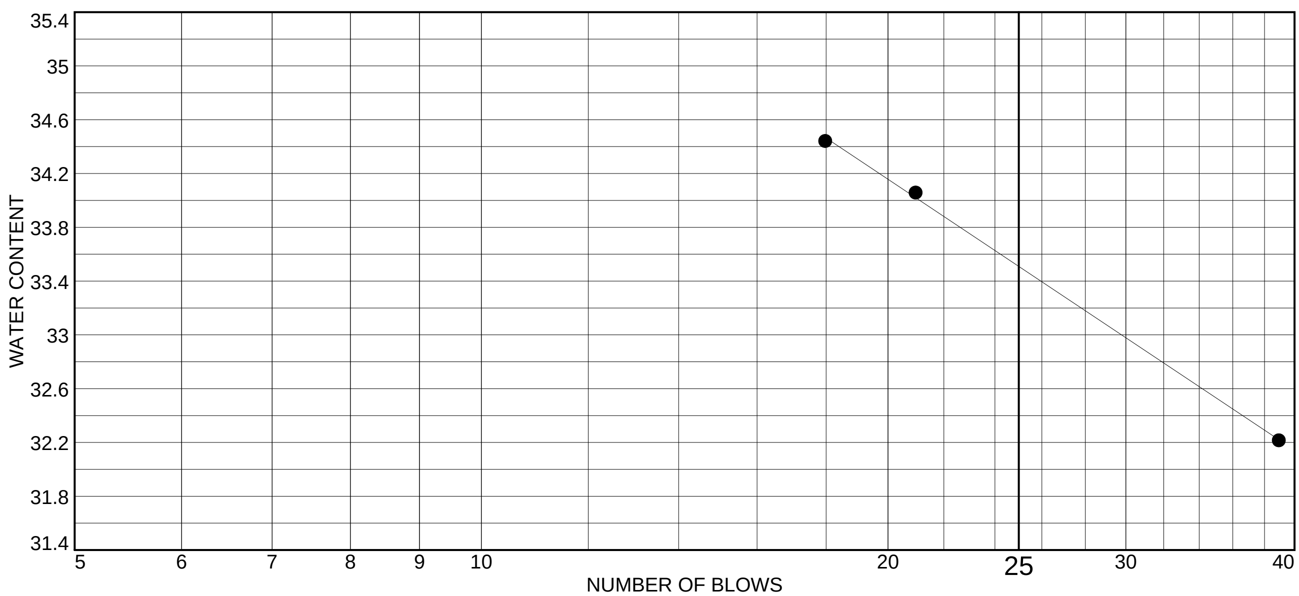
GEOPACIFIC ENGINEERING, INC.

Client: Hidden Falls Development LLC
Project: Park Place Subdivision

Project No: 20-5600 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt	33.5	29.2	4.3	99.5	94.1	ML

Project No. 20-5600 **Client:** Hidden Falls Development LLC

Project: Park Place Subdivision

Location: B-5

Sample Number: S20-273 **Depth:** 12.5'

Remarks:

GEOPACIFIC ENGINEERING, INC.

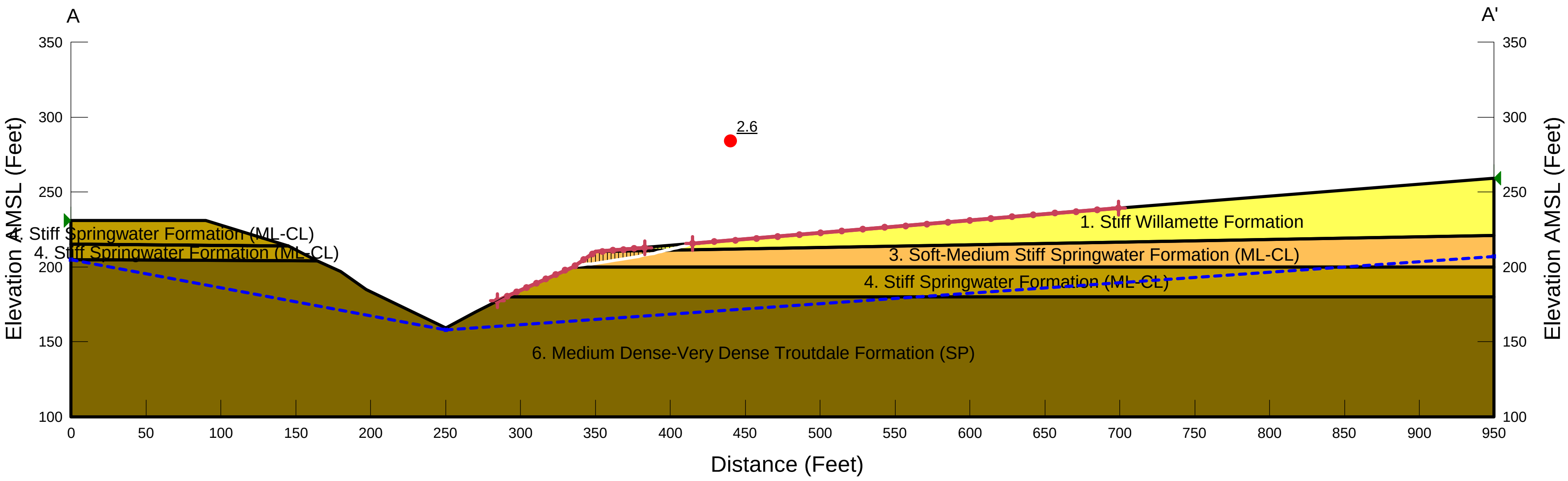
Figure

Tested By: SJC

20-5600 - Park Place Subdivision - Section A-A' - Static Slope Analysis

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1. Stiff Willamette Formation	Mohr-Coulomb	120	0	28
	3. Soft-Medium Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	0	24
	4. Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	300	36
	6. Medium Dense-Very Dense Troutdale Formation (SP)	Mohr-Coulomb	125	200	36

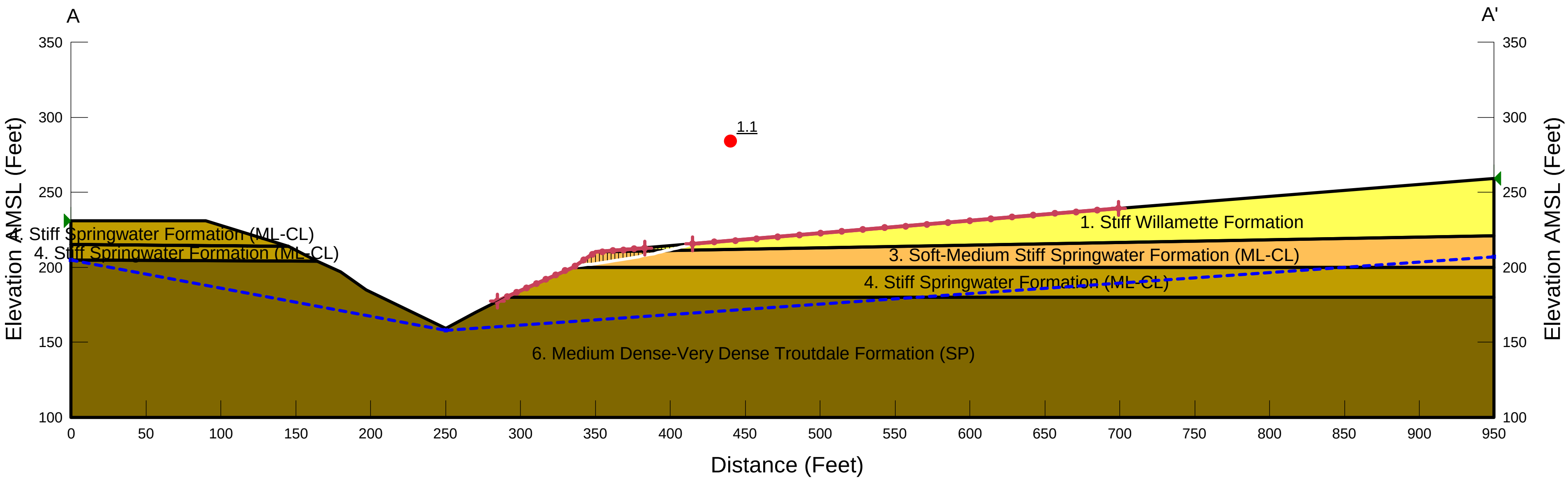
Static Factor of Safety: 2.6



20-5600 - Park Place Subdivision - Section A-A' - Seismic Slope Analysis 0.23g

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1. Stiff Willamette Formation	Mohr-Coulomb	120	0	28
	3. Soft-Medium Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	0	24
	4. Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	300	36
	6. Medium Dense-Very Dense Troutdale Formation (SP)	Mohr-Coulomb	125	200	36

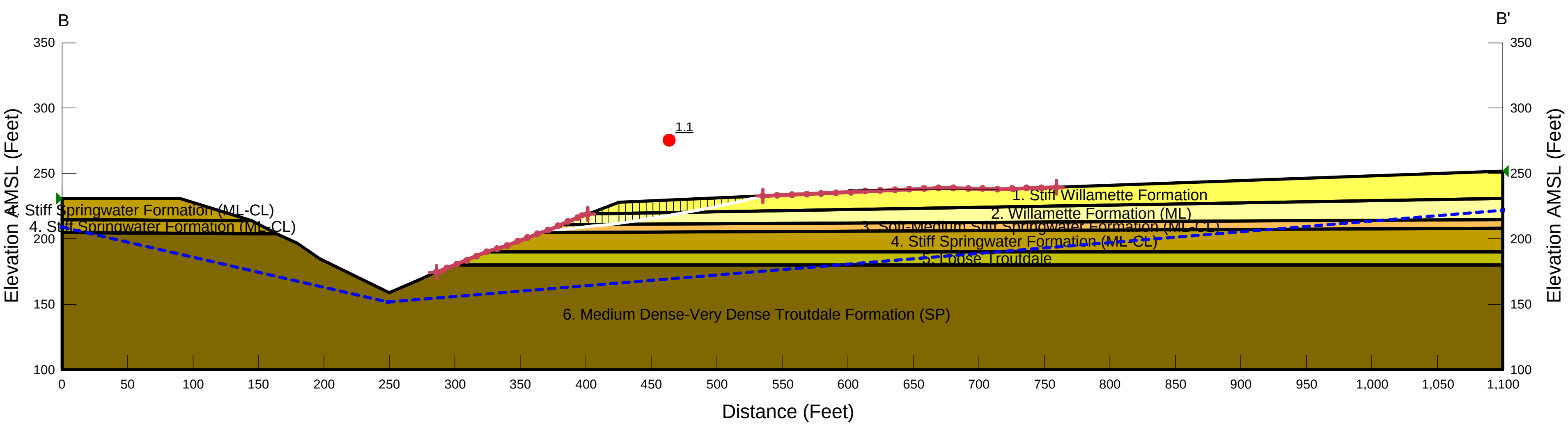
Pseudostatic Factor of Safety: 1.1



20-5600 - Park Place Subdivision - Section B-B' - Existing Conditions - Seismic Slope Analysis 0.23g

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1. Stiff Willamette Formation	Mohr-Coulomb	120	0	28
	2. Willamette Formation (ML)	Mohr-Coulomb	125	0	22
	3. Soft-Medium Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	0	24
	4. Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	300	36
	5. Loose Troutdale	Mohr-Coulomb	120	150	30
	6. Medium Dense-Very Dense Troutdale Formation (SP)	Mohr-Coulomb	125	200	36

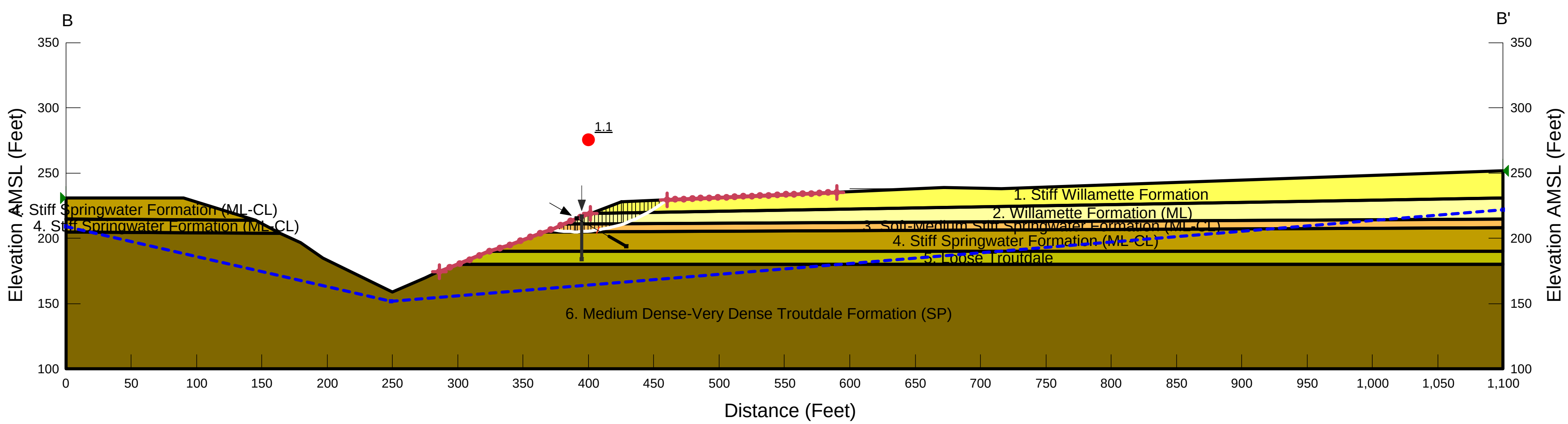
Pseudostatic Factor of Safety: 1.1



20-5600 - Park Place Subdivision - Section B-B' - Seismic Slope Analysis 0.236g

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	1. Stiff Willamette Formation	Mohr-Coulomb	120	0	28
	2. Willamette Formation (ML)	Mohr-Coulomb	125	0	22
	3. Soft-Medium Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	0	24
	4. Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	300	36
	5. Loose Troutdale	Mohr-Coulomb	120	150	30
	6. Medium Dense-Very Dense Troutdale Formation (SP)	Mohr-Coulomb	125	200	36

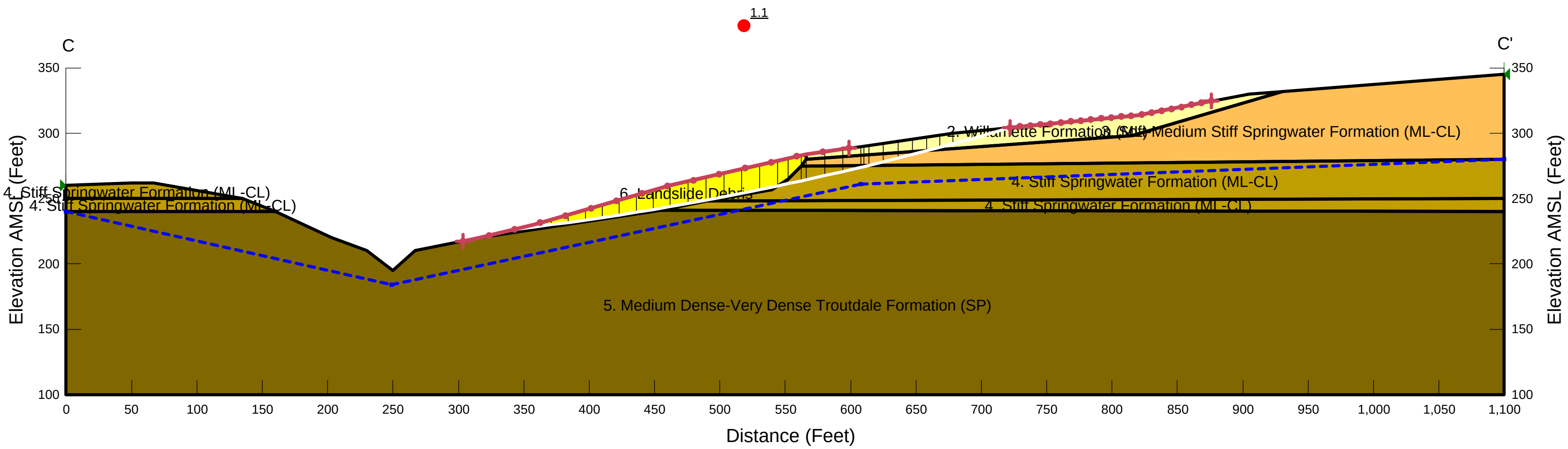
Pseudostatic Factor of Safety: 1.1



20-5600 - Park Place Subdivision - Section C-C' - Seismic Slope Analysis 0.23g

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	2. Willamette Formation (ML)	Mohr-Coulomb	125	50	26
	3. Soft-Medium Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	50	26
	4. Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	300	36
	5. Medium Dense-Very Dense Troutdale Formation (SP)	Mohr-Coulomb	125	200	36
	6. Landslide Debris	Mohr-Coulomb	110	150	10

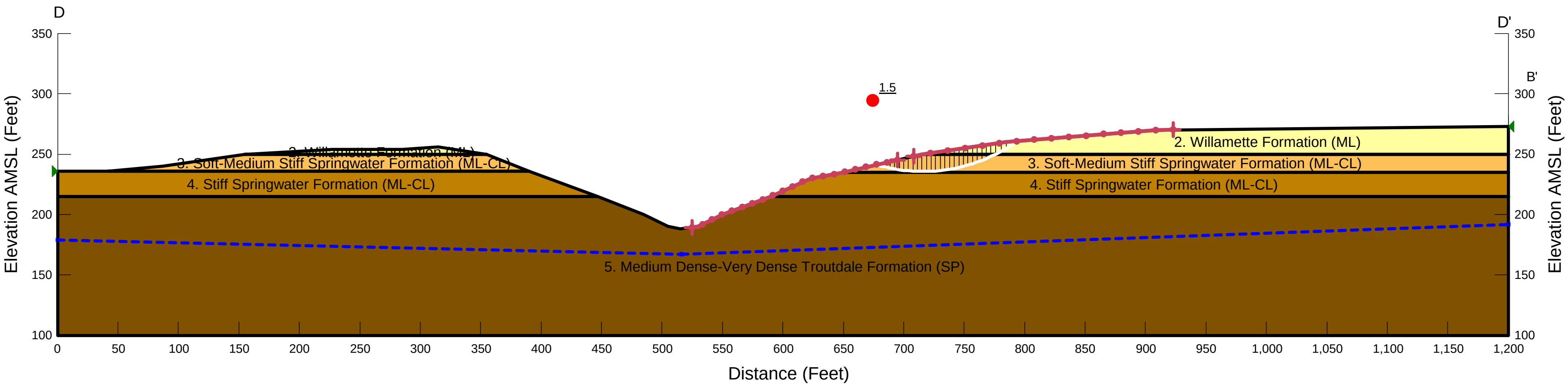
Pseudostatic Factor of Safety: 1.1



20-5600 - Park Place Subdivision - Existing Section D-D' - Seismic Slope Analysis 0.23g

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	2. Willamette Formation (ML)	Mohr-Coulomb	125	50	26
	3. Soft-Medium Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	250	20
	4. Stiff Springwater Formation (ML-CL)	Mohr-Coulomb	125	300	36
	5. Medium Dense-Very Dense Troutdale Formation (SP)	Mohr-Coulomb	125	200	36

Pseudostatic Factor of Safety: 1.5



AKS ENGINEERING & FORESTRY

BEND, OR
2777 NW Lolo Drive, Suite 150
Bend, OR 97703
(541) 317-8429
www.aks-eng.com

KEIZER, OR
3700 River Road N, Suite 1
Keizer, OR 97303
(503) 400-6028

TUALATIN, OR
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

VANCOUVER, WA
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

Date:	3/18/2022
To:	Oregon City Planning Division
From:	Cody Street, EI and Monty Hurley, PE, PLS – AKS Engineering and Forestry, LLC
Project Name:	Park Place Crossing General Development Plan/Master Plan
AKS Job No.:	7404
Project Site:	Clackamas County Assessor's Map 2 2E 27BC, Tax Lots 1000, 2000; 2 2E 28D; Map 2 2E 28D, Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 500, 502, 3700, 3701
Subject:	**General Development Plan/Master Plan Geologic Hazard Overlay Zone Memorandum**

Introduction

This memorandum summarizes aspects of the Park Place Crossing development and the alignment of S Holly Lane that relate to the Geologic Hazard Overlay Zone. This memorandum is intended to supplement the General Development Plan/Master Plan Application, which was originally submitted in July 2021 and has been resubmitted with this memo.

Park Place Crossing is located north and east of S Livesay Road and south of S Holcomb Road in Oregon City, Clackamas County, Oregon; Tax Lots 1000, 2000 of Clackamas County Assessor's Map 2 2E 27BC and Tax Lots 100, 190, 200, 300, 301, 302, 303, 400, 401, 500, 502, 3700, and 3701 of Clackamas County Assessor's Map 2 2E 28D.

Geohazard checklists and applications, as well as geotechnical reports and analyses are not required at the time of General Development Plan/Master Plan application. However, a geotechnical report is necessary for this project to demonstrate its feasibility and compliance with the Oregon City Municipal Code (OCMC) and Public Works Design Standards, as well as best practices for civil and geotechnical engineering. Attached to the Park Place Crossing General Development Plan/Master Plan Application are the Preliminary Geotechnical Report (Exhibit K) and Addendum on Slopes (Exhibit L) prepared by GeoPacific Engineering Inc. (GeoPacific). The intent of this memorandum is to:

1. Summarize the extensive research and investigation that has gone into the project.
2. Substantiate that the layout/design as proposed is feasible, safe, practical, and is the most reasonable layout and design to meet the intent of the Park Place Concept Plan while working within the constraints posed by existing development patterns, topography, natural resources, zoning, geological/geotechnical standards, and applicable jurisdictional requirements.
3. Demonstrate compliance with OCMC 17.44.060.L.
4. Leave the option open to provide additional detail with future Detailed Development Plan (DDP) Applications if necessary to ensure compliance.

Existing Site Conditions

Overall, topography on the site slopes down to the west at grades of 25 percent or less. However, small, isolated areas in the middle of the site and drainages in the northwest and south-central portion of the site exhibit slopes greater than 25 percent. These areas are designated as Geologic Hazards per OCMC 17.44 and are illustrated on the Preliminary Plans (Exhibit A, Sheet P-20) and overlayed on the existing conditions aerial imagery in this memorandum's attached plan sheet EXH-15. Preliminary Existing Conditions Plans are included herein (EXH-1 through EXH-7) to illustrate the extents of field-verified survey information and include overall and zoomed in sector plan sheets for ease of viewing.

Proposed Site Conditions

The Preliminary Grading Plan (Exhibit A, Sheet P-06) illustrates the existing topographic extents of grading of the site across each of the project phases needed to construct infrastructure for the site, including public streets, functional underground utilities, and access to lots including alleys, buildable lots, etc. The Preliminary Grading plan is further broken down into zoomed-in sectors for ease of viewing in this memo as plan sheets EXH-8 through EXH-14, which also include the slope setbacks established by the Preliminary Geotechnical Report at the perimeter of the drainages in the northwest and south-central portion of the site.

Proposed grading adheres to the recommendations within the Preliminary Geotechnical Report and meets the intent and purpose of the City's Geologic Hazards ordinance (OCMC 17.44.010). Grading within the small, isolated areas located in the central portion of the site is unavoidable in order to comply with the Park Place Concept Plan, the City's Transportation System Plan (TSP), zoning requirements, and City Public Works Design Standards; to provide a safe and practical alignment for S Holly Lane through the site, safe access to buildable lots, and building envelopes for all types of housing; and to address slopes and topography throughout the site.

The Preliminary Geotechnical Report states that the grading can be accomplished safely and that cuts and fills are practicable and will not adversely affect and may improve slope stability. This information provides evidence of compliance with OCMC 17.44.060.L. Further detail will be provided with future DDP.

Geotechnical Results

The Preliminary Geotechnical Report and Slopes Addendum prepared by GeoPacific are included in this resubmittal. The Preliminary Geotechnical Report and Slopes Addendum demonstrate that grading can be accomplished safely and concludes that proposed cuts and fills are geotechnically practicable and will not adversely affect and may improve slope stability. The Preliminary Geotechnical Report includes field investigations and findings, including logs of subsurface conditions and laboratory testing results, as well as recommendations for development.

Alternative Alignment and Design Analysis for S Holly Lane

S Holly Lane serves a vital role in both the local and the regional context as the only continuous north/south travel corridor on the east side of Oregon Route 213 (OR 213). Within the context of the Park Place Concept Plan, S Holly Lane is planned to be one of the primary north-south connections between Redland Road and Holcomb Boulevard and to provide multimodal connectivity for this area of the City. This project includes over 2/3 of a mile of construction for this vital Collector, extending S Holly Lane roughly half the distance between S Holcomb Boulevard and Redland Road. Connectivity to Redland Road will be established with future annexation and development to the south of this project. S Holly Lane drops 240 feet in elevation within the Park Place Crossing Master Plan Area, which poses a significant challenge to the design and layout of the road, when combined with existing development patterns (i.e. established connections and subdivisions to the north), Public Works Design Standards (i.e. maximum street grades, ADA crossings etc.), and compliance with the Park Place Concept Plan (i.e. alleys, connectivity, etc.)

EXH-16 in this memo shows the portion(s) of the proposed streets that will be at the maximum grades permitted by code per their respective classification (i.e. Collector or Local). EXH-17 and EXH-18 show the S Holly Lane's intersections meet Americans with Disabilities Act (ADA) requirements for grade change and connectivity through 'table topping,' and that they meet City block length standards, etc. The site grades also has impact cuts and fills along the development's other roadways and the blocks between them (including the small, isolated areas located in the central portion of site which S Holly Lane runs through and adjacent to).

Alternative alignments for S Holly Lane that avoid steep slope areas (slopes greater than 25 percent) were considered and analyzed, including routes between (EXH-23 through EXH-27) and north of (EXH-28 through EXH-32) the majority of the small, isolated steep slope areas. In certain locations, retaining walls may be able to limit grading; however, these retaining walls pose potential maintenance and safety concerns and create unnecessary challenges. The retaining walls would create view tunnels; streetscapes inconsistent with the Park Place Concept Plan; and walkability, aesthetic, and cost concerns, as demonstrated by the Preliminary Grading Plan and Preliminary Geotechnical Report. The geotechnical investigations demonstrate that grading can be accomplished safely and conclude that proposed cuts and fills are geotechnically practicable and can improve safety and slope stability within the small, isolated areas with slopes over 25 percent.

Conclusion

The proposed design is a feasible layout complying with the Park Place Concept Plan (Exhibit N). It follows the recommendations of the Preliminary Geotechnical Report has undergone rigorous alternative design analysis, and works within the constraints posed by existing development patterns, zoning, topography, natural resources, and all relevant jurisdictional requirements.

The project provides protection for the steep slopes and geologic hazard areas in and along the drainages to the northwest and south-central portions of the site. There are some small, isolated areas with slopes over 25 percent in the central portion of the site that will be developed in compliance with Section 17.44.060.L. As demonstrated by the Preliminary Geotechnical Report, these areas can be safely developed, and the planned improvements will improve safety.

The Preliminary Geotechnical Report and this analysis excludes Tax Lots 200, 300, 301, 303, and 502, as these properties are not currently controlled by the applicant and therefore detailed geotechnical and slope analysis could not be performed on these properties; however, these properties are required by the Annexation Conditions of Approval to be included in this application. Further investigations and reports will be provided at the time of each respective Detailed Development Plan (DDP) application.

Attachments:

1. Compiled Geologic Hazard Overlay Zone Memorandum Exhibits

NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBER 20134946, 20132787, 20132791, 20132798, 20132807, 20132485, 20134960, 20134962, 20132485, 20134972, 20176080, 20134975, 20176082, 20134984, 20134988, 20134992, & 20176027. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.

2. FIELD WORK WAS CONDUCTED MAY 13–JULY 15, 2020.

3. VERTICAL DATUM: ELEVATIONS ARE BASED ON NATIONAL GEODETIC SURVEY BENCHMARK DESIGNATION V 723 (PID RD1497) LOCATED AT THE SE CORNER OF HWY 99E AND HWY I–205. ELEVATION = 62.48 FEET (NAVD 88).

4. HORIZONTAL DATUM: A LOCAL DATUM PLANE SCALED FROM OREGON STATE PLANE NORTH 3601 NAD83(2011) EPOCH 2010.0000 BY HOLDING A PROJECT MEAN GROUND COMBINED SCALE FACTOR OF 1.0001150551 AT A CALCULATED CENTRAL PROJECT POINT WITH GRID VALUES OF (NORTH 626648.798, EAST 7672411.244). THE MERIDIAN CONVERGENCE ANGLE AT THE CALCULATED CENTRAL POINT IS –1°27'43". THE STATE PLANE COORDINATES WERE DERIVED FROM THE TRIMBLE VRS NOW NETWORK.

5. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. BOUNDARIES MAY BE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.

6. BUILDING FOOTPRINTS ARE MEASURED TO SIDING UNLESS NOTED OTHERWISE. CONTACT SURVEYOR WITH QUESTIONS REGARDING BUILDING TIES.

7. CONTOUR INTERVAL IS 1 FOOT.

8. TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.

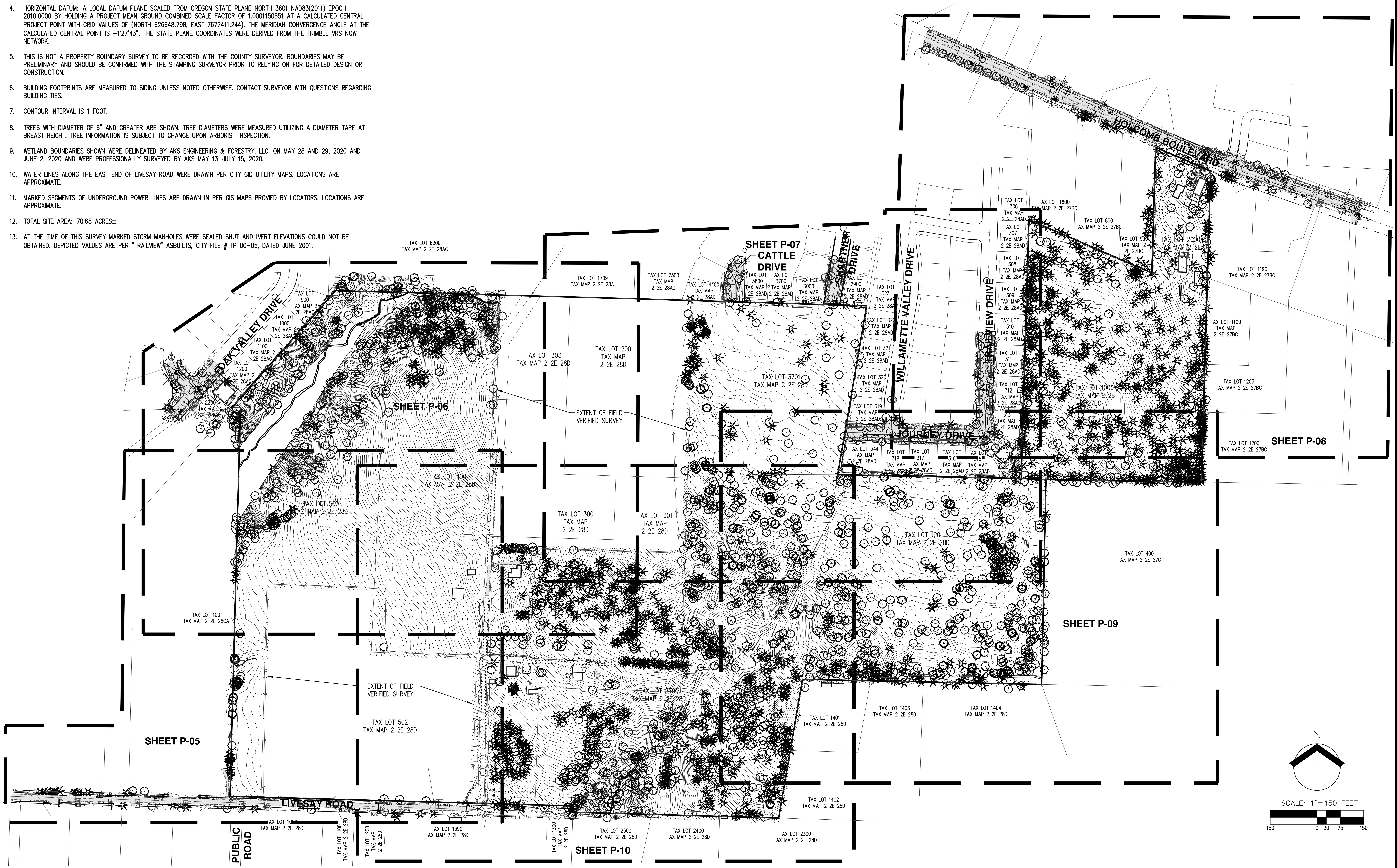
9. WETLAND BOUNDARIES SHOWN WERE DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MAY 28 AND 29, 2020 AND JUNE 2, 2020 AND WERE PROFESSIONALLY SURVEYED BY AKS MAY 13–JULY 15, 2020.

10. WATER LINES ALONG THE EAST END OF LIVESAY ROAD WERE DRAWN PER CITY GID UTILITY MAPS. LOCATIONS ARE APPROXIMATE.

11. MARKED SEGMENTS OF UNDERGROUND POWER LINES ARE DRAWN IN PER GIS MAPS PROVIED BY LOCATORS. LOCATIONS ARE APPROXIMATE.

12. TOTAL SITE AREA: 70.68 ACRES±

13. AT THE TIME OF THIS SURVEY MARKED STORM MANHOLES WERE SEALED SHUT AND IVERT ELEVATIONS COULD NOT BE OBTAINED. DEPICTED VALUES ARE PER "TRAILVIEW" ASBUILTS, CITY FILE # TP 00–05, DATED JUNE 2001.



PRELIMINARY EXISTING CONDITIONS PLAN - OVERALL
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

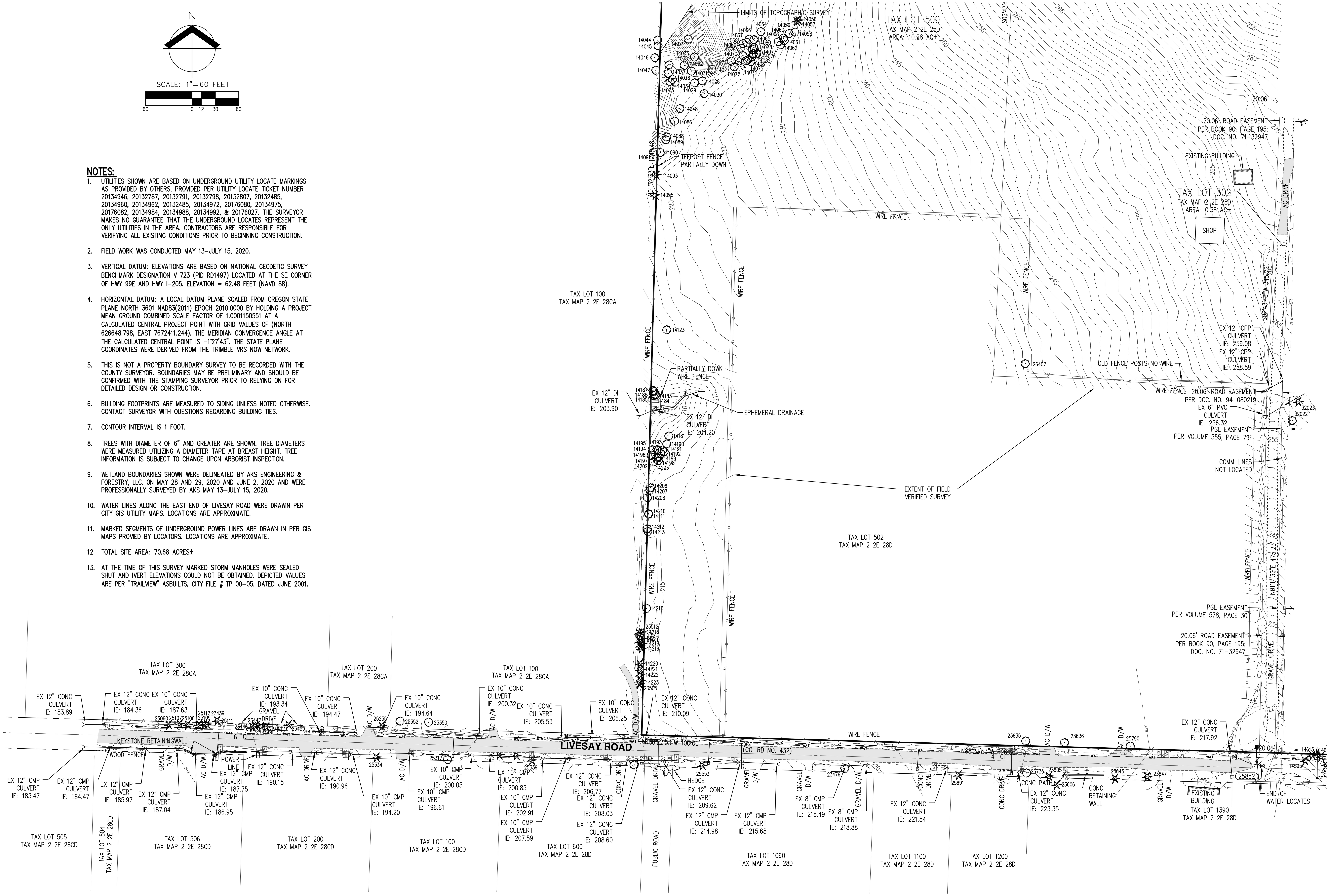
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23

PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-1

AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P-04



NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBER 20134946, 20132787, 20132791, 20132798, 20132807, 20132485, 20134960, 20134962, 20132485, 20134972, 20176080, 20134975, 20176082, 20134984, 20134988, 20134992, & 20176027. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
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5. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. BOUNDARIES MAY BE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.
6. BUILDING FOOTPRINTS ARE MEASURED TO SIDING UNLESS NOTED OTHERWISE. CONTACT SURVEYOR WITH QUESTIONS REGARDING BUILDING TIES.
7. CONTOUR INTERVAL IS 1 FOOT.
8. TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.
9. WETLAND BOUNDARIES SHOWN WERE DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MAY 28 AND 29, 2020 AND JUNE 2, 2020 AND WERE PROFESSIONALLY SURVEYED BY AKS MAY 13–JULY 15, 2020.
10. WATER LINES ALONG THE EAST END OF LIVESAY ROAD WERE DRAWIN PER CITY GIS UTILITY MAPS. LOCATIONS ARE APPROXIMATE.
11. MARKED SEGMENTS OF UNDERGROUND POWER LINES ARE DRAWN IN PER GIS MAPS PROVIED BY LOCATORS. LOCATIONS ARE APPROXIMATE.
12. TOTAL SITE AREA: 70.68 ACRES±
13. AT THE TIME OF THIS SURVEY MARKED STORM MANHOLES WERE SEALED SHUT AND IVERT ELEVATIONS COULD NOT BE OBTAINED. DEPICTED VALUES ARE PER "TRAILVIEW" ASBUILTS, CITY FILE # TP 00–05, DATED JUNE 2001.

Item #1.

AKS

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12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
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PRELIMINARY EXISTING CONDITIONS PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

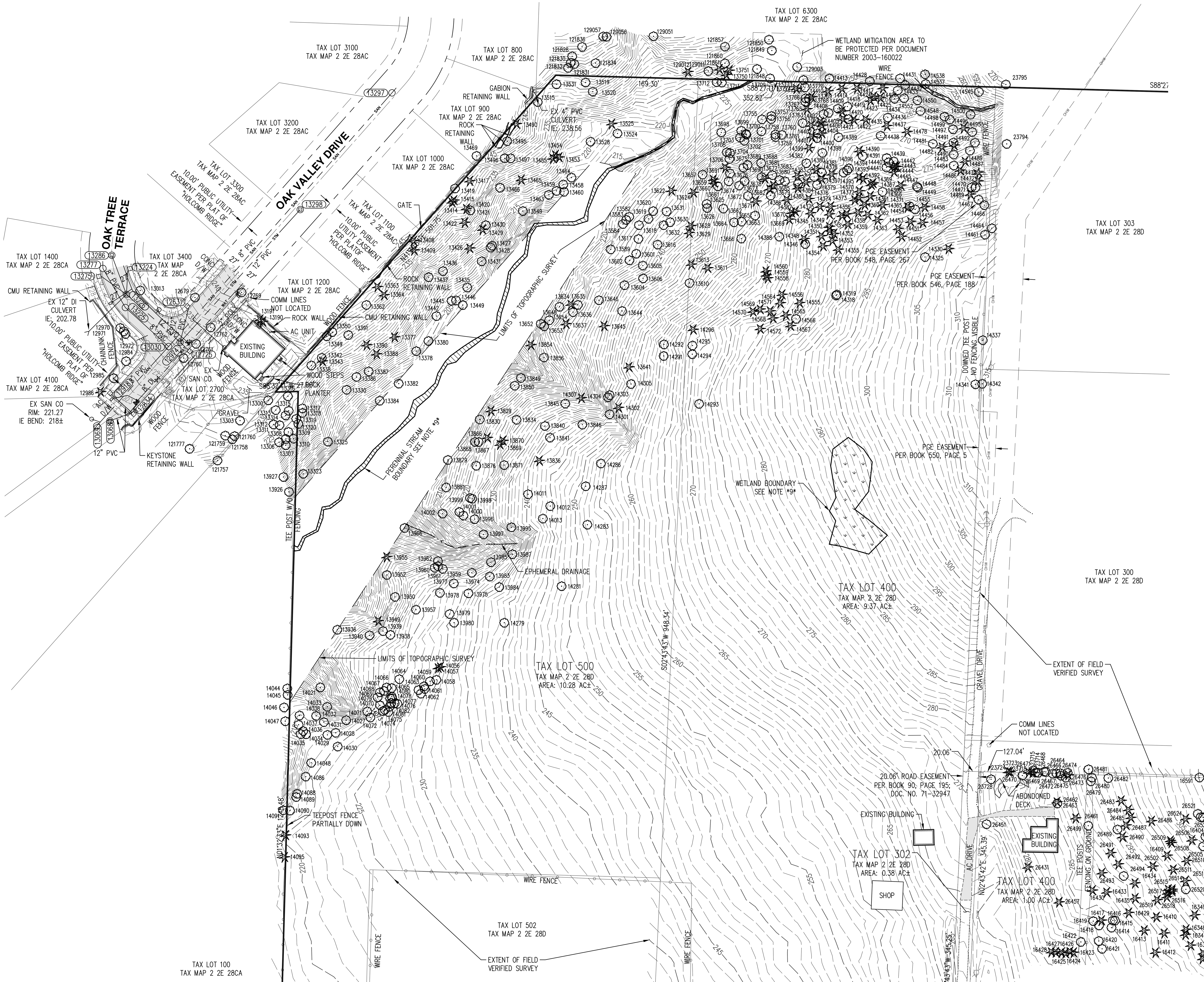
PRELIMINARY NOT FOR CONSTRUCTION

REGISTERED PROFESSIONAL LAND SURVEYOR
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-2

AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P-05



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REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23
PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-3

AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P-06

Item #1.

NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBER 20134946, 20132787, 20132791, 20132798, 20132807, 20132485, 20134960, 20134962, 20132485, 20134972, 20176080, 20134975, 20176082, 20134984, 20134988, 20134992, & 20176027. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
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OREGON
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-4

AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P-07

SCALE: 1"=60 FEET

NOTES:

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AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P–08

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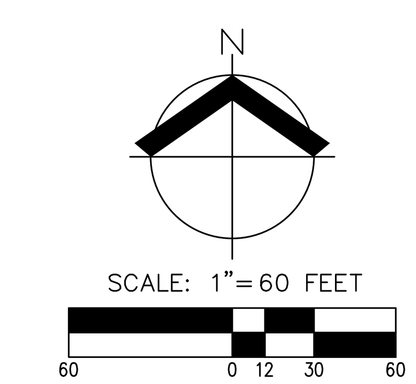
PRELIMINARY — NOT FOR CONSTRUCTION
OREGON
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-5

Item #1.

Item #1.



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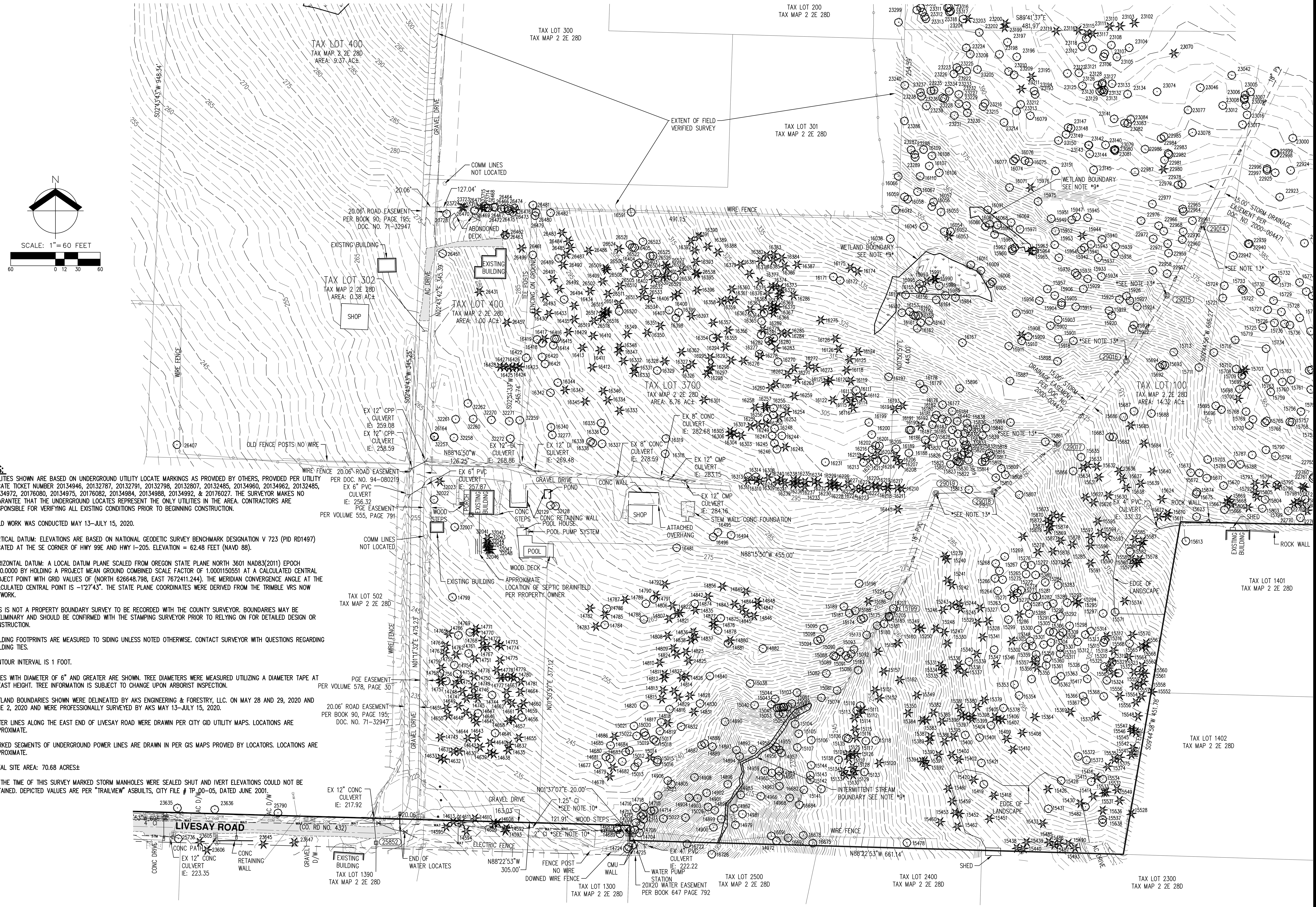
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-6

AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P-09

Item #1.



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AKS DRAWING FILE: 7404 EXCOND.DWG | LAYOUT: P-10

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PRELIMINARY EXISTING CONDITIONS PLAN
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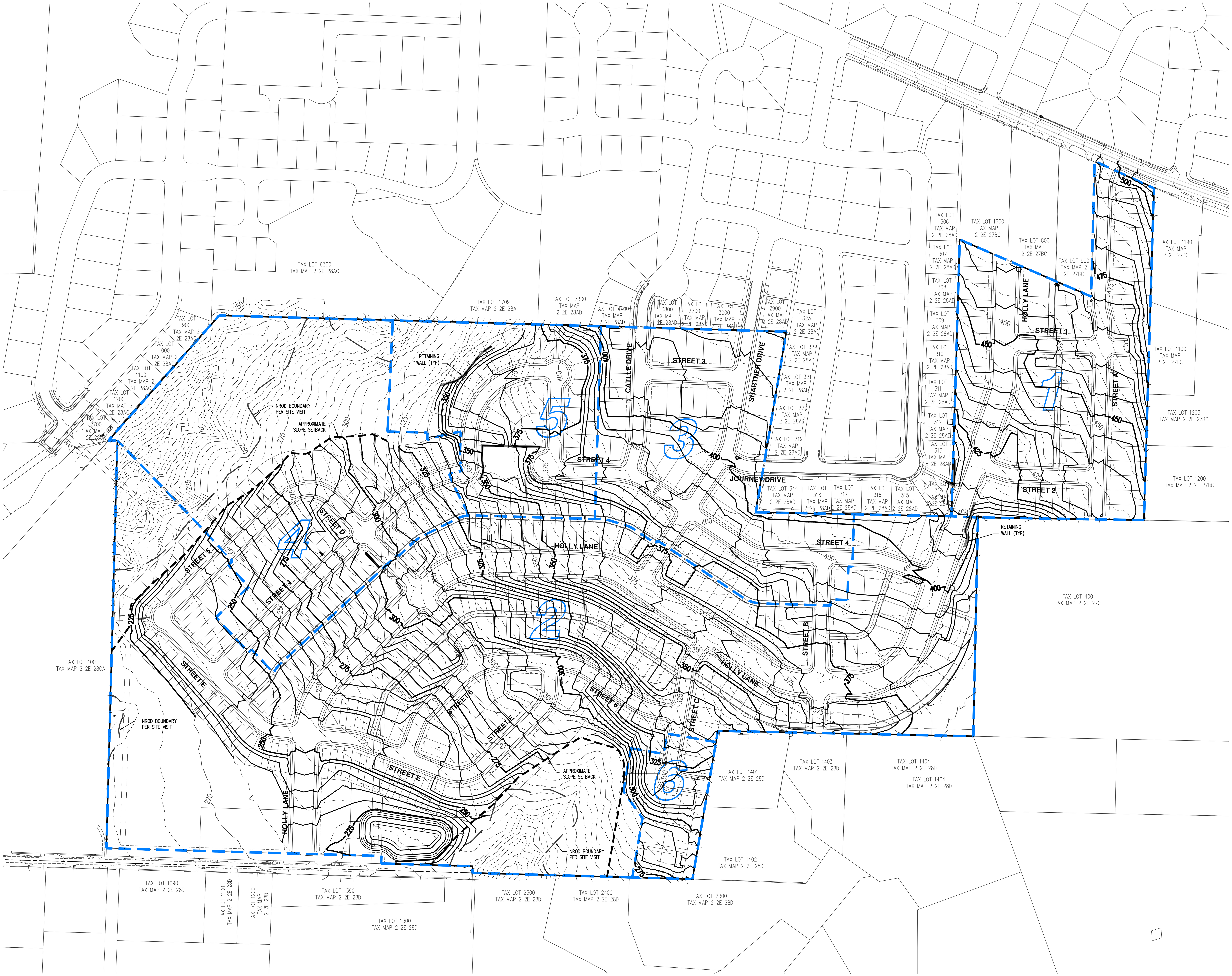
OREGON
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/23

PRELIMINARY
NOT FOR CONSTRUCTION

JOB NUMBER:	7404
DATE:	12/07/2021
DESIGNED BY:	
DRAWN BY:	MTB
CHECKED BY:	BRH

EXH-7

Item #1.



NOTES:

1. EXISTING CONDITION INFORMATION SHOWN IS BASED ON A VARIETY OF SOURCES INCLUDING: TOPOGRAPHIC AND UTILITY SURVEYING, BOUNDARY SURVEYING, GEOGRAPHIC INFORMATION SYSTEM (GIS), AERIAL PHOTOGRAPH AND TAX ASSESSOR MAP INFORMATION. ALL DIMENSIONS AND AREAS SHOWN ARE PRELIMINARY AND APPROXIMATE.
2. CONTOUR INTERVAL IS 5 FEET. CONTOURS SHOWN ARE PER A MIX OF SURVEYED ELEVATIONS AND LIDAR DATA AND SHOULD BE CONSIDERED APPROXIMATE.
3. TAXLOTS 200, 300, 301, 303, AND 502 HAVE NOT BEEN SURVEYED, NOR HAVE THEY BEEN EVALUATED FOR NROD AREAS.
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LEGEND

EXISTING GROUND CONTOUR (5 FT)	
EXISTING GROUND CONTOUR (25 FT)	350
FINISHED GRADE CONTOUR (5 FT)	
FINISHED GRADE CONTOUR (25 FT)	345

N

SCALE: 1"=150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

AKS

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PRELIMINARY GRADING PLAN
PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

REVIEW COPY ONLY

JOB NUMBER:	7404
DATE:	03/15/2022
DESIGNED BY:	CMS
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EXH-8

AKS DRAWING FILE: 7404 ENLARGED GRADING.DWG | LAYOUT: 1

NOTES:

1. EXISTING CONDITION INFORMATION SHOWN IS BASED ON A VARIETY OF SOURCES INCLUDING: TOPOGRAPHIC AND UTILITY SURVEYING, BOUNDARY SURVEYING, GEOGRAPHIC INFORMATION SYSTEM (GIS), AERIAL PHOTOGRAPH AND TAX ASSESSOR MAP INFORMATION. ALL DIMENSIONS AND AREAS SHOWN ARE PRELIMINARY AND APPROXIMATE.
2. CONTOUR INTERVAL IS 5 FEET. CONTOURS SHOWN ARE PER A MIX OF SURVEYED ELEVATIONS AND LIDAR DATA AND SHOULD BE CONSIDERED APPROXIMATE.
3. TAXLOTS 200, 300, 301, 303, AND 502 HAVE NOT BEEN SURVEYED, NOR HAVE THEY BEEN EVALUATED FOR NROD AREAS.
4. VERTICAL DATUM: ELEVATIONS ARE BASED ON NATIONAL GEODETIC SURVEY BENCHMARK DESIGNATION V 723 (PID RD1497) LOCATED AT THE SE CORNER OF HWY 99E AND HWY I-205. ELEVATION = 62.48 FEET (NAVD 88).
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LEGEND

EXISTING GROUND CONTOUR (5 FT)	
EXISTING GROUND CONTOUR (25 FT)	350
FINISHED GRADE CONTOUR (5 FT)	
FINISHED GRADE CONTOUR (25 FT)	345

N

SCALE: 1"= 50 FEET

50 0 10 25 50

ORIGINAL PAGE SIZE: 22" x 34"

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PRELIMINARY GRADING PLAN
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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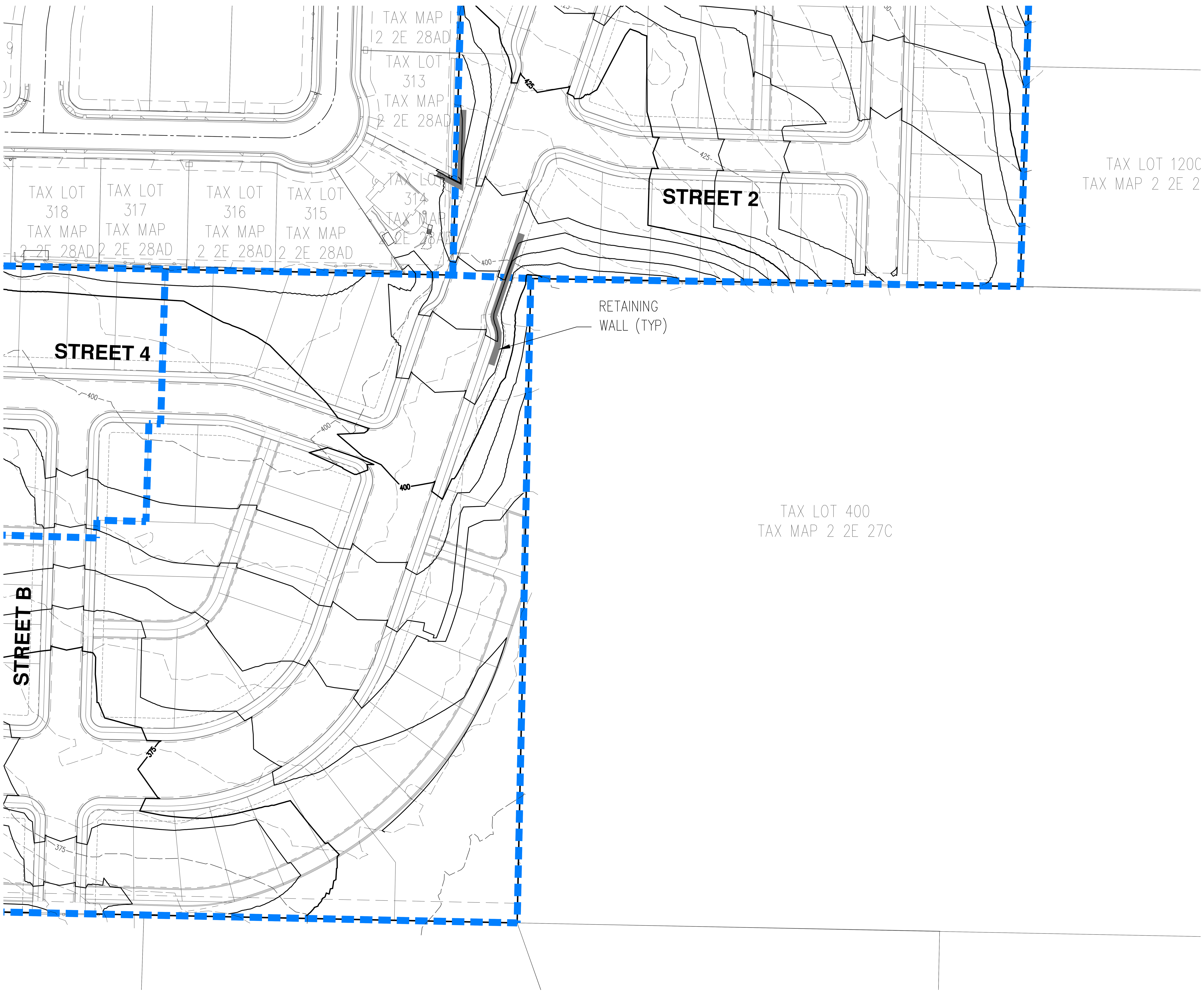
EXH-9



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LEGEND

EXISTING GROUND CONTOUR (5 FT)
EXISTING GROUND CONTOUR (25 FT) — 350 —
FINISHED GRADE CONTOUR (5 FT)
FINISHED GRADE CONTOUR (25 FT) — 345 —

N

SCALE: 1"= 50 FEET
50 0 10 25 50
ORIGINAL PAGE SIZE: 22" x 34"

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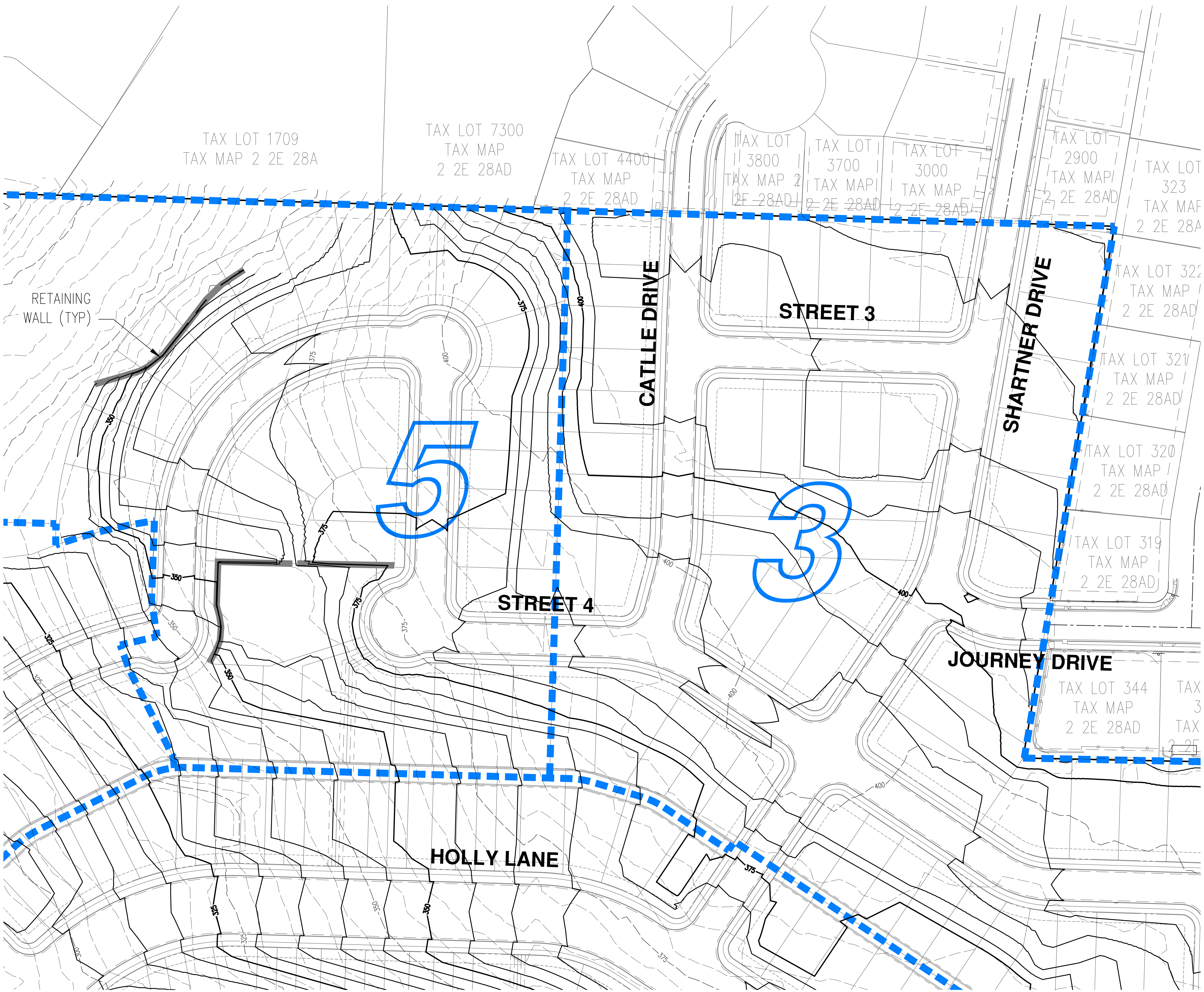
EXH-10

AKS DRAWING FILE: 7404 ENLARGED GRADING.DWG | LAYOUT: 3

Item #1.



NOTES:

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LEGEND

EXISTING GROUND CONTOUR (5 FT)	
EXISTING GROUND CONTOUR (25 FT)	350
FINISHED GRADE CONTOUR (5 FT)	
FINISHED GRADE CONTOUR (25 FT)	345

N

SCALE: 1" = 50 FEET

50 0 10 25 50

ORIGINAL PAGE SIZE: 22" x 34"

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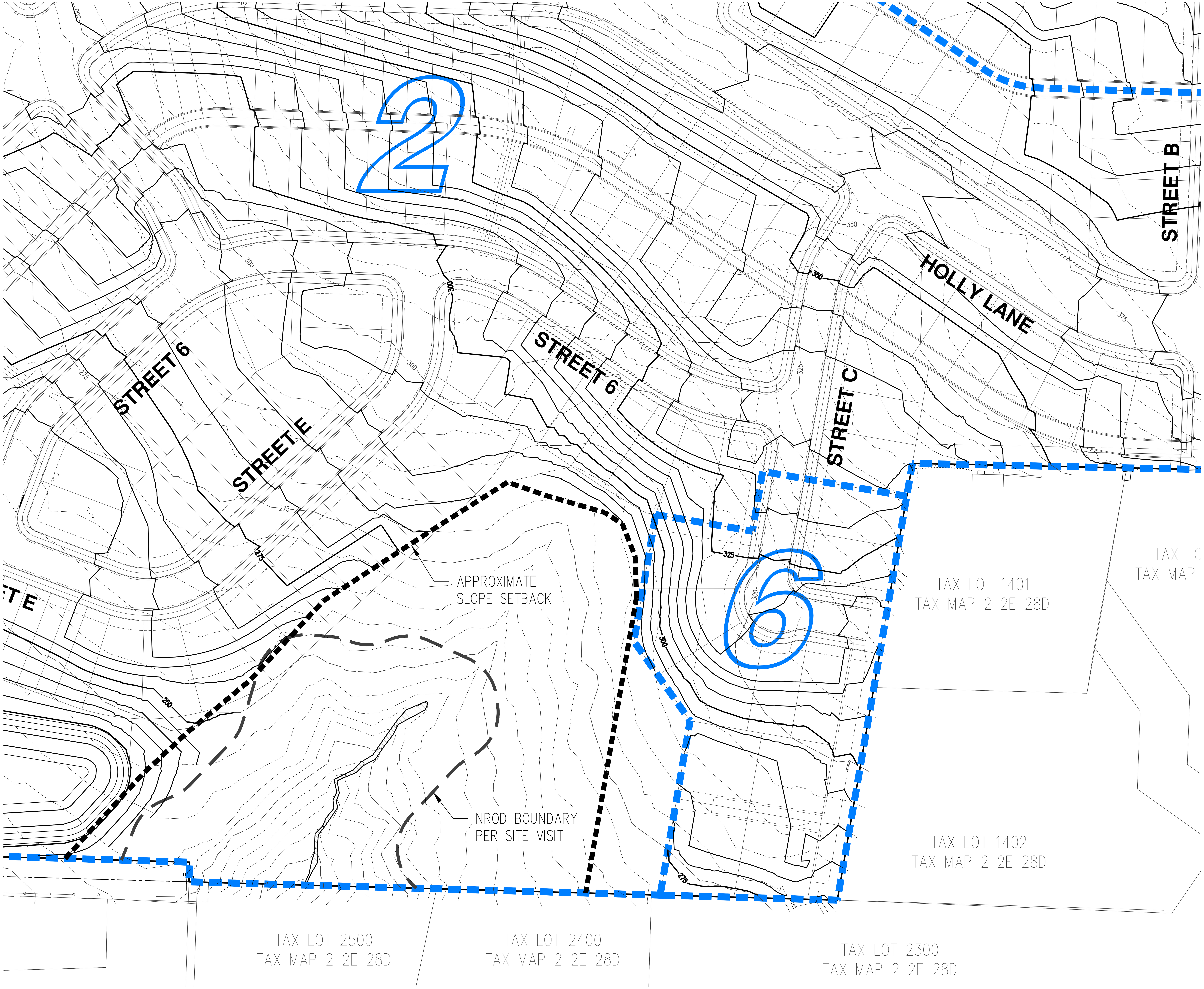
EXH-11

AKS DRAWING FILE: 7404 ENLARGED GRADING.DWG | LAYOUT: 4



NOTES:

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LEGEND

EXISTING GROUND CONTOUR (5 FT)	
EXISTING GROUND CONTOUR (25 FT)	350
FINISHED GRADE CONTOUR (5 FT)	
FINISHED GRADE CONTOUR (25 FT)	345

N

SCALE: 1"= 50 FEET

50 0 10 25 50

ORIGINAL PAGE SIZE: 22" x 34"

Item #1.

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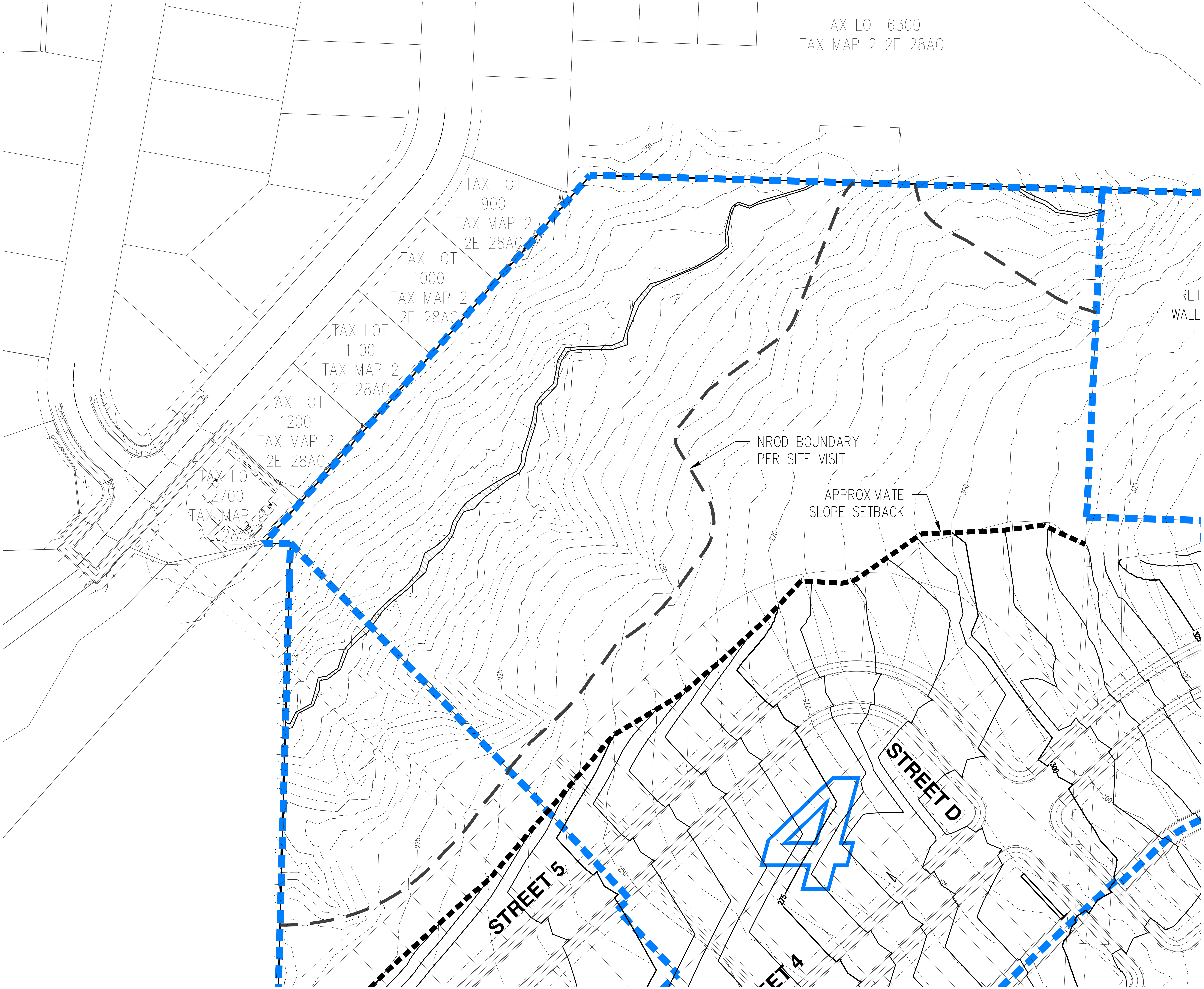
EXH-12

AKS DRAWING FILE: 7404 ENLARGED GRADING.DWG | LAYOUT: 5



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LEGEND

EXISTING GROUND CONTOUR (5 FT)
EXISTING GROUND CONTOUR (25 FT) — 350 —
FINISHED GRADE CONTOUR (5 FT)
FINISHED GRADE CONTOUR (25 FT) — 345 —

N

SCALE: 1"= 50 FEET
50 0 10 25 50
ORIGINAL PAGE SIZE: 22" x 34"

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EXH-13

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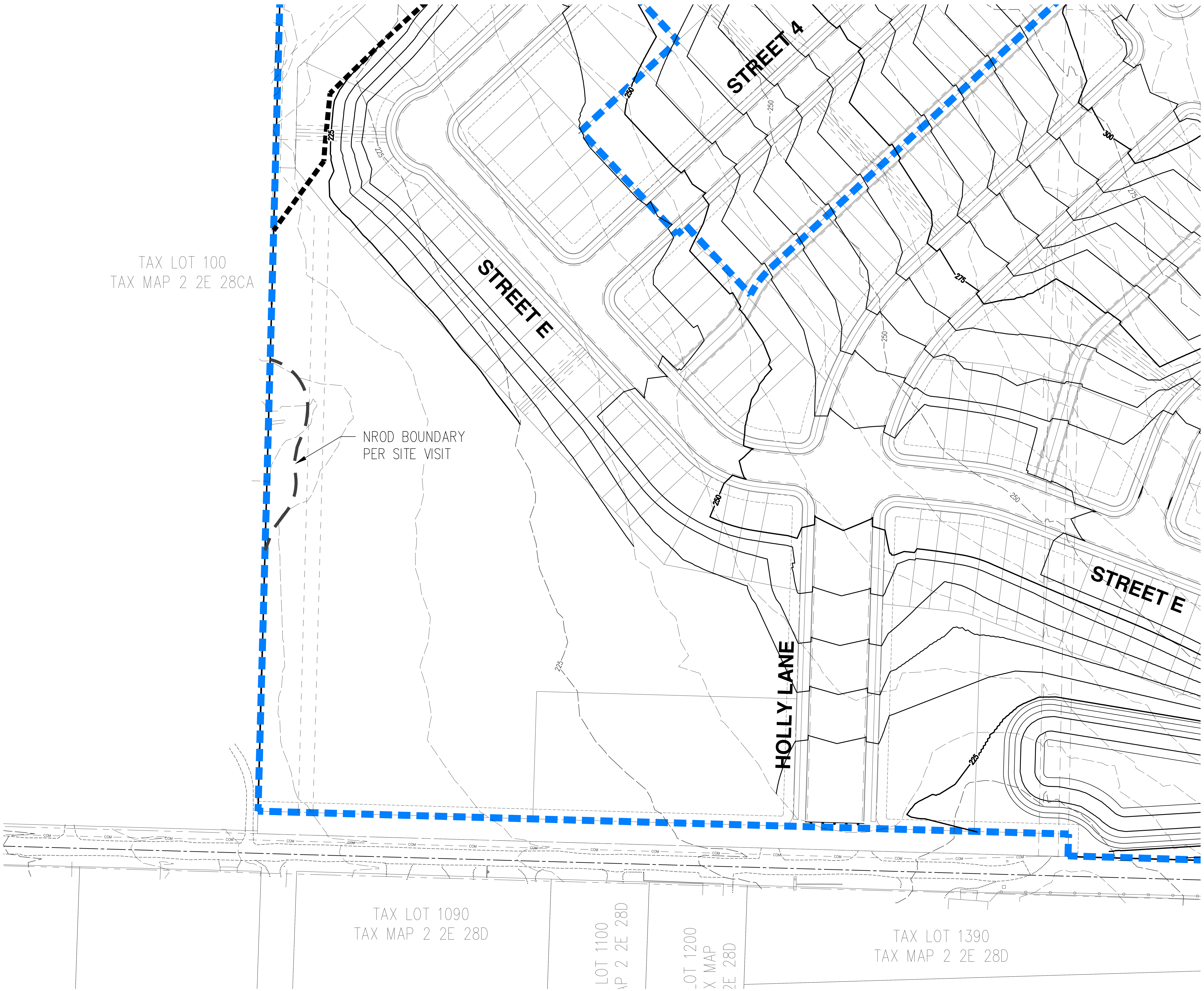
Item #1.



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LEGEND

EXISTING GROUND CONTOUR (5 FT)	
EXISTING GROUND CONTOUR (25 FT)	350
FINISHED GRADE CONTOUR (5 FT)	
FINISHED GRADE CONTOUR (25 FT)	345

N

SCALE: 1"= 50 FEET

50 0 10 25 50

ORIGINAL PAGE SIZE: 22" x 34"

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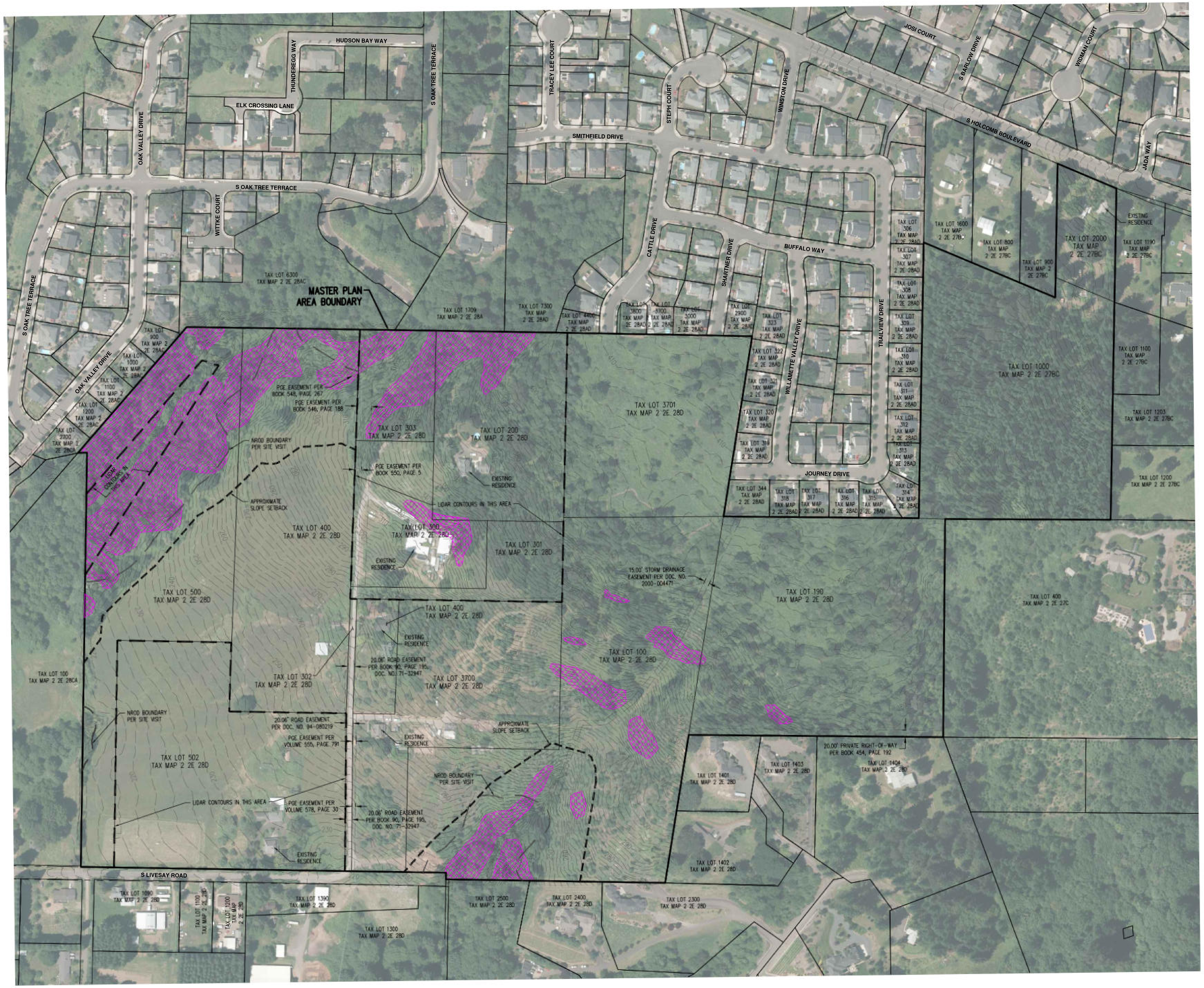
EXH-14

AKS DRAWING FILE: 7404 ENLARGED GRADING.DWG | LAYOUT: 7



LEGEND

GEOLOGIC HAZARD AREA (SLOPES GREATER THAN 25%) WITHIN MASTER PLAN AREA (PER OC WEBMAPS)

NOTES:

1. EXISTING CONDITION INFORMATION SHOWN IS BASED ON A VARIETY OF SOURCES INCLUDING: TOPOGRAPHIC AND UTILITY SURVEYING, BOUNDARY SURVEYING, GEOGRAPHIC INFORMATION SYSTEM (GIS), AERIAL PHOTOGRAPH AND TAX ASSESSOR MAP INFORMATION. ALL DIMENSIONS AND AREAS SHOWN ARE PRELIMINARY AND APPROXIMATE.
2. CONTOUR INTERVAL IS 2 FEET. CONTOURS SHOWN ARE PER A MIX OF SURVEYED ELEVATIONS AND LIDAR DATA AND SHOULD BE CONSIDERED APPROXIMATE.
3. TAXLOTS 200, 300, 301, 303, AND 502 HAVE NOT BEEN SURVEYED, NOR HAVE THEY BEEN EVALUATED FOR NROD AREAS.
4. FOR SLOPE ANALYSIS AND NATURAL RESOURCE OVERLAY INFORMATION PLEASE REFER TO SHEETS P-19 AND P-20.
5. VERTICAL DATUM: ELEVATIONS ARE BASED ON NATIONAL GEODETIC SURVEY BENCHMARK DESIGNATION V 723 (PID RD1497) LOCATED AT THE SE CORNER OF HWY 99E AND HWY I-205. ELEVATION = 62.48 FEET (NAVD 88).
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7. THIS IS NOT A PROPERTY BOUNDARY SURVEY TO BE RECORDED WITH THE COUNTY SURVEYOR. BOUNDARIES MAY BE PRELIMINARY AND SHOULD BE CONFIRMED WITH THE STAMPING SURVEYOR PRIOR TO RELYING ON FOR DETAILED DESIGN OR CONSTRUCTION.

EXISTING TAX LOT SUMMARY:

TAX LOT	# OF RESIDENCES	AREA (ACRE)
100:	NONE	14.3±
190:	NONE	10.8±
200:	1 RESIDENCE	5.2±
300:	1 RESIDENCE	3.1±
301:	NONE	1.4±
302:	NONE	0.4±
303:	NONE	1.8±
400:	1 RESIDENCE	10.4±
500:	NONE	10.3±
502:	1 RESIDENCE	9.4±
1000:	NONE	9.7±
2000:	1 RESIDENCE	1.5±
3700:	1 RESIDENCE	6.8±
3701:	NONE	6.6±
TOTAL:	6 RESIDENCES	91.7±

SCALE: 1" = 150 FEET

150 0 30 75 150

ORIGINAL PAGE SIZE: 22" x 34"

PRELIMINARY EXISTING CONDITIONS PLAN WITH AERIAL PHOTO

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

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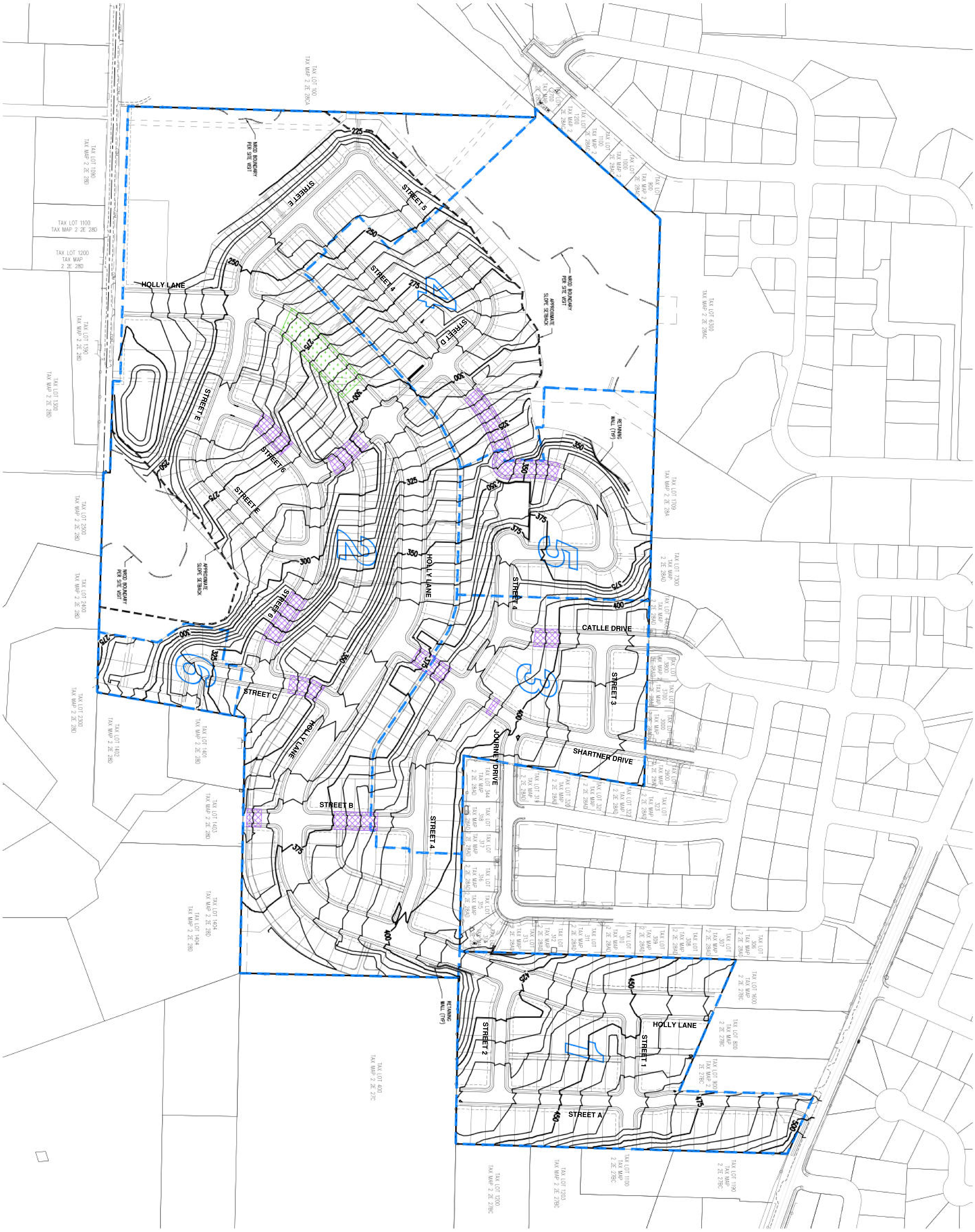
EX-1



LEGEND

LOCAL STREET SLOPES BETWEEN 12% AND 15%

COLLECTOR SLOPES AT 12%

LEGEND

EXISTING GROUND CONTOUR (5 FT)

EXISTING GROUND CONTOUR (25 FT) — 350

FINISHED GRADE CONTOUR (5 FT)

FINISHED GRADE CONTOUR (25 FT) — 345

MAXIMUM SLOPES:

LOCAL STREET SLOPE:
15% IN RESIDENTIAL AREAS PER CLACKAMAS COUNTY STANDARD DRAWING C110

FIRE SPRINKLERS REQUIRED WHERE SLOPES OVER 12% ARE NECESSARY PER OREGON FIRE CODE 503.1.1 EXCEPTION (2)

COLLECTOR SLOPE:
12% IN RESIDENTIAL AREAS PER CLACKAMAS COUNTY STANDARD DRAWING C130

N

SCALE: 1"=150 FEET

150 0 75 150

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STREET SLOPE EXHIBIT

PARK PLACE CROSSING MASTER PLAN

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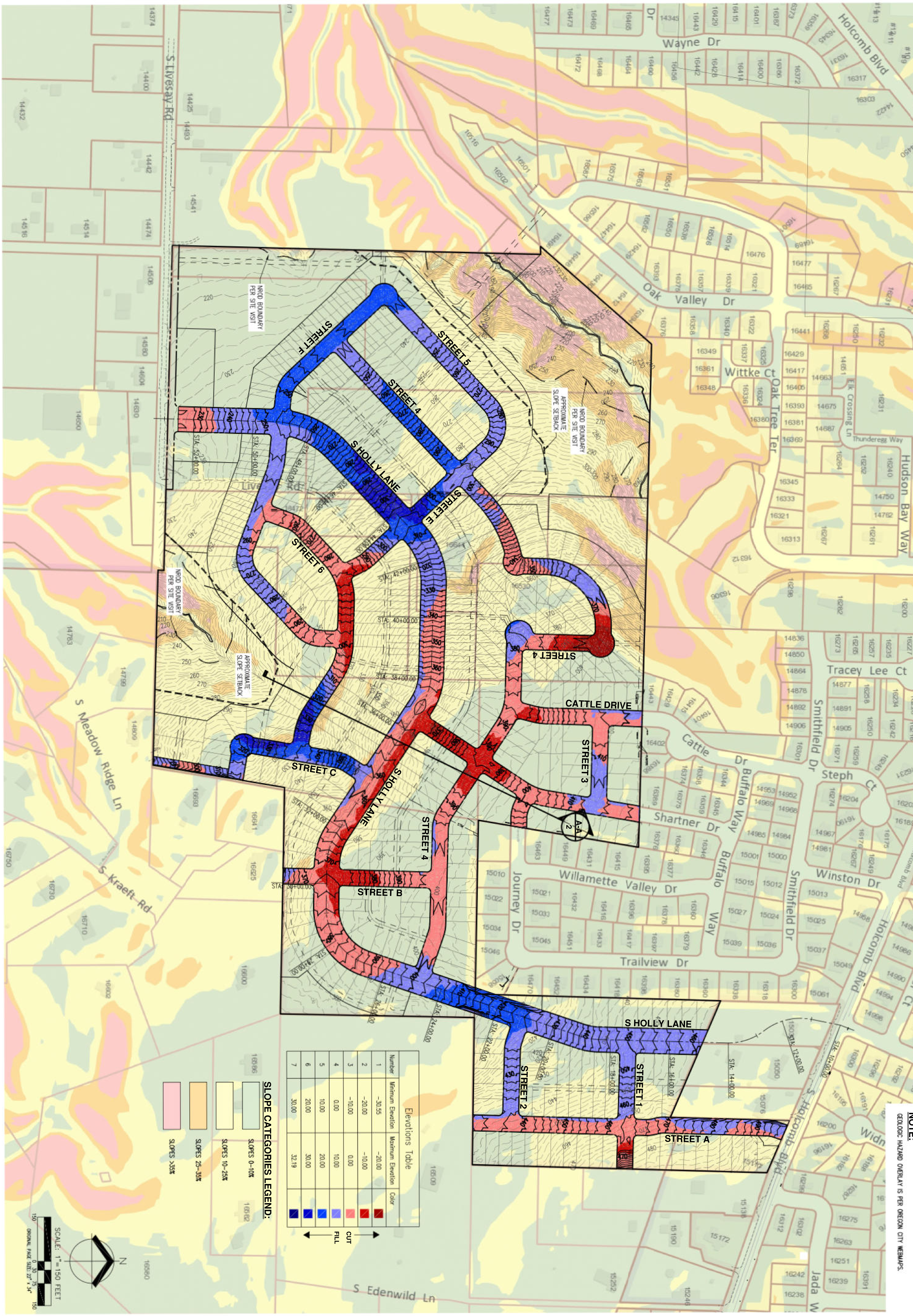

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	-30.55	-20.00	
2	-20.00	-10.00	
3	-10.00	0.00	
4	0.00	10.00	
5	10.00	20.00	
6	20.00	30.00	
7	30.00	32.19	

PRELIMINARY COLOR CUT-FILL MAP (ROW ONLY)
PARK PLACE CROSSING MASTER PLAN
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DATE:	03/15/2022
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EX-1

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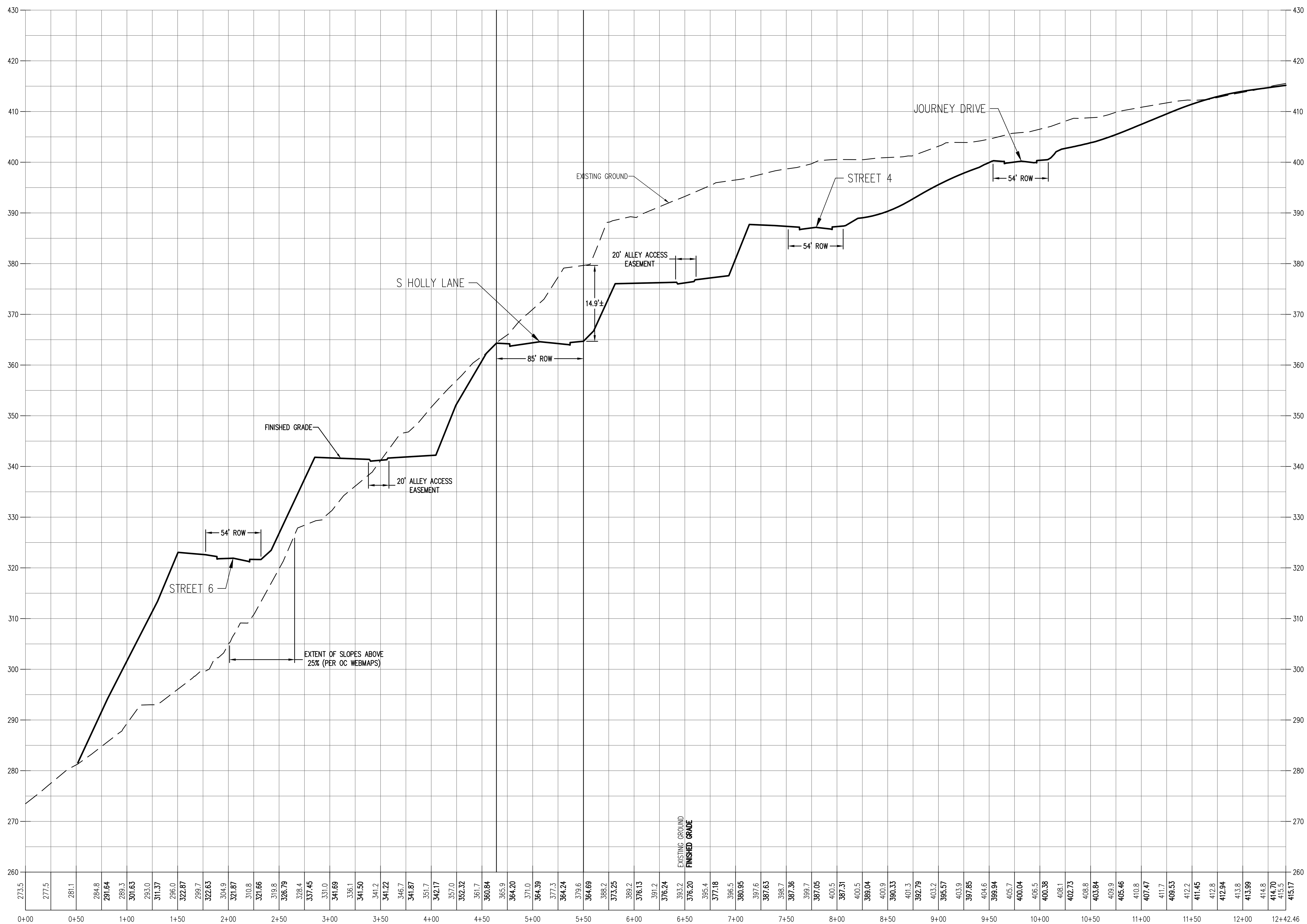
Item #1.

Item #1.



SECTION A-A
Hor. Scale: 1"= 50'
Vert. Scale: 1"= 10'

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SECTION A-A
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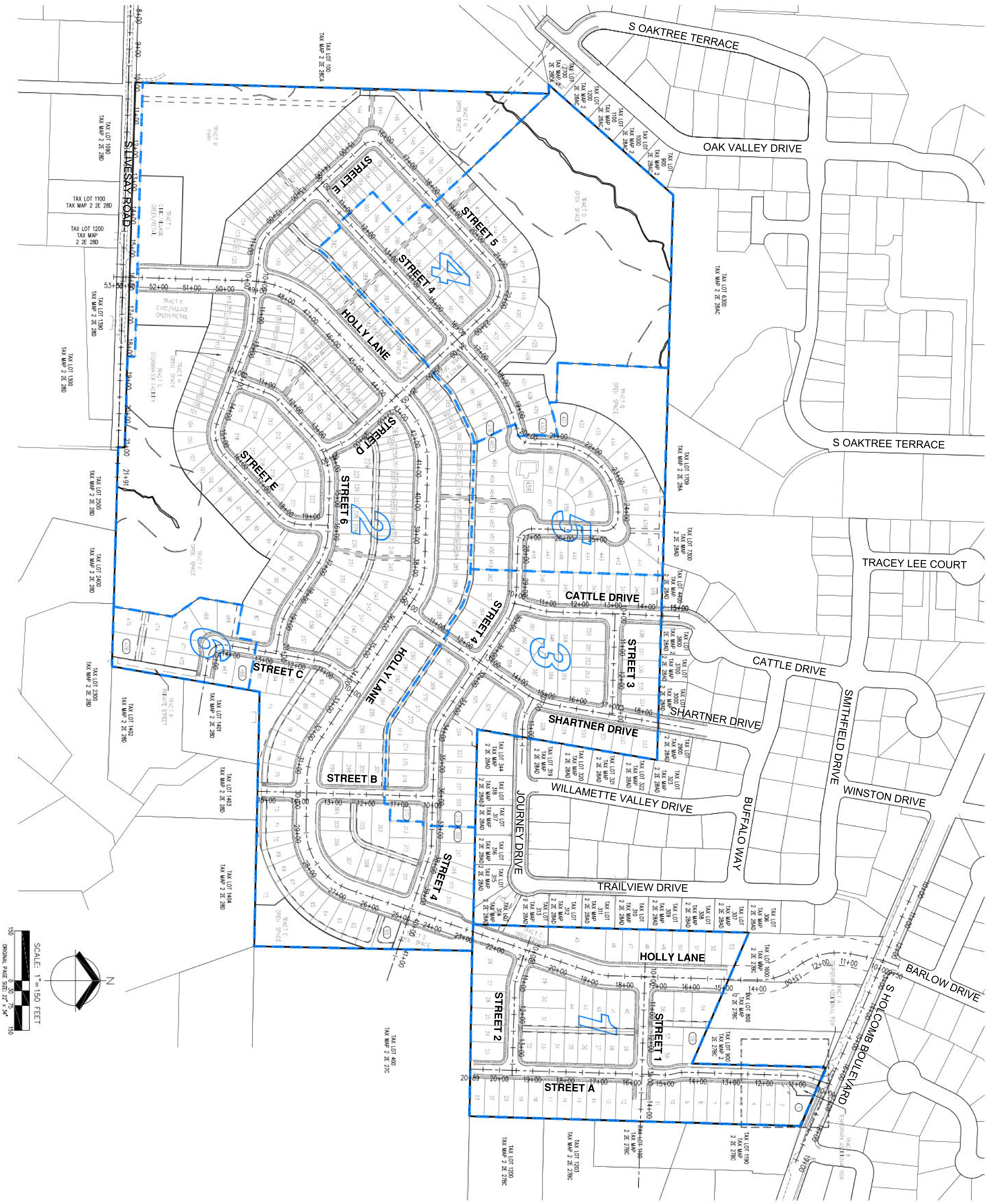
EXH-18

AKS DRAWING FILE: 7404 CUT-FILL ROW-ONLY.DWG | LAYOUT: SECTION A-A

AKS DRAWING FILE: 7404 SITE-STREETS.DWG | LAYOUT: P-08



PRELIMINARY SITE PLAN WITH STREET STATIONING

PARK PLACE CROSSING MASTER PLAN

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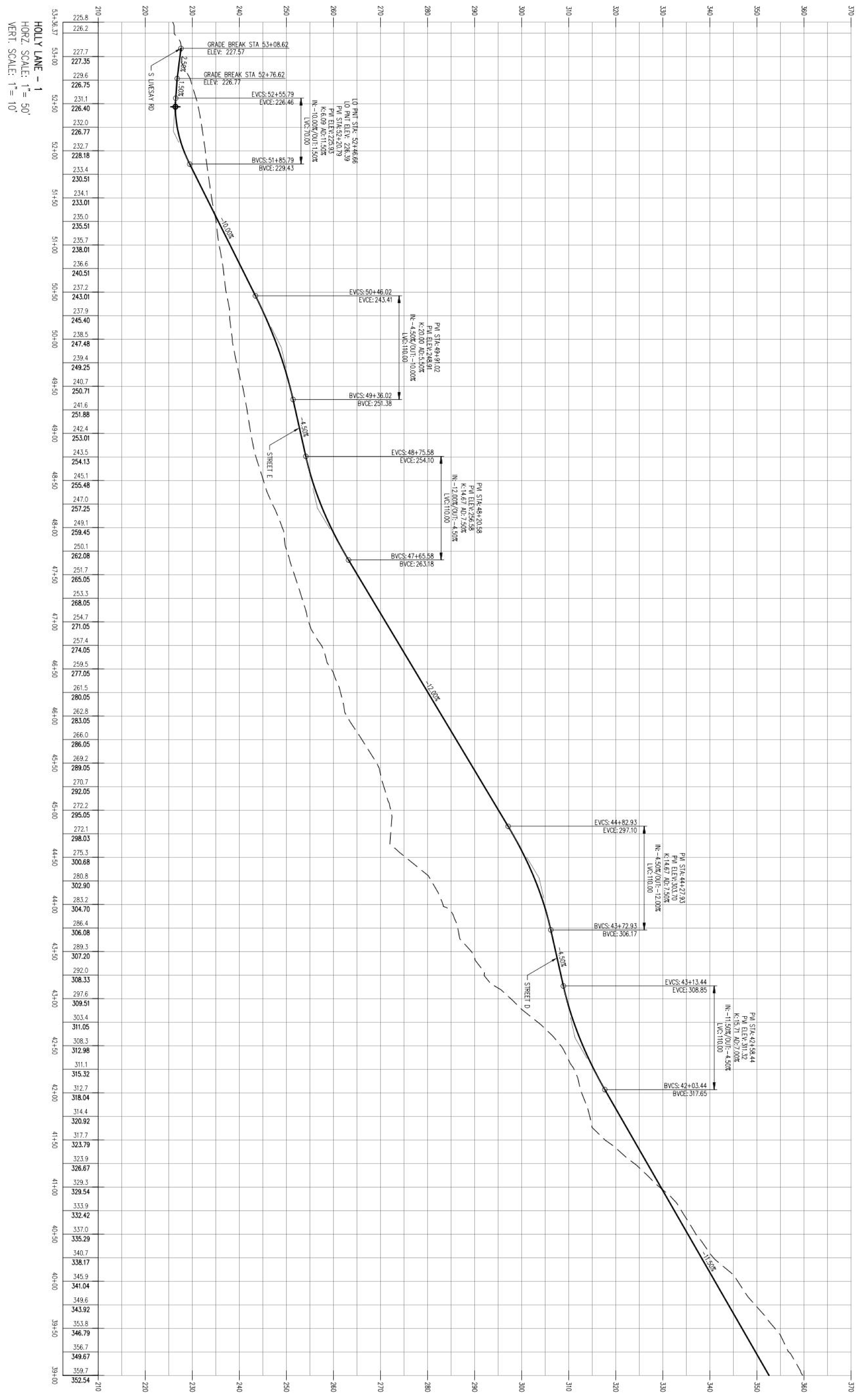
AKS DRAWING FILE: 7404CSURF-PROFILES.DWG | LAYOUT: 1



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STREET PROFILES
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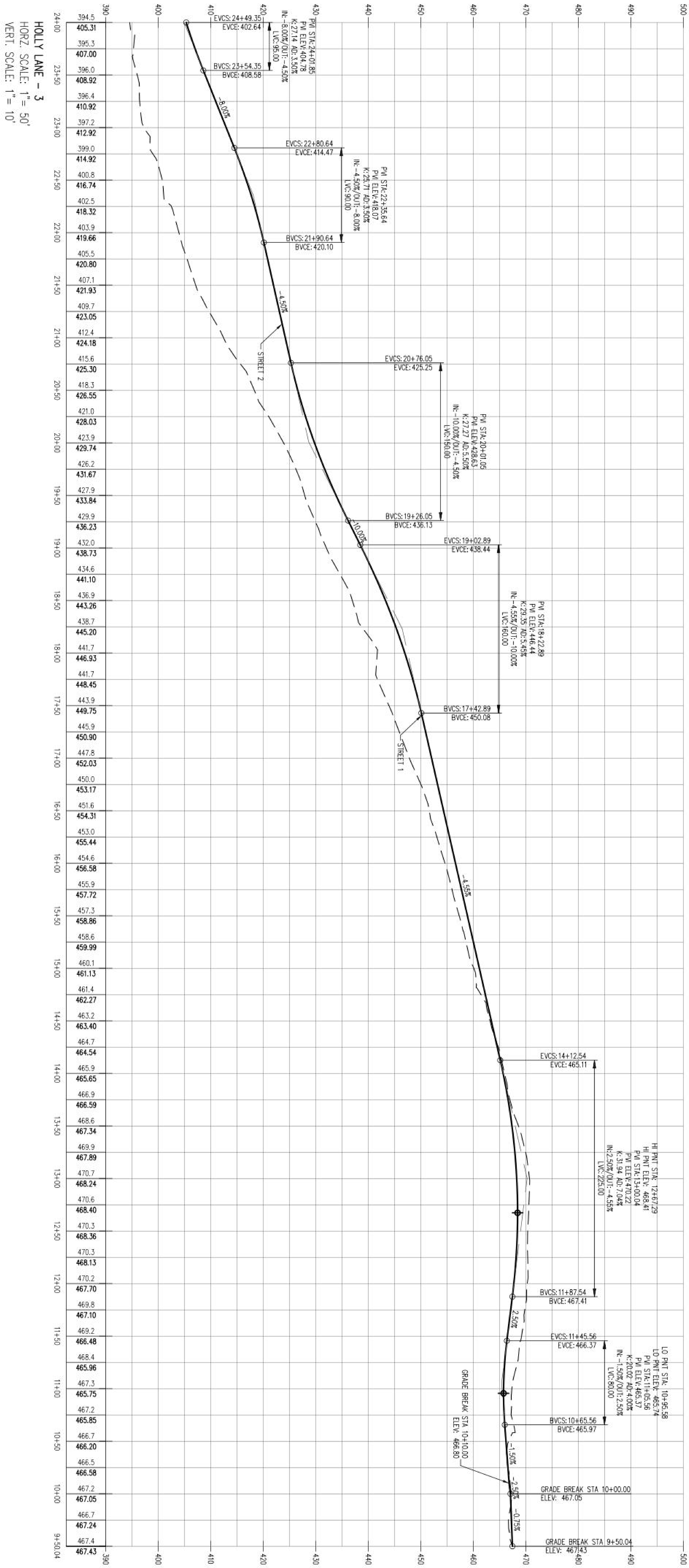

PRELIMINARY NOT FOR CONSTRUCTION

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3

STREET PROFILES
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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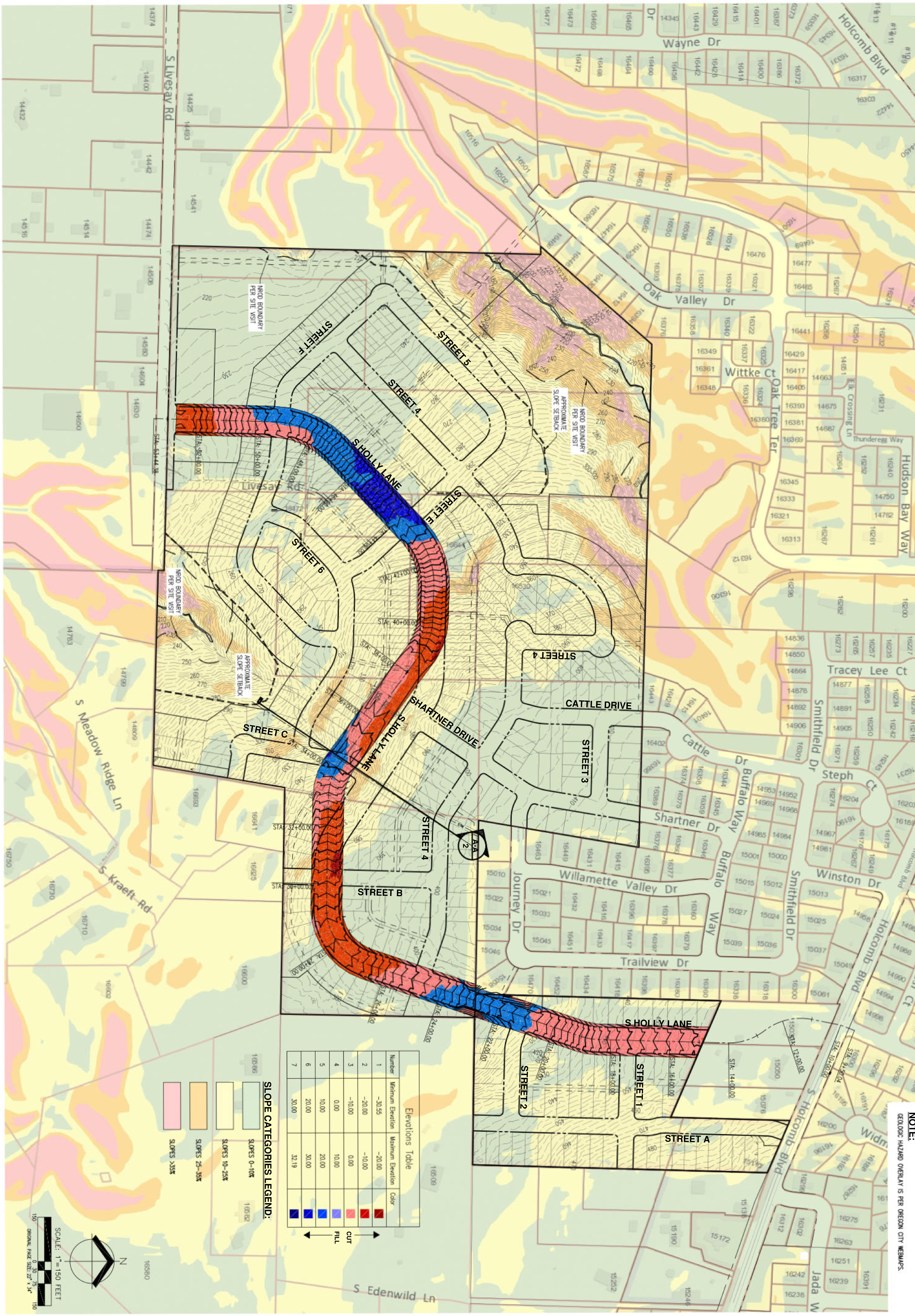

NOTE:
GEOLOGIC HAZARD OVERLAY IS PER OREGON CITY WEBMAPS.

SLOPE CATEGORIES LEGEND:

- SLOPES 0-10%
- SLOPES 10-25%
- SLOPES 25-35%
- SLOPES >35%

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	-30.55	-20.00	
2	-20.00	-10.00	
3	-10.00	0.00	
4	0.00	10.00	
5	10.00	20.00	
6	20.00	30.00	
7	30.00	32.19	

CUT
FILL

PRELIMINARY COLOR CUT-FILL MAP - S HOLLY LANE ALTERNATE 1

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

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EX-1

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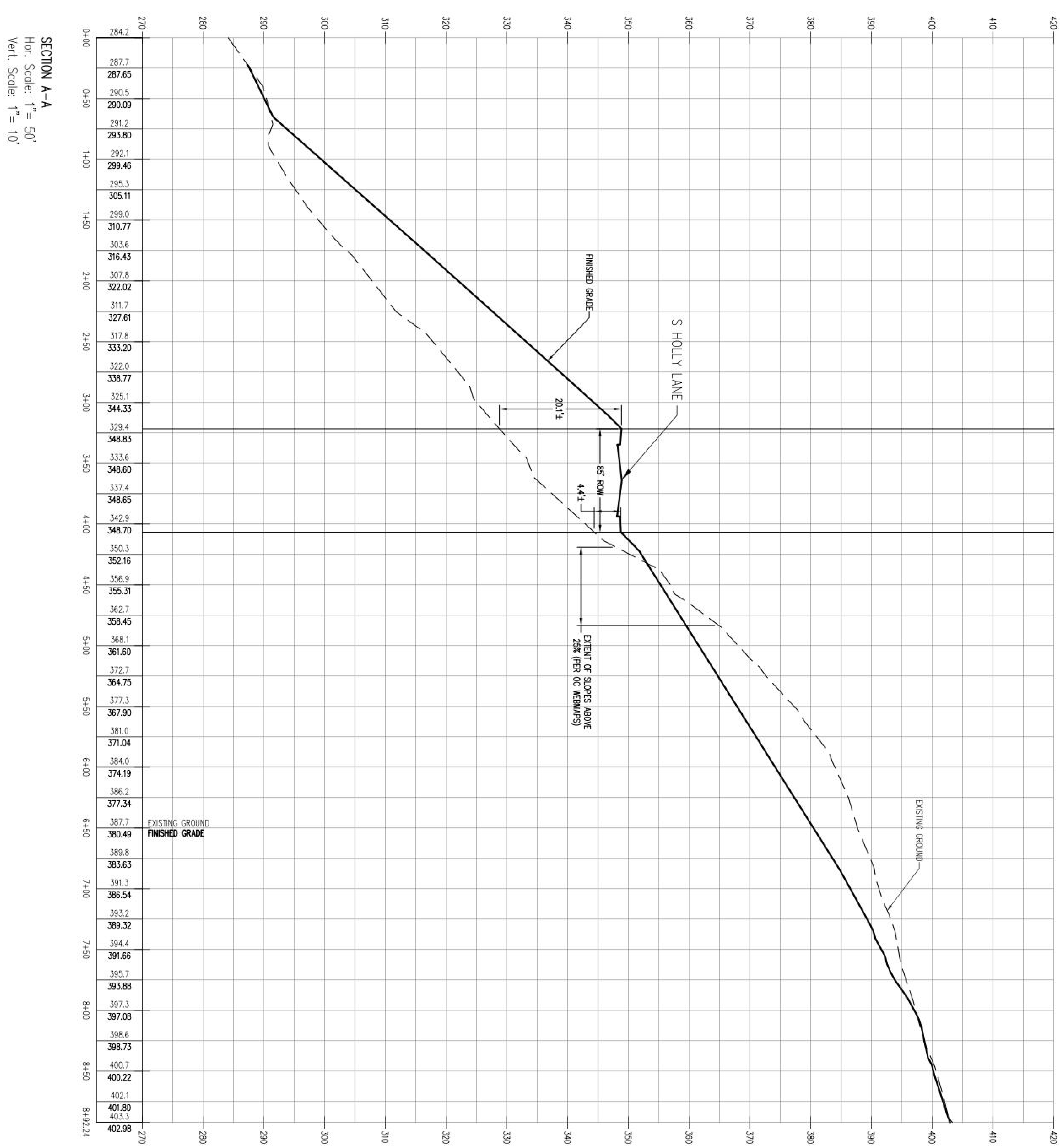

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S HOLLY LANE ALTERNATE 1 SECTION A-A
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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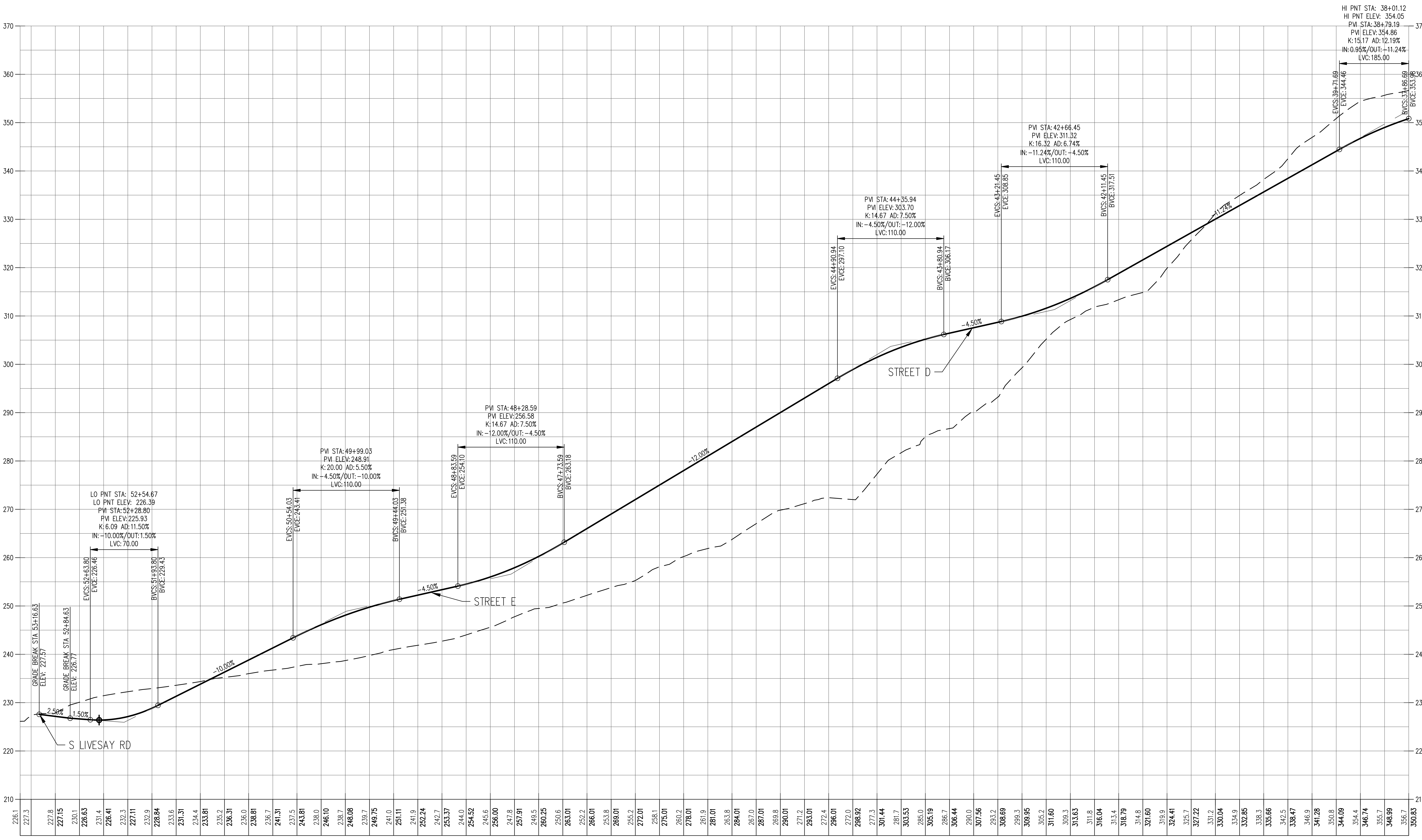
EX-2

Item #1.



HOLLY LANE ALTERNATE 1 - 1
HORZ. SCALE: 1"= 50'
VERT. SCALE: 1"= 10'

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OREGON CITY, OR

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EXH-25

AKS DRAWING FILE: 7404 CSURF-PROFILES ALT-1.DWG | LAYOUT: 1

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STREET PROFILES

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

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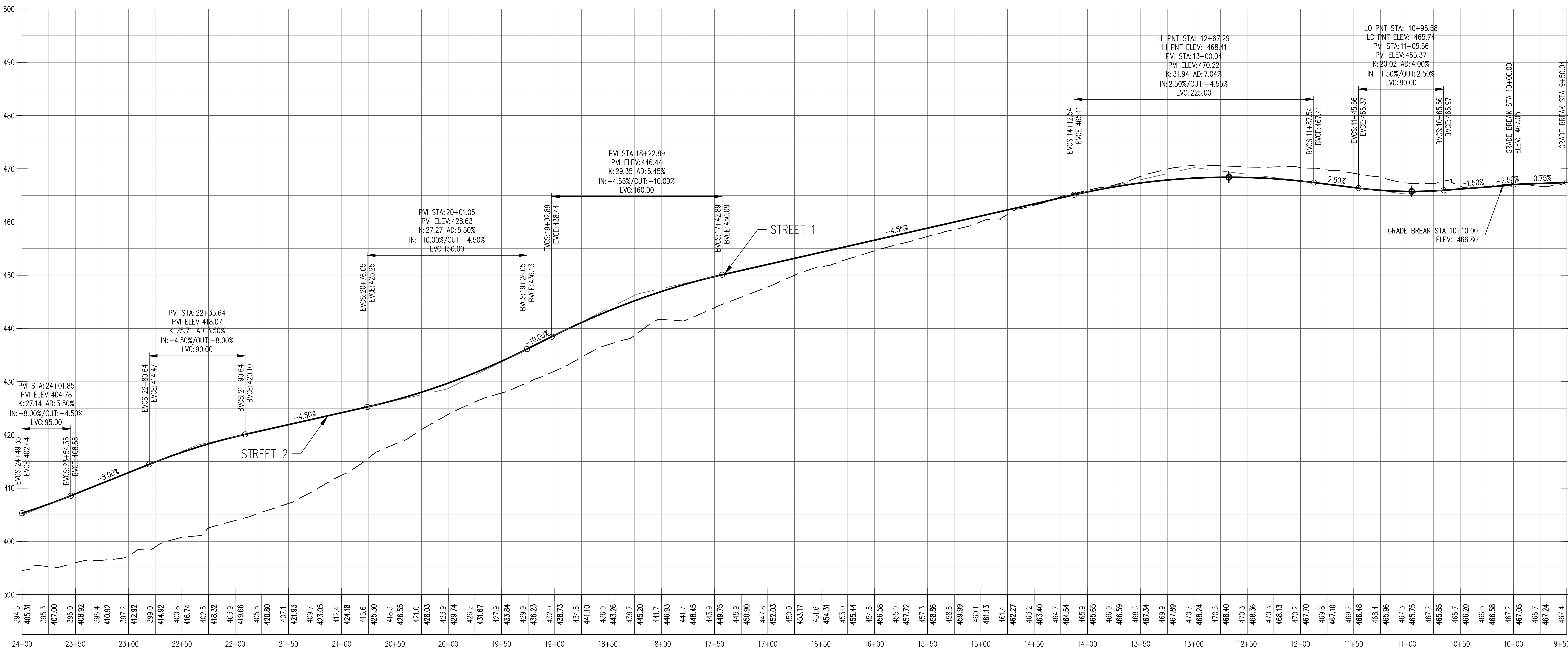

HOLLY LANE ALTERNATE 1 - 3
HORZ. SCALE: 1"= 50'
VERT. SCALE: 1"= 10'

AKS DRAWING FILE: 7404 CSURF-PROFILES ALT-1.DWG | LAYOUT: 3

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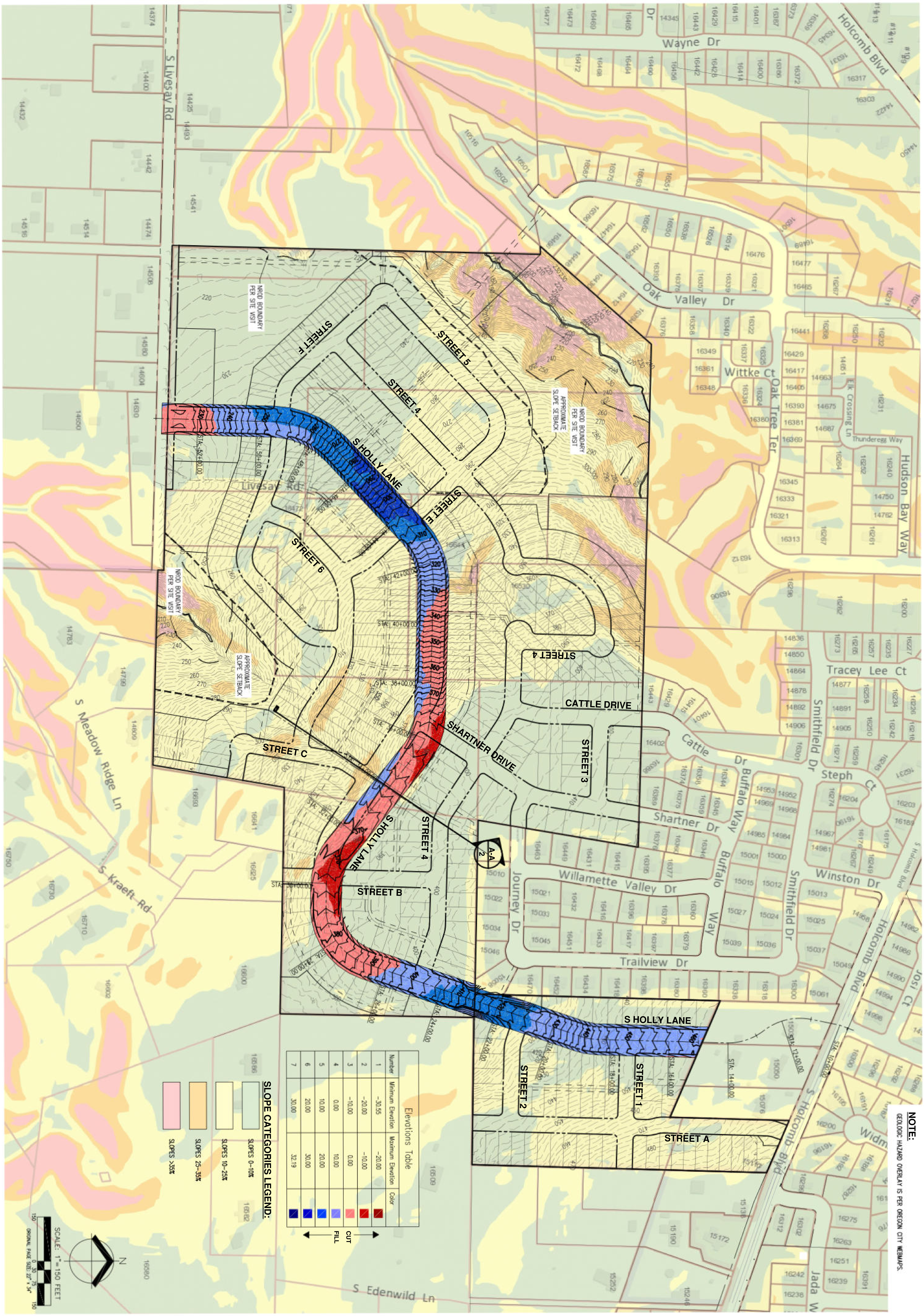

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	-30.55	-20.00	
2	-20.00	-10.00	
3	-10.00	0.00	
4	0.00	10.00	
5	10.00	20.00	
6	20.00	30.00	
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PRELIMINARY COLOR CUT-FILL MAP - S HOLLY LANE ALTERNATE 2

PARK PLACE CROSSING MASTER PLAN

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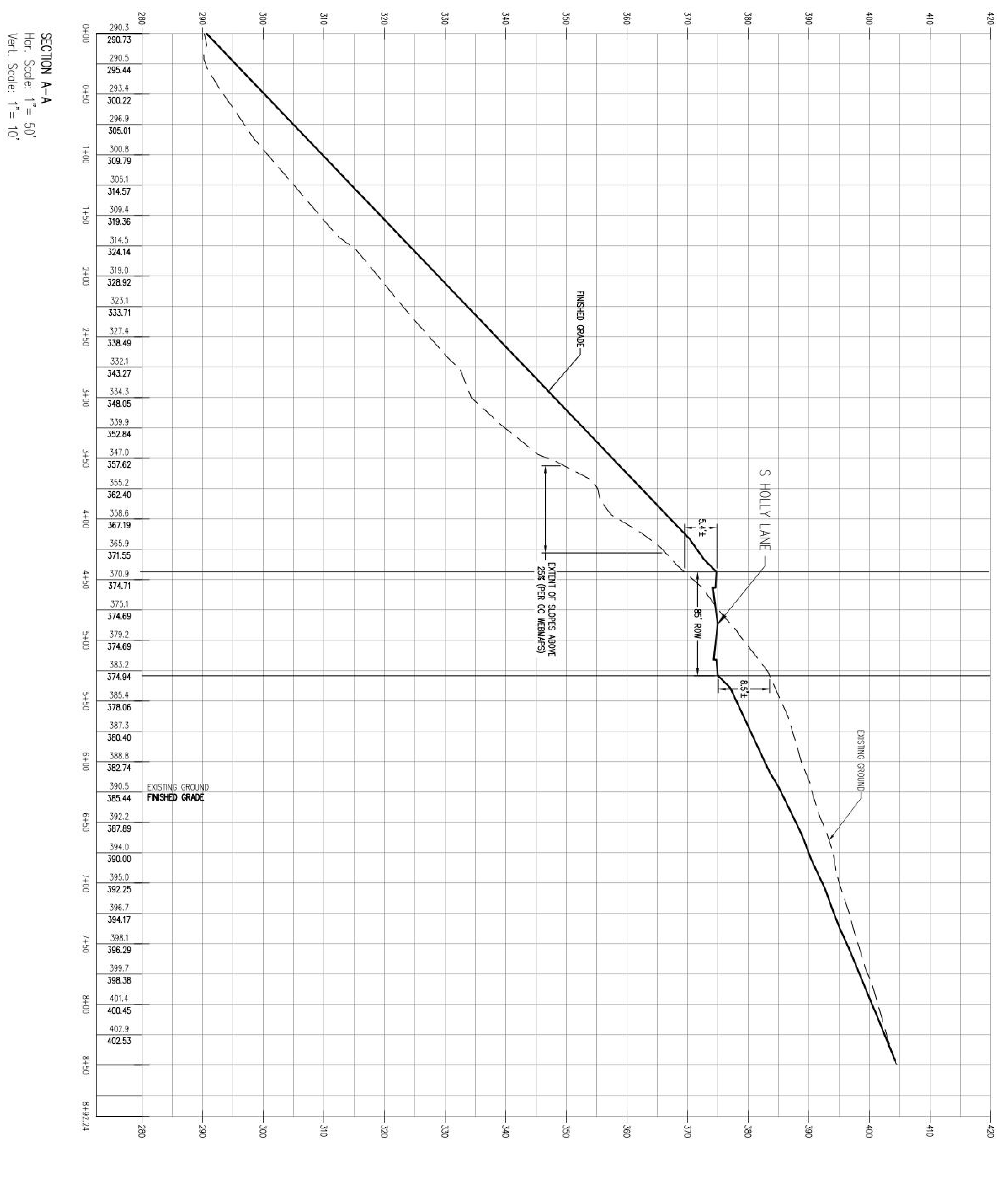

EX-2

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S HOLLY LANE ALTERNATE 2 SECTION A-A
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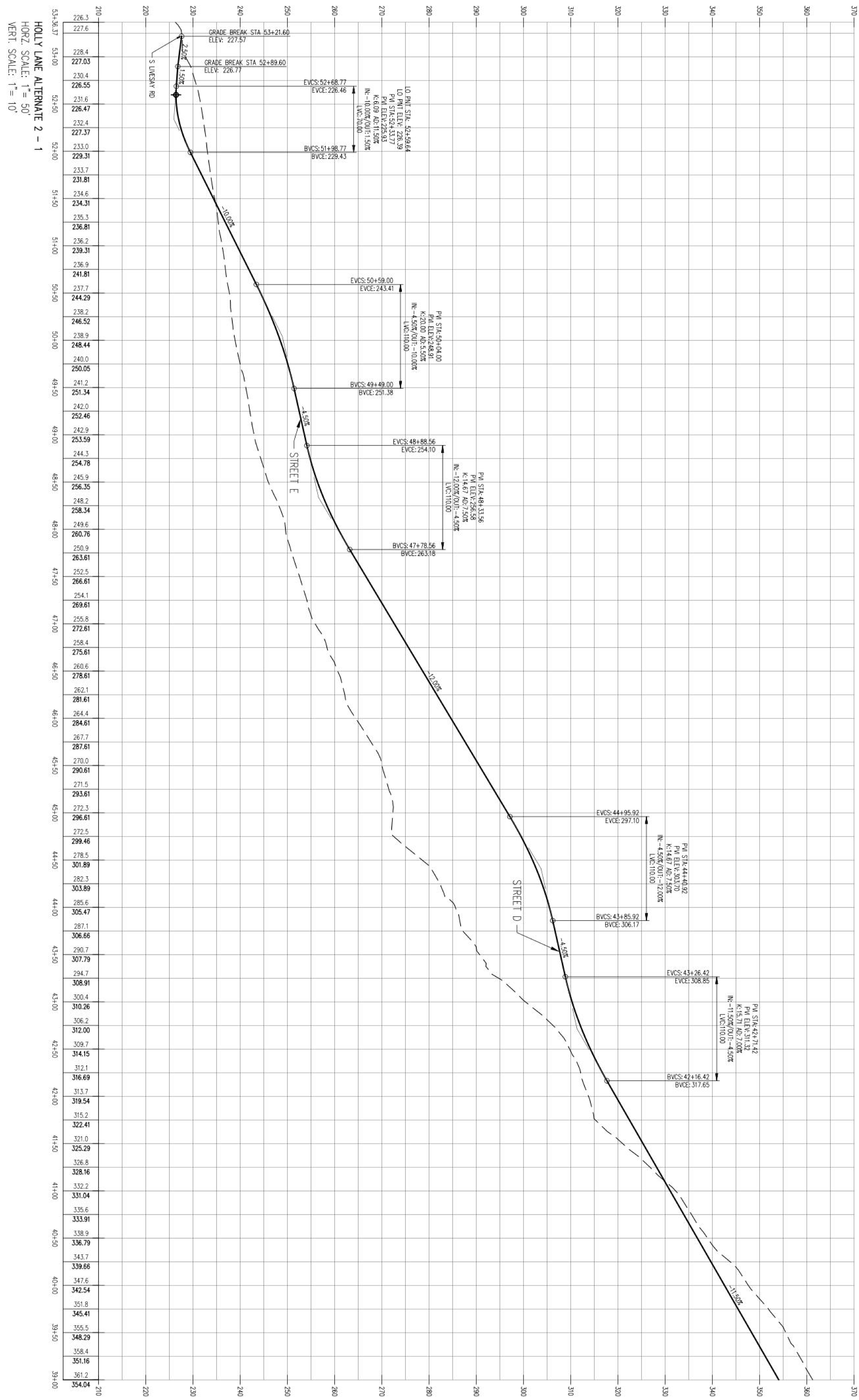

STREET PROFILES
PARK PLACE CROSSING MASTER PLAN
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STREET PROFILES
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

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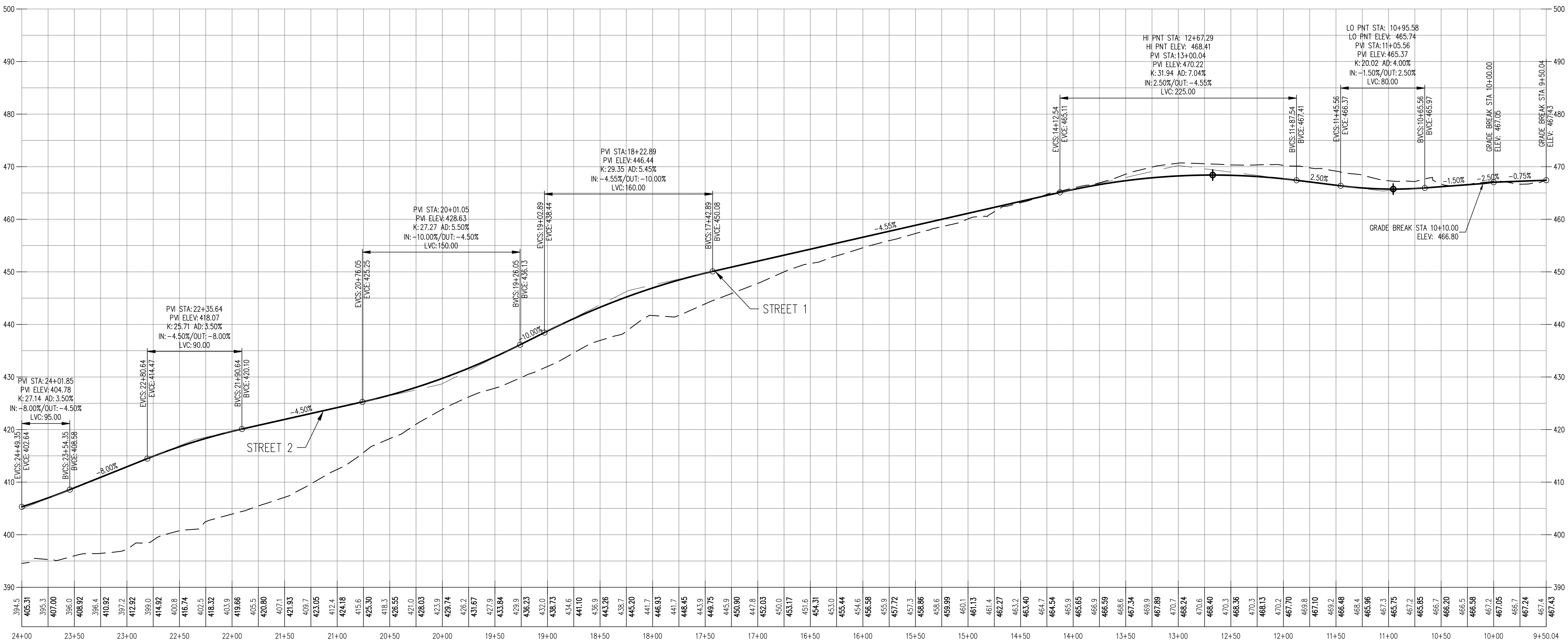
Item #1.

Item #1.



HOLLY LANE ALTERNATE 2 - 3
HORZ. SCALE: 1"= 50'
VERT. SCALE: 1"= 10'

AKS DRAWING FILE: 7404 CSURF-PROFILES ALT-2.DWG | LAYOUT: 3

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EXH-32

GEOPACIFIC

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

March 18, 2022
Project No. 20-5600

Harlan Borow
Hidden Falls Development, LLC
1980 Willamette Falls Drive, Suite 260
West Linn, Oregon 97068
Via email: harlan@iconconstruction.net

SUBJECT: ADDENDUM ON SLOPES
PARK PLACE CROSSING GENERAL DEVELOPMENT PLAN / MASTER PLAN
TERMINUS OF SOUTH LIVESAY ROAD
OREGON CITY, OREGON

Reference: GeoPacific Engineering, Inc., Preliminary Geotechnical Engineering Report, Park Place Crossing General Development Plan / Master Plan, Terminus of South Livesay Road, Oregon City, Oregon, Dated March 18, 2022.

This letter presents an addendum on slopes for the proposed Park Place Crossing General Development Plan. It is our understanding that some relatively small, isolated areas with slopes steeper than 25 percent have been identified on OCWebmaps. This report addresses one sloped area in the central portion of the site, associated with the existing residence at 16644 South Livesay Road, and several sloped areas in the southeast portion of the site. The approximate locations of the subject areas with slopes steeper than 25 percent are shown on Figure 1. GeoPacific previously performed a geotechnical investigation of the site and provided preliminary recommendations for site development in the above-referenced report, dated March 16, 2022.

SLOPED AREA IN CENTRAL PORTION OF THE SITE

As shown on Figure 1, an area with a slope steeper than 25 percent has been identirfied on OC Webmaps in the central portion of the site, immediately northeast of the existing residence at 16644 South Livesay Road. In this area, OC Webmaps indicates that the slopes are generally between 25 to 35 percent, but that grades within a small portion of the sloped area are inclined at grades of over 35 percent. Based on our review of topographic mapping and our review of LiDAR imagery (Figure 2), we infer that the slope in this area was shaped artificially by grading associated with the existing single-family residence.

Landslide inventory mapping of the Oregon City and Gladstone Quadrangles and the statewide landslide database indicate no mapped landslides are present in the vicinity of the subject slope area (Schlicker and Finlayson, 1979; Madin, 1990; Madin and Burns, 2006; Burns and Madin, 2009; Madin, 2009; Burns and Mickelson, 2010; Burns et al., 2012; DOGAMI SLIDO, 2022).

Mass grading of the site will involve the construction of engineered fill slopes on the downslope side of this area and no significant addition or removal of fill material on the upslope side of this area. Current plans indicate that fills of up to 20 feet are planned on the downslope side of the existing slope area. The approximate magnitudes of cuts and fills in the vicinity of this slope area are shown on Figure 1.

Fill slopes will likely be constructed of native soils and will be graded no steeper than 2H:1V (Horizontal to Vertical). At these gradients, constructed of the appropriate materials, keyed, benched, and with proper drainage measures installed, fill slopes should remain grossly and surficially stable. Based on our understanding of the proposed grading in the vicinity of the subject slope area, which is currently steeper than 25 percent, it is our opinion that the proposed cuts and fills are generally practicable and adequate factors of safety can be maintained. We anticipate that stability of this existing slope area will be adequate to support the proposed design/layout. Soil conditions in this area are to be investigated at a later date.

SLOPED AREAS IN SOUTHEAST PORTION OF THE SITE

As shown on Figure 1, several relatively small, isolated areas with slopes steeper than 25 percent have been identified on OC Webmaps in the southeast portion of the site. LiDAR imagery of the subject portion of the site is shown on Figure 2. Landslide inventory mapping of the Oregon City and Gladstone Quadrangles and the statewide landslide database indicate no mapped landslides are present in the vicinity of the subject slope areas (Schlicker and Finlayson, 1979; Madin, 1990; Madin and Burns, 2006; Burns and Madin, 2009; Madin, 2009; Burns and Mickelson, 2010; Burns et al., 2012; DOGAMI SLIDO, 2022). During our reconnaissance, we did not observe evidence of recent movement (ground cracks, scarps, or hummocky topography) in the area of the subject slopes.

Our explorations indicate the areas with slopes exceeding 25% grade in the southeast portion of the site are underlain by soils belonging to the Springwater Formation. The fluvial depositional nature of this formation result in variable soil types consisting of silt, clay, gravel conglomerate, highly weathered volcanic rock, and sand. In our explorations in the vicinity of the subject area (test pits TP-2, TP-15, and TP-24), the Springwater Formations soils consisted of stiff to very stiff clay and silt and medium dense to dense gravel. The Springwater Formation is considered to have a moderate shear strength and moderate resistance to slope instability along moderate slopes.

In our opinion, the slope instability hazard in the subject area of the proposed development is low. Existing Springwater Formation soils in the vicinity of the subject slope areas are stiff to very stiff or medium dense to dense, and no evidence of recent landslide movement was observed in that area.

Mass grading of the site will generally involve the construction of engineered fill slopes in these areas. Current plans indicate that fills of up to 25 feet are planned on the downslope sides of the existing slope areas. The approximate magnitudes of cuts and fills in the vicinity of each of the subject slope areas are shown on Figure 1.

Fill slopes will likely be constructed of native soils and will be graded no steeper than 2H:1V (Horizontal to Vertical). Cut slopes will be excavated into native soils and will be graded no steeper than 2H:1V. At these gradients, constructed of the appropriate materials, keyed, benched, and with proper drainage measures installed, cut and fill slopes should remain grossly and surficially stable. Based on our understanding of the proposed grading in the vicinities of the subject slope areas, which are currently steeper than 25 percent, it is our opinion that the proposed cuts and fills are generally practicable and adequate factors of safety will be maintained. Stability of these areas of existing slopes will be adequate to support the proposed design/layout.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and their consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

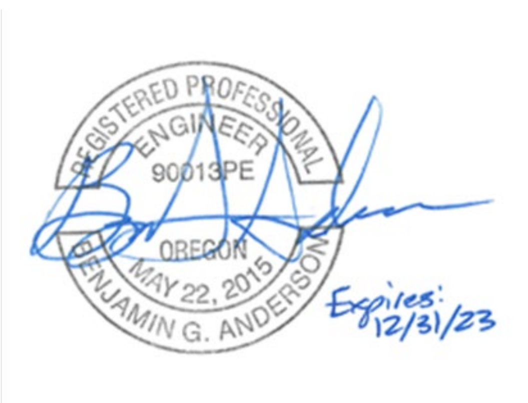
Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, GeoPacific attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

GEOPACIFIC ENGINEERING, INC.



Benjamin G. Anderson, P.E.
Associate Engineer

Attachments: References
Figure 1 – Site Plan with OC Webmap Overlay
Figure 2 – Site Plan with LiDAR Imagery Overlay

REFERENCES

Burns, W.J. and Madin, I.P., 2009, Landslide Inventory Map of the Northwest Quarter of the Oregon City Quadrangle, Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries, IMS-26, scale 1:8,000, 1 plate.

Burns, W.J. and Mickelson, K.A., 2010, Landslide Inventory Maps of the Oregon City Quadrangle, Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries, IMS-30, scale 1:8,000, 4 plates.

Burns, W.J., Mickelson, K.A., Duplantis, S., and Madin, I.P., 2012, Landslide Inventory Maps of the Gladstone Quadrangle, Clackamas and Multnomah Counties, Oregon: Oregon Department of Geology and Mineral Industries, IMS-48, 4 plates, 1:8,000 scale.

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1:24,000, 22 p.

Madin, I.P., 2009, Geologic map of the Oregon City 7.5' Quadrangle, Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries GMS-119.

Madin, I.P. and Burns, W.J., 2006, Map of the landslide geomorphology of Oregon City, Oregon, and vicinity interpreted from lidar imagery and aerial photographs: Oregon Department of Geology and Mineral Industries Open File Report O-06-27.

Oregon Department of Geology and Mineral Industries, 2022, DOGAMI Lidar Viewer: https://gis.dogami.oregon.gov/lidarviewer/.

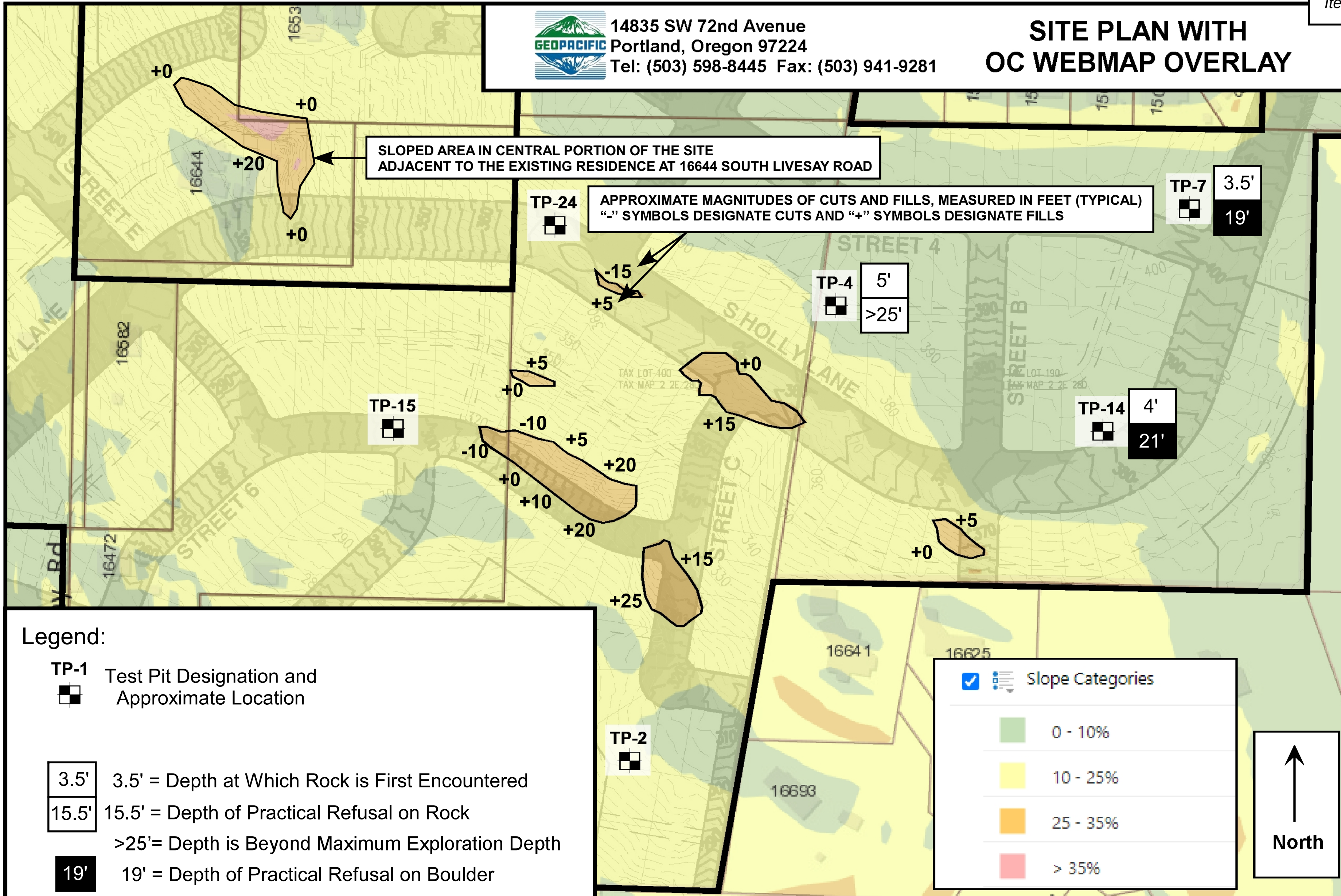
Oregon Department of Geology and Mineral Industries, 2021, SLIDO: Statewide Landslide Information Database for Oregon: https://gis.dogami.oregon.gov/slido/

Schlicker, H.G. and Finlayson, C.T., 1979, Geology and Geologic Hazards of northwestern Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries, Bulletin No. 99, 79 p., scale 1:24,000.

Item #1.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

SITE PLAN WITH OC WEBMAP OVERLAY



Legend:

TP-1 Test Pit Designation and Approximate Location

3.5' = Depth at Which Rock is First Encountered

15.5' = Depth of Practical Refusal on Rock

>25'= Depth is Beyond Maximum Exploration Depth

19' = Depth of Practical Refusal on Boulder

Note: Location of all geotechnical information is approximate.

0' 200'
APPROXIMATE SCALE 1"=200'

Date: 03/19/21
Drawn by: BGA

Project: Park Place Crossing General Development Plan Oregon City, Oregon	Project No. 20-5600	FIGURE 1

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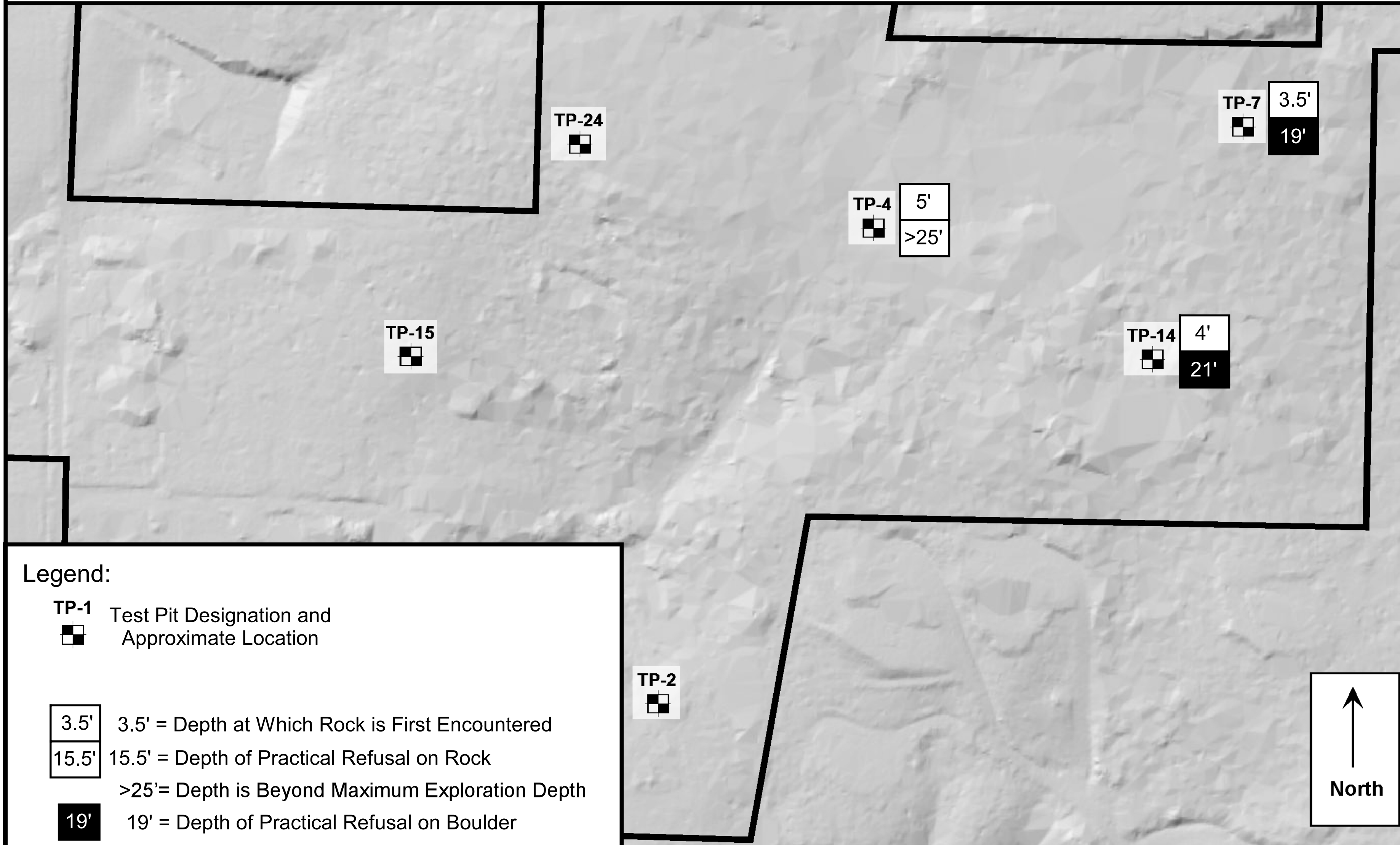
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

SITE PLAN WITH LIDAR IMAGERY OVERLAY



Legend:

TP-1 Test Pit Designation and Approximate Location

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0' 200'
APPROXIMATE SCALE 1"=200'

Date: 03/16/22
Drawn by: BGA

Project: Park Place Crossing General Development Plan Oregon City, Oregon	Project No. 20-5600	FIGURE 2

ENGINEERING & FORESTRY

January 14, 2022

Public Works – Engineering
City of Oregon City
625 Center Street
Oregon City, OR 97045

RE: Park Place Crossing Master Plan Sanitary Sewer Calculations Addendum

Dear Josh and John:

The purpose of this addendum letter is to provide updated calculations based on the revised layout of the Park Place Crossing Master Plan (attached updated Exhibit 10). The revised layout has approximately 476 lots accommodating both single-family attached and detached dwelling units. Based on the updated calculations, the Oak Valley Drive sanitary sewer main that drains into the Park Place Sanitary Sewer Basin can have 399 lots connected to it without any downstream deficiencies. With upsizing of certain pipe segments, all 476 lots can be accommodated.

Park Place Crossing Master Plan (Connect to Park Place Sanitary Sewer Basin) (Exhibit 2)

The table shows the pipe segments that the sanitary sewer conveyance flows through from the connection at Oak Valley Drive to Redland Road. The pipe identification (ID), length, diameter, existing capacity, and buildout peak flows columns are based on data from the City of Oregon City *Sanitary Sewer Master Plan*, dated November 2014. The "Available Capacity After Future Buildout Condition" column was calculated by subtracting the "Buildout Peak Flows" column from the "Existing Pipe Capacity" column. This total available capacity was then used, in conjunction with the average flow per lot value from the updated Exhibit 1 (0.486 gallons per minute), to calculate the maximum number of lots that can flow through each pipe before surcharging. A peaking factor of 3 was used in the calculations, per the *Sanitary Sewer Master Plan*, so when the term "surcharging" is used, please note that there is a factor of safety of three for these values and the pipes are not likely flowing 100 percent full. The yellow highlighted columns show the maximum number of lots that can flow to each pipe (pipe ID 10742-10743 is the controlling pipe) with a maximum of 399 lots. This number of lots was used to show the actual maximum potential number of lots flowing to Oak Valley Drive without any downstream upgrades. If pipe segments of the pipe ID 10742-10473 are upsized, the Oak Valley Drive sanitary sewer main that drains into the Park Place Sanitary Sewer Basin can accept sewage from all 476 Park Place Crossing lots without any downstream deficiencies.

Please let us know if you have any questions on the above information or attachments.

Sincerely,
AKS ENGINEERING & FORESTRY, LLC

Monty Hurley, PE, Principal
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
503-563-6151 | Monty@aks-eng.com

Attachments

Updated Exhibit 1: Sanitary Sewer Flow Calculations for Park Place Concept Area

Updated Exhibit 2: Park Place Concept Area (Connect to Park Place Sanitary Sewer Basin)

Updated Exhibit 10: Park Place Concept Area Layout

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VANCOUVER, WA
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Vancouver, WA 98682
(360) 882-0419

EXHIBIT 1: SANITARY SEWER FLOW CALCULATIONS FOR PARK PLACE CROSSING MASTER PLAN

		Phase 1 & 2 (Connect to Holcomb Boulevard Sanitary Sewer Basin)	Overall (Including Phase 1 & 2) (Connect to Park Place Sanitary Sewer Basin)[d]
Gross area (acre):		12.11	91.69
Actual Net area[b] (acre):		7.82	47.70
Actual No. of lots:		78	476
Average Lot Size[e] (sf):	4,365		
Persons per lot[a]:	2.5		
Unit flow[a] (gpcd):	80		
Peaking Factor[a]:	3		
I/I[c] (gpad):	1000		
Domestic Flow (gpm):		32.50	198.33
I/I Flow (gpm):		5.43	33.13
Total Wastewater Flow (gpm):		**37.93**	**231.46**
Average flow per lot (gpm):		**0.486**	**0.486**

[a] Per Exhibit 9 - Section 3.5.1, Future Base Flows in the City of Oregon City Sanitary Sewer Master Plan, dated November 2014

[b] Per Exhibit 9 - Future Development Flow Method - Analysis Step 21 in the City of Oregon City Sanitary Sewer Master Plan, dated November 2014, actual net area utilized per the most current layout.

[c] Per Exhibit 9 - Section 3.5.2, Future Wet Weather Flows in the City of Oregon City Sanitary Sewer Master Plan, dated November 2014

[d] The Park Place Crossing Master Plan (Connect to Park Place Sanitary Sewer Basin) "Actual No. of Lots" is the maximum lots that can tie into the existing sanitary sewer line in Oak Valley Drive without surcharging the downstream pipes. The "Actual Net area" for this column is calculated based on the average lot size multiplied by the maximum number of lots.

[e] The average lot size is calculated from the most current Park Place layout (Exhibit 10).

Updated Exhibit 1

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(503) 400-6028

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12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

VANCOUVER, WA
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

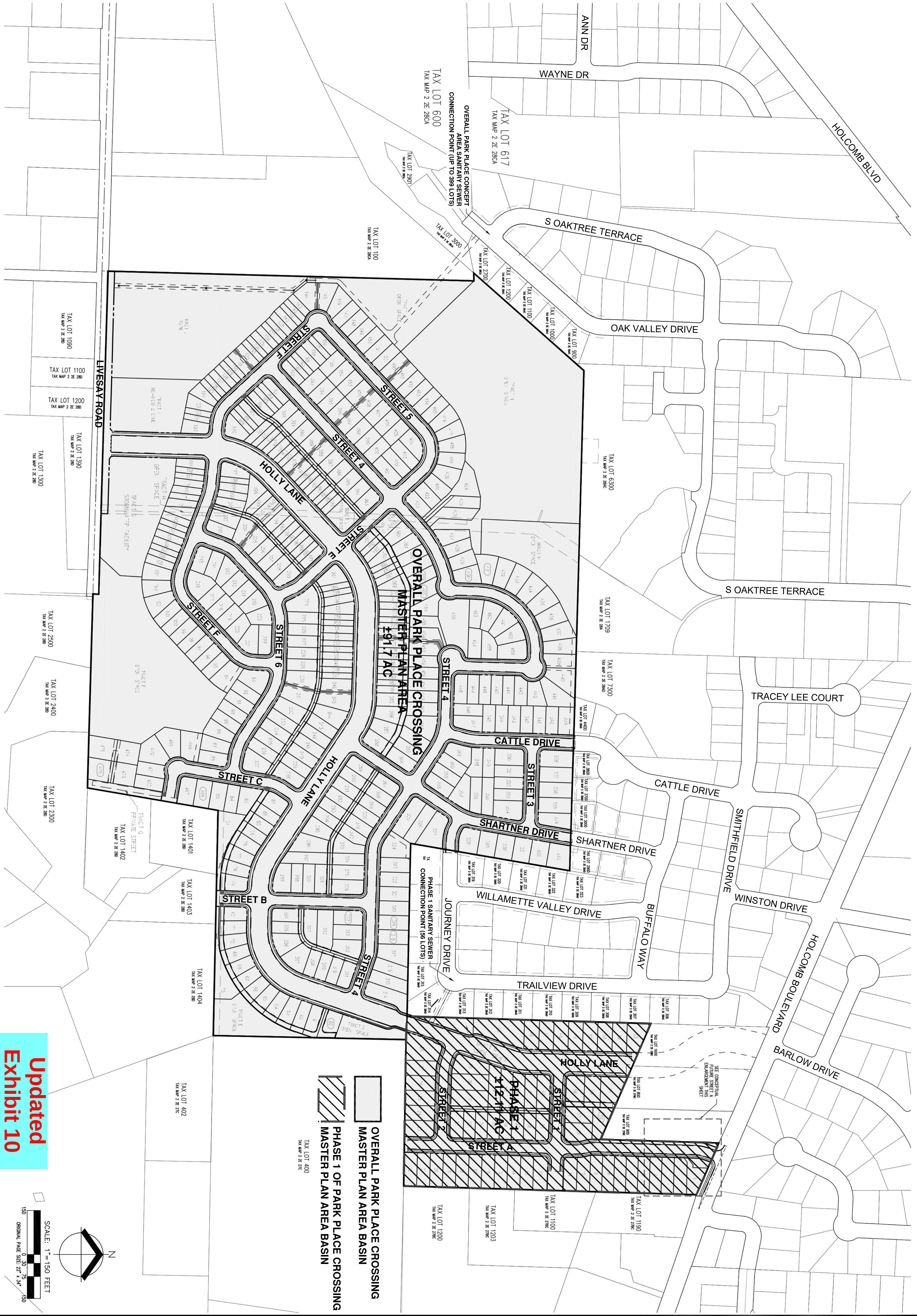
EXHIBIT 2: PARK PLACE CROSSING MASTER PLAN (Connect to Park Place Sanitary Sewer Basin)

Pipe ID[1]	Length[1]	Existing Pipe Diameter[1]	Existing Pipe Capacity[1] (GPM)	Existing Peak Flows[1] (GPM)	Buildout Peak Flows[1] (GPM)	Available Capacity After Future Buildout Condition (GPM)[2]	**No. of Future Lots (Park Place Concept Area - Overall) Can Connect With Available Capacity[3]**	As-built Pipe Diameter	Existing Pipe (As-built) Capacity (GPM)	Available Capacity After Future Buildout Condition (GPM)	**No. of Future Lots (Park Place Concept Area - Overall) Can Connect With Available Capacity**
10429_10430	322	8	371	92	105	266	547				
10430_10431	275	8	855	97	114	741	1524				
10431_10432	179	8	928	99	117	811	1668				
10432_10487	165	8	883	102	119	764	1571				
10487_10488	201	8	407	105	122	285	586				
10488_10422	33	8	389	106	130	259	533				
10422_10490	301	8	394	128	152	242	498				
10490_10489	12	8	3666	128	153	3513	7225				
10489_10288	315	8	1415	144	168	1247	2564				
10288_10491	28	8	1314	148	174	1140	2344				
10491_10492	309	8	1157	153	180	977	2009				
10492_10742	255	8	741	160	186	555	1141				
10742_10743	402	8	388	166	194	194	**399**				
10743_10744	335	8	936	190	222	714	1468				
10744_10745	196	8	1436	193	227	1209	2486				
10745_10746	127	8	595	195	230	365	751				
10746_10740[4]	316	8	309	201	236	73	150	10	530	294	605
10740_10747[4]	10	8	322	208	243	79	162	10	530	287	590
10747_10750	301	10	603	213	248	355	730				
10750_10748	50	10	883	213	219	664	1366				
10748_10770	191	10	627	252	288	339	697				
10770_10771	372	10	602	264	300	302	621				
10771_10772	358	10	604	269	307	297	611				
10772_10773	346	10	685	275	315	370	761				

[1] Value per City of Oregon City Sanitary Sewer Master Plan dated November 2014
[2]Calculated by subtracting buildout peak flows from existing pipe capacity.
[3]Calculated by dividing available capacity after future buildout condition by the average flow per lot.
[4]The Sanitary Sewer Master Plan shows a pipe size of 8" for both pipe segments 10746_10740 and 10740_10747. The Holcomb - Park Place Sanitary Sewer Collection System As-builts show these as 10" pipes (Exhibit 6).

Average flow per lot for Park Place Concept Area (gpm): 0.486

>>> 399 Lots of Park Place Concept Area Can Connect to Park Place Sanitary Sewer Basin Without Any Pipe Runs Being Surcharged



CONCEPT AREA LAYOUT & SANITARY SEWER BASIN MAP
PARK PLACE CROSSING MASTER PLAN
OREGON CITY, OR

JOB NUMBER:	7404
DATE:	07/19/2021
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	

PRELIMINARY NOT FOR CONSTRUCTION

REGISTERED PROFESSIONAL ENGINEER — ...TY B. HURLEY — RENEWAL DATE: 6/30/23

EXH 10

AKS ENGINEERING & FORESTRY, LLC
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Item #1.

Cody Street

From: Josh Wheeler <jwheeler@orcity.org>
Sent: Thursday, May 13, 2021 10:59 AM
To: Cody Street
Cc: Vu Nguyen; Cassondra Simic; Harlan Borow
Subject: RE: Additional Park Place Sanitary info

The City has reviewed your responses and are now confident that we can move forward. We have no further comments.

Josh Wheeler, PE
Assistant City Engineer
Public Works Department
City of Oregon City
625 Center Street
Oregon City, Oregon 97045
Email: jwheeler@orcity.org
971.322.9745 Cell

PLEASE NOTE THAT MY PHONE NUMBER HAS CHANGED TO A CELL PHONE WHILE WE ARE WORKING FROM HOME.

From: Cody Street <streetc@aks-eng.com>
Sent: Friday, April 30, 2021 3:43 PM
To: Josh Wheeler <jwheeler@orcity.org>
Cc: Vu Nguyen <VuN@aks-eng.com>; Cassondra Simic <simicc@aks-eng.com>; Harlan Borow <harlan@iconconstruction.net>
Subject: RE: Additional Park Place Sanitary info

Josh,

Preferred path forward would be to address all items now during this investigative phase.

Responses to Brown and Caldwell are provided below in orange.

Please let us know if there is any additional information you need at this time.

Thank you,

Cody Street, EI
AKS ENGINEERING & FORESTRY, LLC
P: 503.563.6151 Ext. 286 | www.aks-eng.com | StreetC@aks-eng.com

---

From: Josh Wheeler <jwheeler@orcity.org>
Sent: Thursday, February 25, 2021 8:11 AM
To: Cody Street <streetc@aks-eng.com>; Cassondra Simic <simicc@aks-eng.com>
Cc: Darren Gusdorf <darren@iconconstruction.net>
Subject: FW: Additional Park Place Sanitary info

Hello,

Please see the response by Brown and Caldwell. All of our question have not been addressed. Before we fully sign off on the concept, the below items will need addressed. We can do this through conditions of approval or during this investigative phase.

Thank you.

Josh Wheeler, PE
Assistant City Engineer
Public Works Department
City of Oregon City
625 Center Street
Oregon City, Oregon 97045
Email: jwheeler@orcity.org
971.322.9745 Cell

PLEASE NOTE THAT MY PHONE NUMBER HAS CHANGED TO A CELL PHONE WHILE WE ARE WORKING FROM HOME.

From: Ryan Retzlaff <rretzlaff@BrwnCald.com>
Sent: Wednesday, February 24, 2021 4:10 PM
To: Josh Wheeler <jwheeler@orcity.org>
Cc: Ryan Retzlaff <rretzlaff@BrwnCald.com>; Don Whitehead <dwhitehead@BrwnCald.com>
Subject: RE: Additional Park Place Sanitary info

Josh,

We are in agreement with the general assertion the existing sanitary system has capacity for the proposed developments of Park Place and Serres Property. A few elements should be considered that are identified in the email below.

The updated information provided by AKS in the email on February 2, 2021 did not appear to include any updated calculations or modifications to the design. Nor did the email address comments provided by BC on the email dated November 12, 2020 (Attached) AKS responses to B&C's November 12,2020 email are provided in the attached email. Based on this, the comments in the previous email stand as little clarity has been provided.

The attached Routing Options figure has been marked up to identify the developments and total units proposed per AKS. The aqua blue lines represent those that have been modeled for capacity in the SSMP and calculated for capacity by AKS. We are in agreement these have capacity but for the three pipe segments identified in figure 4-3 of the SSMP that surcharge. More information on these three pipes is included below.

The magenta lines in the attached figure have not been analyzed or has data been provided that would allow for any certainty that sufficient capacity exists. The following is provided as a rough estimate for the capacity of these lines which are mostly 8".

- 8" pipe with minimum slope of 0.004 ft/ft (per city design standards) has the capacity to move 347.58 gpm. If each unit contributes 0.504 gpm, as stated in exhibit 1 of the AKS letter, 690 units could theoretically be served by an 8" line at minimum slope. Assuming all pipe in the system is at or above the minimum design slope as the GIS does not have inverts for most of these pipes. Understood, no further action is needed.
- The theoretical capacity is determined based on these calculations with the assumptions stated in exhibit 1 of the AKS October letter. Correct, no further action is needed.

- The actual I/I is unknown. 1000 gpad is a theoretical number and should be verified or the pipes and man could be inspected to determine their relative condition and potential for I/I. The infrastructure in this area is roughly 20-30 years old based on city GIS and therefore should have relatively low I/I. As previous mention, these existing pipes probably have lower I/I than the theoretical (design) number, hence they should have more/extra capacity. No further action is needed.
- Based on the above the 8” lines (magenta) in the attached likely have capacity for the proposed developments. Agree. No further action is needed to determine the capacity of these lines.

Other considerations:

- The SSMP did not identify Holcomb Blvd for a CIP but the model extended only to node 10505 so no evaluation was completed of the section of pipe these developments will connect to. Understood, no further action is needed.
- Three pipes have been identified with possible surcharging between nodes 10505/12992 (CIP #6 in the SSMP0, 12992/10506 and 10444/10445. These are shown in figure 4-3 of the SSMP and identified by AKS ,10444/10445, in their October letter (refer highlighted text in red below). The analysis showing the surcharging is for future flows which is full build out. The addition of the Serres and Park Place development is close to the modeled scenario for buildout.

  The existing pipe from node 10505_12992 has extra capacity of 90 gpm and flow from future Park Place Phase 1 & 2 is 39 gpm. This section of pipe has capacity for future flow of Park Place Phase 1 & 2. No further action is needed.

  Future flow from Serres Properties Development will not drain to the existing 8-inch pipe from node 12992_10506, but the buildout peak flows in the SSMP has included its flow. The correct buildout peak flow should be approximately 454 gpm. The estimates buildout peak flow (with future flow from 78 Lots of Park Place Phase 1 & 2) is 39 gpm and the estimated available capacity for this section of pipe is 33 gpm. This section of pipe might be slightly surcharged with the flow from future Park Place Phase 1 & 2. No further action is needed.

  For the existing 12-inch pipe from node 10444_10445, we’ve surveyed and confirmed it has 0.34% slope which has capacity up to 2.08 cfs. The estimates buildout peak flow (with future flow from 116 Lots of Serres Properties Development and 78 Lots of Park Place Phase 1 & 2) is 931 gpm which is equivalent to approximately 2.07 cfs. This section of pipe has capacity for future flow. No further action is needed.

- It may be beneficial to inspect/CCTV the existing system at and near MH 10429, where the system crosses an unnamed stream/creek. This is a likely location where I/I could be significantly higher than theoretical values. These pipes were installed around 20 years ago, therefore they should have lower I/I than the theoretical (design) number. No further action is needed.

Please reach out with any questions or concerns.

Ryan Retzlaff
T 503.977.6628 | **C** 503.893.0410

From: Josh Wheeler <jwheeler@orcity.org>
Sent: Wednesday, February 03, 2021 12:57 PM
To: Ryan Retzlaff <rretzlaff@BrwnCald.com>
Subject: FW: Additional Park Place Sanitary info

I'm using Mimecast to share large files with you. Please see the attached instructions.

Hi Ryan,

Please review the attached and below information and let me know if there will be any downstream issues to the existing sanitary system without a need of upsizing the existing sewers.

My goal is for this to be a short exercise at low cost.

Please ensure it is billed separately from any other work so that I can bill the developer accordingly.

Josh Wheeler, PE
Assistant City Engineer
Public Works Department
City of Oregon City
625 Center Street
Oregon City, Oregon 97045
Email: jwheeler@orcity.org
971.322.9745 Cell

PLEASE NOTE THAT MY PHONE NUMBER HAS CHANGED TO A CELL PHONE WHILE WE ARE WORKING FROM HOME.

From: Cody Street <streetc@aks-eng.com>
Sent: Tuesday, February 2, 2021 5:42 PM
To: Josh Wheeler <jwheeler@orcity.org>
Cc: Cassondra Simic <simicc@aks-eng.com>
Subject: RE: Additional Park Place Sanitary info

Hey Josh,

Sorry for the delay. Attached is our most recent letter regarding the san. sewer calculations to save everyone time digging through past correspondence. Also attached is a PDF reference for the intended SSWR routing option.

Assumptions:

- The entire Park Place development is single family, one unit for each residential lot.
- Areas:
  - Park Place Phase 1 – Net area: 7.07 acres (56 Lots)
  - Park Place (including Phase 1) – Net area: 48.61 acres (385 Lots)
  - Serres Properties – Net area: 24.7 acres (106 Lots)
  - Abernethy – Net area: 22.5 acres (98 Lots)

Please let us know if there is any further info needed.

Cody Street, EI
AKS ENGINEERING & FORESTRY, LLC
P: 503.563.6151 Ext. 286 | www.aks-eng.com | StreetC@aks-eng.com

---

From: Josh Wheeler <jwheeler@orcity.org>
Sent: Tuesday, February 2, 2021 11:24 AM
To: Cassondra Simic <simicc@aks-eng.com>

Cc: Cody Street <streetc@aks-eng.com>
Subject: RE: Additional Park Place Sanitary info

No problem. Just making sure I understood what we came away with in our last meeting.

Josh Wheeler, PE
Assistant City Engineer
Public Works Department
City of Oregon City
625 Center Street
Oregon City, Oregon 97045
Email: jwheeler@orcity.org
971.322.9745 Cell

PLEASE NOTE THAT MY PHONE NUMBER HAS CHANGED TO A CELL PHONE WHILE WE ARE WORKING FROM HOME.

From: Cassondra Simic <simicc@aks-eng.com>
Sent: Tuesday, February 2, 2021 11:03 AM
To: Josh Wheeler <jwheeler@orcity.org>
Cc: Cody Street <streetc@aks-eng.com>
Subject: RE: Additional Park Place Sanitary info

Hi Josh,

Yes, Cody and I are working on organizing the information we have and will pass that all along as soon as possible. Sorry for the delay!

Thank you,

Cassie Simic, PE
AKS ENGINEERING & FORESTRY, LLC
P: 503.563.6151 Ext. 264 | F: 503.563.6152 | www.aks-eng.com | SimicC@aks-eng.com

---

From: Josh Wheeler <jwheeler@orcity.org>
Sent: Tuesday, February 2, 2021 11:01 AM
To: Cassondra Simic <simicc@aks-eng.com>
Subject: Additional Park Place Sanitary info

Hi Cassie,

Was AKS going to provide some inputs and assumptions that I can provide to Brown and Caldwell to verify the modeling so that the City can be comfortable with capacities or determine certain pipes need upsized?

Josh Wheeler, PE
Assistant City Engineer
Public Works Department
City of Oregon City
625 Center Street
Oregon City, Oregon 97045
Email: jwheeler@orcity.org
971.322.9745 Cell

OREGON CITY

PLEASE NOTE THAT MY PHONE NUMBER HAS CHANGED TO A CELL PHONE DURING THIS PHASED WORKING SCHEDULE. YOU MAY STILL USE 503-496-1548 BUT THERE MAY BE A DELAY IN REPLIES.

Website: www.orcity.org | webmaps.orcity.org | Follow us on: Facebook!|Twitter
Think ***GREEN*** *before you print.*

The City of Oregon City is open for business and continues to offer services and programs online and virtually. Some City facilities are open to the public, find current openings here, we encourage visitors to wear a mask, practice physical distancing, and reschedule in-person visits if you are feeling unwell.

The City has installed additional shielding and is providing hand sanitizer as well as occupancy limits to ensure our staff and visitors have a safe, no touch experience. Our goal is to be responsive to our community throughout this pandemic; we appreciate your understanding and cooperation.

Engineering Development Services Public Counter Hours at City Hall at 625 Center Street are 9:00 AM to 4:00 PM Monday through Thursday. We are available for in-person discussions on Friday by appointment only.

October 1, 2020

Oregon City Engineering Department
City of Oregon City
625 Center Street
Oregon City, OR 97045

RE: Park Place Concept Area Sanitary Sewer Calculations

Dear Jeremy, Josh, and John:

The purpose of this letter is to walk you through the calculations performed by AKS in the attached exhibits. In our previous meeting, we stated that 200 lots could flow to the existing system in Oak Valley Drive without causing surcharge downstream. We have reevaluated the results from Brown and Caldwell. Based on additional review and calculations that reduce the assumed net area values, we now believe we can connect up to 385 lots to the Oak Valley Drive sanitary sewer main that drains into the Park Place Sanitary Sewer Basin without downstream deficiencies.

Sanitary Sewer Flow Calculations for Park Place Concept Area (Exhibit 1)

The attached calculations include the Park Place Phase 1 (first 56 lots) total wastewater flow, average flow per lot, and the overall Park Place area calculations for the maximum total lots before a sanitary sewer main surcharge condition occurs. The number of persons per lot, unit flow, peaking factor, and inflow/infiltration values are from the City of Oregon City Sanitary Sewer Master plan dated November 2014. The Sanitary Sewer Master Plan utilizes 20% of the gross area as the net area for calculations. This assumption is very conservative and is appropriate for a high-level analysis, but since we have a more detailed analysis of the site, we have utilized actual net area based on the preliminary development layout. The percentage of gross area that can be utilized for development is closer to 50-55%, rather than the 80% used in the Brown and Caldwell analysis. This reduction in net area is due to large open space, stormwater facility and street right-of-way areas. Based on this more detailed analysis, the total wastewater flow from the Park Place site is significantly lower than the number in the sanitary sewer master plan.

Park Place Concept Area (Connect to Park Place Sanitary Sewer Basin) (Exhibit 2)

The table shows the pipe segments that the sanitary sewer conveyance flows through from the connection at Oak Valley Drive to Redland Road. The pipe ID, length, diameter, existing capacity, and buildout peak flows columns are based on data from the City of Oregon City Sanitary Sewer Master Plan dated November 2014. The “Available Capacity After Future Buildout Condition” column was calculated using “Existing Pipe Capacity” column and subtracting the “Buildout Peak Flows” column. This total available capacity was then used, in conjunction with the average flow per lot value from the previous page (0.504 gpm), to calculate the maximum number of lots that could flow through each pipe before surcharging. A peaking factor of 3 was utilized in the calculations, per the Sanitary Sewer Master Plan, so when the term “surcharging” is used, please note that there is a factor of safety of 3 for these values, and the pipes are not likely flowing 100% full. The yellow highlighted columns show the maximum number of lots that can flow to each pipe, pipe 10742-10743 ended up the controlling pipe, with 385 maximum lots. We used this number to show the actual maximum potential number of lots flowing to Oak Valley Drive.

The Holcomb – Park Place Sanitary Sewer Collection System as-builts show 10” pipes for segments 10746-10740 and 10740-10747 (numbered according to the Sanitary Sewer Master Plan), as opposed to the Sanitary Sewer Master Plan which shows 8” pipe segments. The additional columns on the right-hand side of Exhibit 2 show the recalculation of capacity for pipe segments 10746-10740 and 10740-10747, according to the as-built pipe size of 10”. This provides an additional 287 gpm of capacity in these pipe segments.

Sanitary Sewer Flow Calculations for Abernethy Landing and the Serres Property (Exhibit 3)

As noted, the Sanitary Sewer Master Plan assumes a 20% reduction in gross site area for the net area, which is much more conservative than the actual net areas. Abernethy Landing is a developed, platted subdivision. A copy of the recorded plat is attached. It has 98 lots. The Sanitary Sewer Master Plan assumed 117 lots based on only a 20% reduction in gross site area for net area. The Serres Property is in preliminary design. A copy of the preliminary layout is attached. It has 106 lots. The Sanitary Sewer Master Plan assumed 140 lots based on only a 20% reduction in gross site area for net area. These calculations show side by side the Sanitary Sewer Master Plan calculations versus the actual net area and number of lots. The resulting difference in flow is 8.55 gpm for Abernethy Landing and 16.52 gpm for the Serres properties.

Park Place Concept Plan Area (Phase 1) and Serres Properties (Connection to Holcomb Boulevard Sanitary Sewer Basin) (Exhibit 4)

These calculations use the corrected flow for the Abernethy Landing and Serres Property projects to calculate the available downstream capacity. Pipe 10505-12992 is the first modeled pipe after Abernethy Landing flow is added, and the available capacity was increased by 8.55 gpm. Phase 1 of Park Place will flow to Holcomb Boulevard via Journey Drive and add an additional 28 gpm of flow (well within the 90 gpm available). The “Buildout Peak Flows” from the Sanitary Sewer Master Plan were based on undeveloped land in each sanitary sewer basin. For the Holcomb Boulevard Sanitary Sewer basin, Abernethy Landing and the Serres Property were the only large undeveloped properties remaining in the Holcomb Boulevard Sanitary Sewer Basin. Now, the Serres properties are the only large undeveloped properties remaining in the Holcomb Boulevard Sanitary Sewer Basin. Our calculations show an “Adjusted Buildout Peak Flows” column. This is calculated using the existing peak flows plus 118 gpm, from the corrected Abernethy Landing and Serres Property flows. Since Park Place was not planned to drain to the Holcomb Boulevard Sanitary Sewer Basin, it was not originally included in the peak buildout flow. An additional 28 gpm from Park Place Phase 1 is added to the buildout peak flows in the next calculation column, to account for the first 56 lots draining to the Holcomb Boulevard Sanitary Sewer Basin. This results in a possible slight surcharge in the 10444-10445 pipe.

Based on this more detailed analysis of actual development areas, the overall Park Place project site can be conveyed through the existing sanitary sewer system in the Park Place Sanitary Sewer Basin, and Park Place Phase 1 can drain to the existing sanitary sewer system in the Holcomb Boulevard Sanitary Sewer Basin without the need for upsizing any pipe segments. The calculations were adjusted to provide the actual net area for the Serres Property, Abernethy Landing, and the Park Place properties, which results in more available pipe capacity.

Please let us know if you have any questions on the above information or attachments.

Sincerely,

AKS ENGINEERING & FORESTRY, LLC

Monty Hurley, PE, Principal
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
503-563-6151 | Monty@aks-eng.com

Attachments

Attachment 1: Sanitary sewer Alignment Through the Drainage, and Sanitary Sewer Profile Through the Drainage (SAN 1 & 2)

Exhibit 1: Sanitary Sewer Flow Calculations for Park Place Concept Area

Exhibit 2: Park Place Concept Area (Connect to Park Place Sanitary Sewer Basin)

Exhibit 3: Sanitary Sewer Flow Calculations for Abernethy Landing and the Serres Property

Exhibit 4: Park Place Concept Plan Area (Phase 1) and Serres Properties (Connection to Holcomb Boulevard Sanitary Sewer Basin)

Exhibit 5: Sanitary Sewer Master Plan Map

Exhibit 6: Pages from Holcomb – Park Place Sanitary Sewer Collection System As-Builts

Exhibit 7: Abernethy Landing Recorded Plat

Exhibit 8: Serres Property Layout

Exhibit 9: Future Development Flow Method

Exhibit 10: Park Place Concept Area Layout

AKS DRAWING FILE: 7404 CPIPES - SSWR.DWG | LAYOUT: PLAN

REVISIONS

DESIGNED BY: CLS
DRAWN BY: CLS
MANAGED BY: MBH
CHECKED BY: VHN
DATE: 9.30.2020

OAK VALLEY DRIVE SANITARY SEWER CONNECTION ALIGNMENT MAP

PARK PLACE VILLAGE

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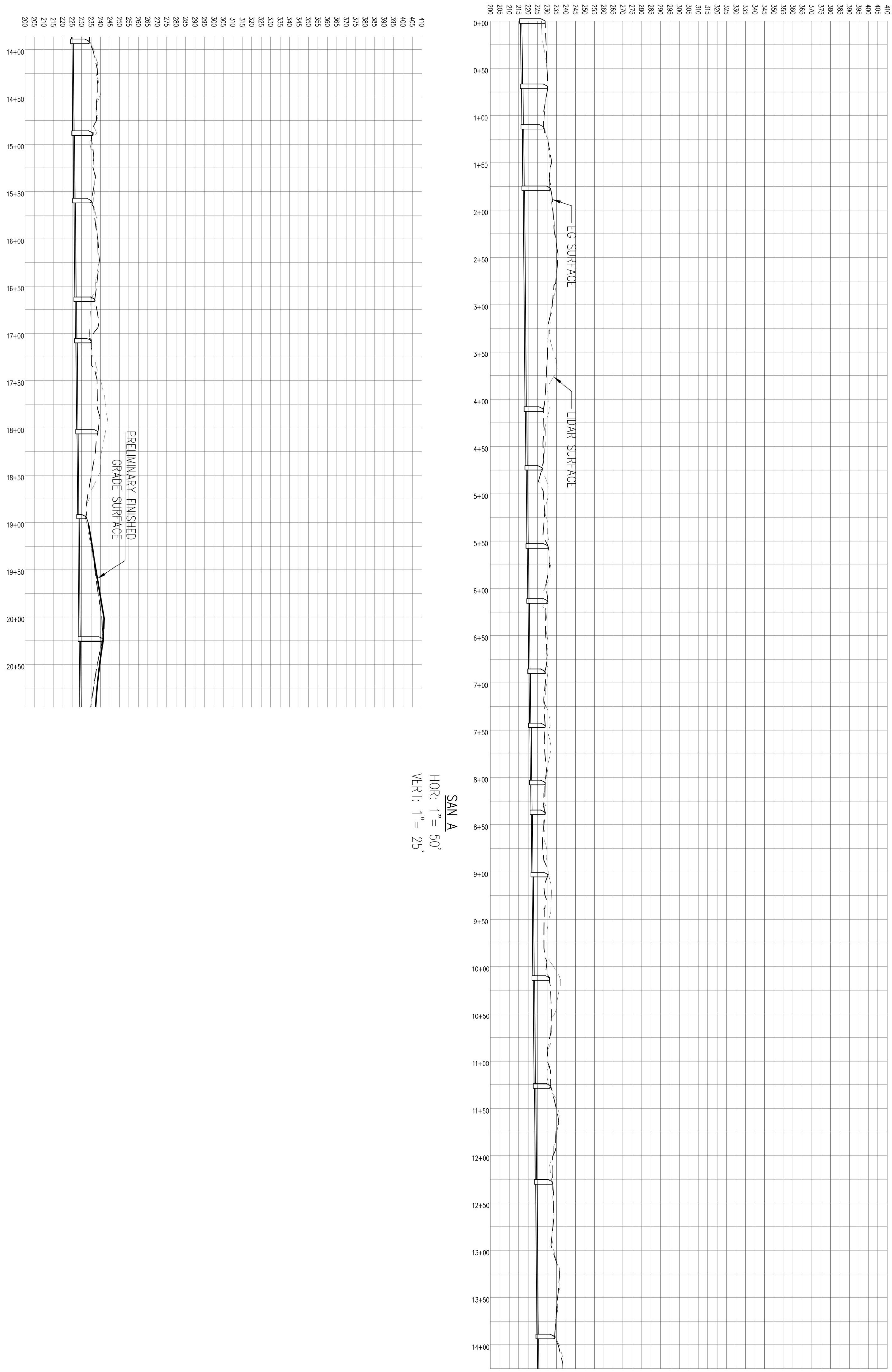
SAN1



DESIGNED BY:	CLS
DRAWN BY:	CLS
MANAGED BY:	MBH
CHECKED BY:	VHN
DATE:	9.30.2020

REVISIONS

SANITARY SEWER PROFILE THROUGH DRAINAGE

PARK PLACE VILLAGE

OREGON CITY OREGON

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SAN 2

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Vancouver, WA 98682
(360) 882-0419

www.aks-eng.com

EXHIBIT 1: SANITARY SEWER FLOW CALCULATIONS FOR PARK PLACE CONCEPT AREA

		Park Place Concept Area - Phase 1 (Connect to Holcomb Boulevard Sanitary Sewer Basin)	Park Place Concept Area - Overall (Connect to Park Place Sanitary Sewer Basin)[d]
Gross area (acre):		12.11	91.69
Actual Net area[b] (acre):		7.07	48.61
Actual No. of lots:		56	385
Average Lot Size[e] (sf):	5,500		
Persons per lot[a]:	2.5		
Unit flow[a] (gpcd):	80		
Peaking Factor[a]:	3		
I/I[c] (gpad):	1000		
Domestic Flow (gpm):		23.33	160.42
I/I Flow (gpm):		4.91	33.76
Total Wastewater Flow (gpm):		**28.24**	**194.18**

Average flow per lot (gpm): **0.504** **0.504**

[a] Per Exhibit 9 - Section 3.5.1, Future Base Flows in the City of Oregon City Sanitary Sewer Master Plan dated November 2014

[b] Per Exhibit 9 - Future Development Flow Method - Analysis Step 21 in the City of Oregon City Sanitary Sewer Master Plan dated November 2014, actual net area utilized per the most current layout.

[c] Per Exhibit 9 - Section 3.5.2, Future Wet Weather Flows in the City of Oregon City Sanitary Sewer Master Plan, dated November 2014

[d] The Park Place Concept Area (Connect to Park Place Sanitary Sewer Basin) "Actual No. of Lots" is the maximum lots that can tie into the existing sanitary sewer line in Oak Valley Drive without surcharging the downstream pipes. The "Actual Net area" for this column is calculated based on the average lot size multiplied by the maximum number of lots.

[e] The average lot size is calculated from the most current Park Place layout (Exhibit 10).

AKS ENGINEERING & FORESTRY
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(503) 563-6151
VANCOUVER, WA
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

EXHIBIT 2: PARK PLACE CONCEPT AREA (Connect to Park Place Sanitary Sewer Basin)

Pipe ID[1]	Length[1]	Existing Pipe Diameter[1]	Existing Pipe Capacity[1] (GPM)	Existing Peak Flows[1] (GPM)	Buildout Peak Flows[1] (GPM)	Available Capacity After Future Buildout Condition (GPM)[2]	**No. of Future Lots (Park Place Concept Area - Overall) Can Connect With Available Capacity[3]**	As-built Pipe Diameter	Existing Pipe (As-built) Capacity (GPM)	Available Capacity After Future Buildout Condition (GPM)	**No. of Future Lots (Park Place Concept Area - Overall) Can Connect With Available Capacity**
10429_10430	322	8	371	92	105	266	527				
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10431_10432	179	8	928	99	117	811	1608				
10432_10487	165	8	883	102	119	764	1515				
10487_10488	201	8	407	105	122	285	565				
10488_10422	33	8	389	106	130	259	514				
10422_10490	301	8	394	128	152	242	480				
10490_10489	12	8	3666	128	153	3513	6965				
10489_10288	315	8	1415	144	168	1247	2472				
10288_10491	28	8	1314	148	174	1140	2260				
10491_10492	309	8	1157	153	180	977	1937				
10492_10742	255	8	741	160	186	555	1100				
10742_10743	402	8	388	166	194	194	**385**				
10743_10744	335	8	936	190	222	714	1416				
10744_10745	196	8	1436	193	227	1209	2397				
10745_10746	127	8	595	195	230	365	724				
10746_10740[4]	316	8	309	201	236	73	145	10	530	294	583
10740_10747[4]	10	8	322	208	243	79	157	10	530	287	569
10747_10750	301	10	603	213	248	355	704				
10750_10748	50	10	883	213	219	664	1317				
10748_10770	191	10	627	252	288	339	672				
10770_10771	372	10	602	264	300	302	599				
10771_10772	358	10	604	269	307	297	589				
10772_10773	346	10	685	275	315	370	734				

[1] Value per City of Oregon City Sanitary Sewer Master Plan dated November 2014

[2] Calculated by subtracting buildout peak flows from existing pipe capacity.

[3] Calculated by dividing available capacity after future buildout condition by the average flow per lot.

[4] The Sanitary Sewer Master Plan shows a pipe size of 8" for both pipe segments 10746_10740 and 10740_10747. The Holcomb - Park Place Sanitary Sewer Collection System As-builts show these as 10" pipes (Exhibit 6).

>>> 385 Lots of Park Place Concept Area Can Connect to Park Place Sanitary Sewer Basin Without Any Pipe Runs Being Surcharged

AKS ENGINEERING & FORESTRY

BEND, OR
2777 NW Lolo Drive, Suite 150
Bend, OR 97703
(541) 317-8429
www.aks-eng.com

KEIZER, OR
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Tualatin, OR 97062
(503) 563-6151

VANCOUVER, WA
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

EXHIBIT 3: SANITARY SEWER FLOW CALCULATIONS FOR ABERNETHY LANDING AND THE SERRES PROPERTY

	Abernethy Landing[d] (Per Sanitary Sewer Master Plan)	Abernethy Landing[d] (Actual Built Scenario)	Serres Properties[e] (Per Sanitary Sewer Master Plan)	Serres Properties[e] (Actual Design Scenario)
Gross area (acre):	29.27		35.11	
Net area - 80% of Gross area[a] (acre):	23.42		28.09	
No. of lots[a] (5 lot per acre):	117		140	
Actual net area[b] (acre):		22.50		24.70
Actual No. of lots:		98		106
Persons per lot[a]: 2.5				
Unit flow[a] (gpcd): 80				
Peaking Factor[a]: 3				
I/I[c] (gpad): 1000				
Domestic Flow (gpm):	48.75	40.83	58.33	44.17
I/I Flow (gpm):	16.26	15.63	19.51	17.15
Total Wastewater Flow (gpm):	**65.01**	**56.46**	**77.84**	**61.32**

Difference in flow between the Master Plan and actual built calculation (gpm): **8.55** **16.52**

Total Serres and Abernethy Landing Flow (Master Plan) **143 gpm**

Total Serres and Abernethy Landing Flow (Actual) **118 gpm**

[a] Per Exhibit 9 - Section 3.5.1, Future Base Flows in the City of Oregon City Sanitary Sewer Master Plan dated November 2014
[b] Per Exhibit 9- Future Development Flow Method - Analysis Step 21 in the City of Oregon City Sanitary Sewer Master Plan dated November 2014, actual net area utilized
[c] Per Exhibit 9 - Section 3.5.2, Future Wet Weather Flows in the City of Oregon City Sanitary Sewer Master Plan dated November 2014
[d] Abernethy Landing recorded plat is Exhibit 7.
[e] The Serres Property layout is Exhibit 8.

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EXHIBIT 4: PARK PLACE CONCEPT PLAN AREA (Phase 1) AND SERRES PROPERTIES (Connect to Holcomb Boulevard Sanitary Sewer Basin

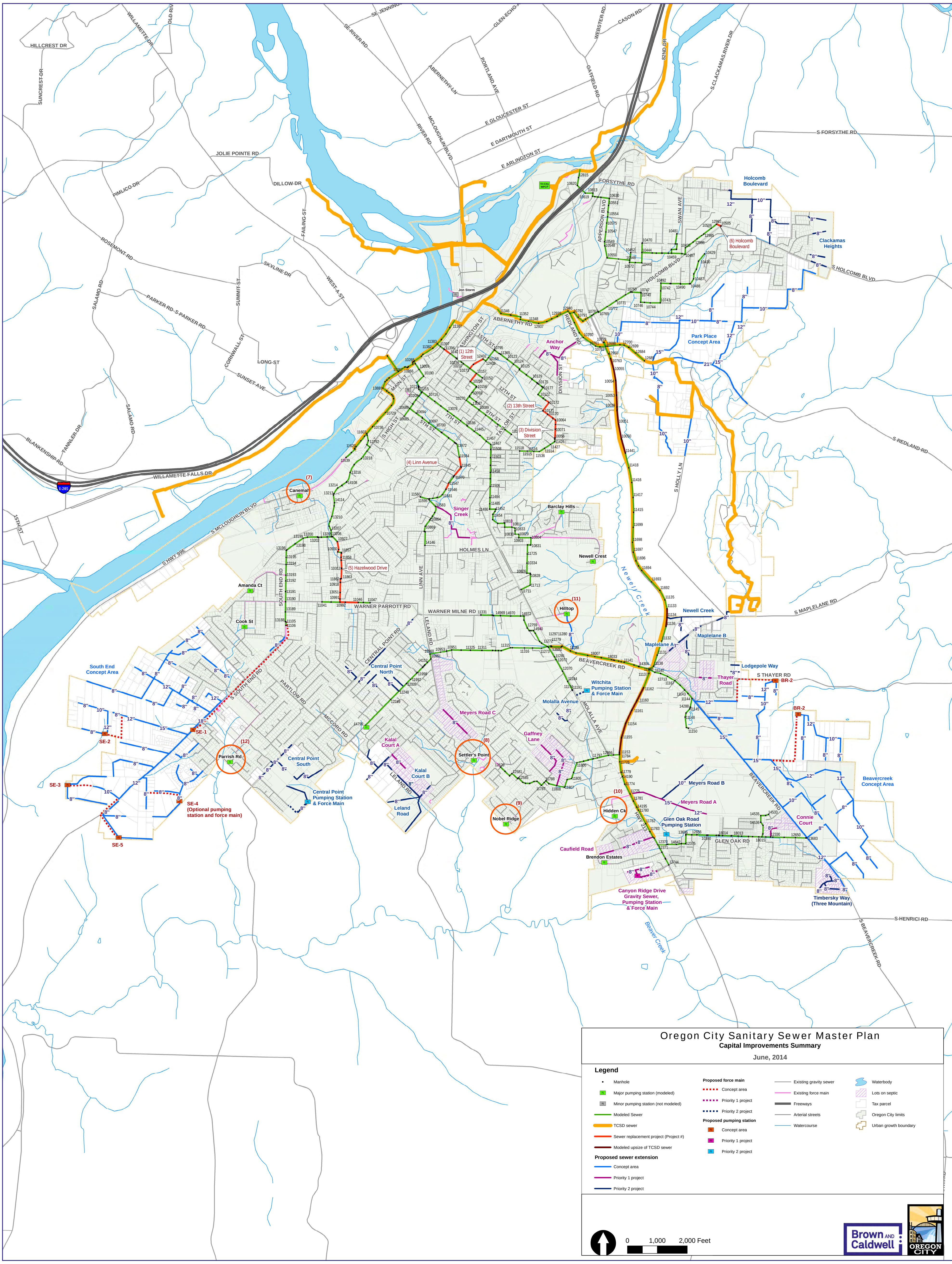
Pipe ID[1]	Length[1]	Existing Pipe Diameter[1]	Existing Pipe Capacity[1] (GPM)	Existing Peak Flows[1] (GPM)	Buildout Peak Flows[1] (GPM)	Difference in flow between the Master Plan and actual Abernethy Landing build out (GPM):	Available Capacity After Future Buildout Condition (GPM)	**Total Flow From Future Park Place Phase 1 (56 Lots) Concept Area (GPM)**		**Adjusted Buildout Peak Flows (GPM)[2]**	**Adjusted Buildout Peak Flows & Park Place Phase 1 (GPM)[3]**
10505_12992	161	8	540	328	459	8.55	90	**28**			
10444_10445	343	12	899	770	1017					**888**	**916**

[1] Value per City of Oregon City Sanitary Sewer Master Plan dated November 2014

[2]Serres Properties and Abernethy Landing flows plus existing peak flows

[3]Adjusted buildout peak flows plus Park Place Phase 1 (56 lots) = 28 gpm.

>>> Existing Downstream Pipe Runs Will Not Be Impacted by Serres Properties Development, Pipe run 10444 to 10445 Will Be Slightly Surcharged with Future 56 Lots of Park Place Concept Area

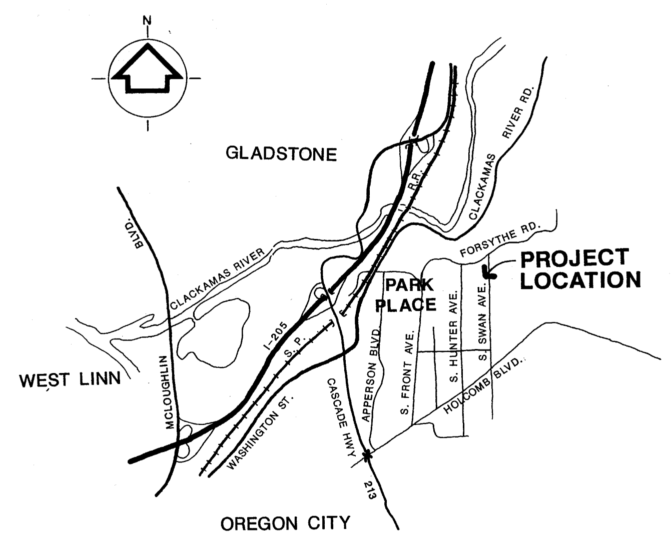


Oregon City Sanitary Sewer Master Plan
Capital Improvements Summary
June, 2014
Legend
Manhole
Major pumping station (modeled)
Minor pumping station (not modeled)
Modeled Sewer
TCSD sewer
Sewer replacement project (Project #)
Modeled upsize of TCSD sewer
Proposed sewer extension
Concept area
Priority 1 project
Priority 2 project
Proposed force main
Concept area
Priority 1 project
Priority 2 project
Proposed pumping station
Concept area
Priority 1 project
Priority 2 project
Existing gravity sewer
Existing force main
Freeways
Arterial streets
Watercourse
Waterbody
Lots on septic
Tax parcel
Oregon City limits
Urban growth boundary
0
1,000
2,000 Feet
Brown AND Caldwell
OREGON CITY
Holcomb Boulevard
Clackamas Heights
(6) Holcomb Boulevard
Park Place Concept Area
(1) 12th Street
(2) 13th Street
(3) Division Street
(4) Linn Avenue
(5) Hazelwood Drive
Anchor Way
Singer Creek
Barclay Hills
Newell Crest
Canemah
Amanda Ct
Cook St
Hilltop
Newell Creek
Maplelane A
Maplelane B
Lodgepole Way
Thayer Road
Witchita Pumping Station & Force Main
Molalla Avenue
South End Concept Area
Central Point North
Central Point South
Central Point Pumping Station & Force Main
Parrish Rd
Meyers Road C
Kalal Court A
Kalal Court B
Leland Road
Settler's Point
Gaffney Lane
Nobel Ridge
Hidden Ck
Meyers Road A
Meyers Road B
Glen Oak Road Pumping Station
Connie Court
Caufield Road
Brendon Estates
Canyon Ridge Drive Gravity Sewer, Pumping Station & Force Main
Timbersky Way (Three Mountain)
Beavercreek Concept Area
SE-1
SE-2
SE-3
SE-4
(Optional pumping station and force main)
SE-5
BR-1
BR-2
WILLAMETTE FALLS DR
S MCLOUGHLIN BLVD
WARNER PARROTT RD
WARNER MILNE RD
BEAVERCREEK RD
S MAPLELANE RD
S THAYER RD
S HENRICI RD
S REDLAND RD
S HOLCOMB BLVD
GLEN OAK RD
HOLMES LN
LINN AVE
LELAND RD
SOUTH END RD
S FORSYTHE RD

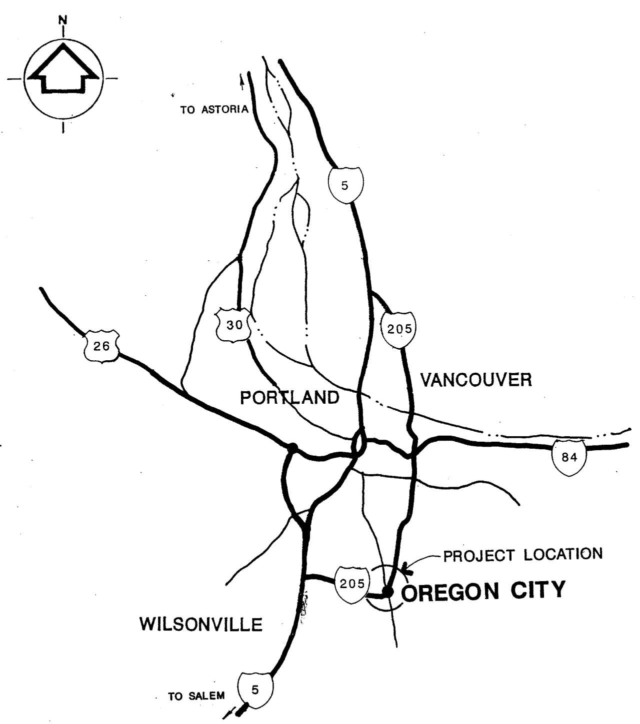
Item #1.

CITY OF OREGON CITY

HOLCOMB - PARK PLACE SANITARY SEWER COLLECTION SYSTEM



VICINITY MAP



LOCATION MAP

LEGEND

SYMBOL (EXISTING)	DESCRIPTION
	GRID REGISTER
	CATCH BASIN
	CULVERT
	FIRE HYDRANT
	GATE VALVE
	GUY POLE
	H.V. CONTROL POINT
	LIGHT POLE
	MANHOLE
	PIPE
	POWER VAULT
	POWER POLE
	RAILROAD SWITCH
	RAILROAD SIGN
	SIGN

SYMBOL (EXISTING)	DESCRIPTION
	SANITARY MANHOLE
	SINGLE TREE SMALL
	SINGLE TREE LARGE
135.0 ×	SPOT ELEVATION
	TELEPHONE BOX
	TRAFFIC POLE
	TELEPHONE MANHOLE
	UTILITY BOX
	BUILDING

SYMBOL (EXISTING)	DESCRIPTION
—X—X—X—X—X—	FENCE LINE
— —G— — —G— —	GAS LINE
——S—— ——S——	SEWER LINE
— —TV— — —TV— —	TELEVISION CABLE
— —W— — —W— —	WATER LINE
— —SD— — —SD— —	STORM DRAIN LINE
	CURB LINE
	EDGE OF PAVEMENT
	GRAVEL ROAD
	PAVED DRIVEWAY
	PAVED PARKING LOT
	PARKING LOT
	PROPERTY LINE/R.O.W. LINE
	UNPAVED DRIVEWAY
	RAILROAD TRACKS
	VEGETATION LINE
	CONSTRUCTION EASEMENT
120	CONTOUR LINE

SYMBOL (PROPOSED)	DESCRIPTION
	SANITARY SEWER
	MANHOLE
3+00	SANITARY SEWER SERVICE LINE
	SANITARY SEWER WITH CASING
	TRANSITION COUPLING
	CLEANOUT
BSM'T	BASEMENT ELEVATION

GENERAL NOTES

1. ADJUST GAS LINE AS REQUIRED.
2. ADJUST WATER LINE UP AS REQUIRED.
3. SERVICE LATERAL SHALL BE LAID AT THE MINIMUM SLOPE 0.02.
4. REMOVE AND REPLACE FENCE AS REQUIRED.
5. REMOVE AND REPLACE CULVERT AS REQUIRED.
6. REMOVE AND REPLACE CATCH BASIN AS REQUIRED.
7. REGRADE DRAINAGE DITCH TO ORIGINAL CONDITION.

DRAWING REFERENCES

NOTE:
THE SYMBOLS LISTED ON THIS SHEET ARE TYPICAL SYMBOLS THAT MAY OR MAY NOT BE USED IN THIS SET OF PLANS. SPECIAL SYMBOLS WILL BE NOTED ON THE SHEETS THAT THEY APPLY TO.

1. DRAWINGS ARE CROSS REFERENCED IN THE FOLLOWING MANNER:
   (a) SECTION CUT ON DRAWING C08:
   1 — SECTION IDENTIFICATION
   C09 — DRAWING ON WHICH SECTION APPEARS
   (b) ON DRAWING C09 THE SECTION IS IDENTIFIED AS:
   1 — SECTION IDENTIFICATION
   C08 — DRAWING FROM WHICH THE SECTION WAS TAKEN
   (c) SECTION CUT AND SHOWN ON SAME DRAWING:
   1 — SECTION IDENTIFICATION
   C09 — SAME DRAWING
2. PLANS, DETAILS AND ELEVATIONS ARE CROSS REFERENCED IN A SIMILIAR MANNER.
3. SECTION REFERENCED IN TEXT, "SEE ... OR DETAIL 5 ON DRAWING NUMBER C...

The data on this map is the BEST INFORMATION AVAILABLE from the records of the City of Oregon City - errors and omissions may exist.

Exhibit 6

Kramer, Chin, & Mayo, Inc. 7080 S.W. Fir Loop Portland, OR 97223	
date FEB. 1992	designed by GM
	drawn by GD
scale AS NOTED	checked by AS
	approved by JM

REGISTERED PROFESSIONAL ENGINEER 14,162 OREGON
REGISTERED PROFESSIONAL ENGINEER 14,047 OREGON

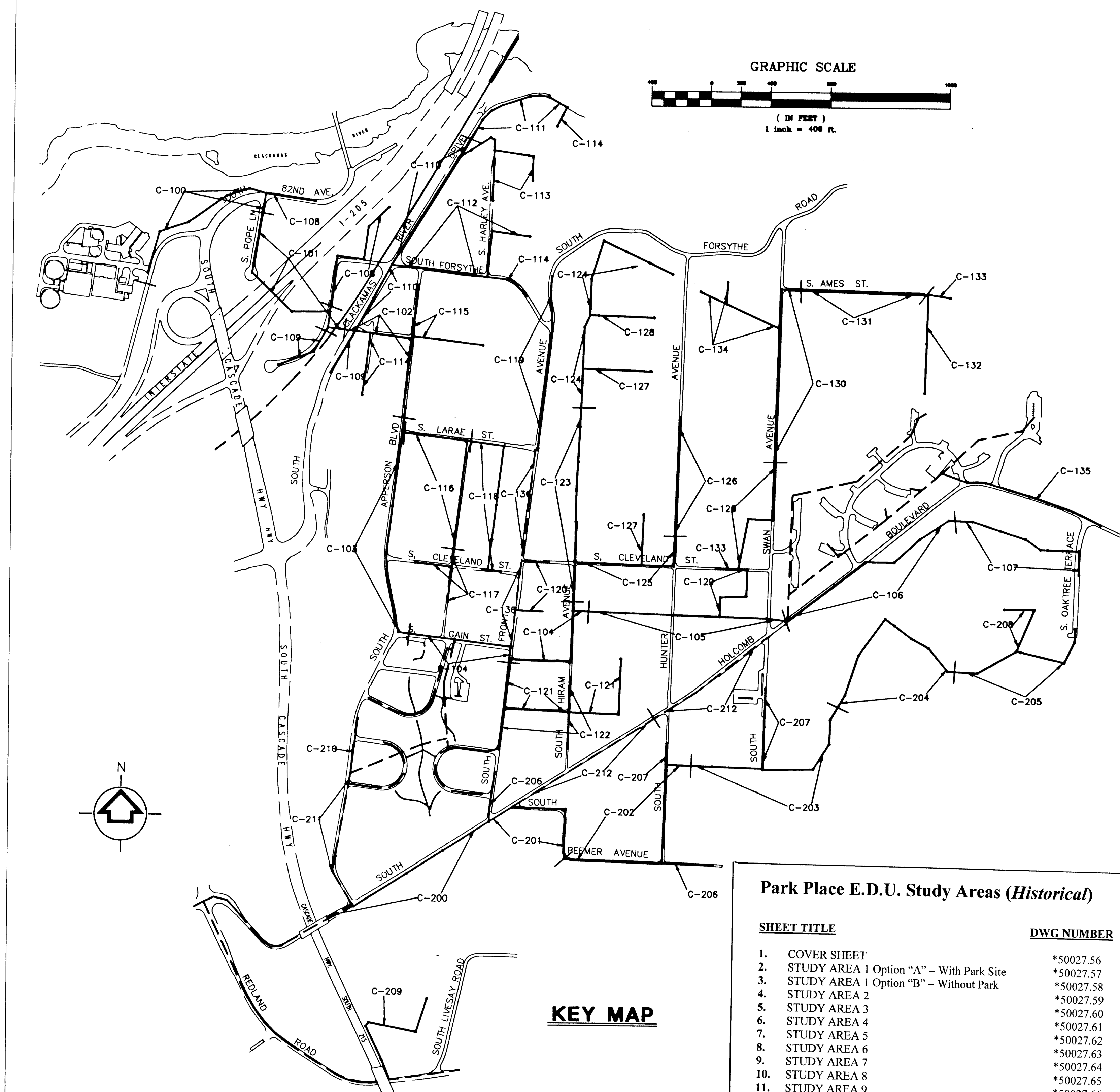
revisions
AS-BUILT 6/30/93

HOLCOMB - PARK PLACE
SANITARY SEWER COLLECTION SYSTEM
OREGON CITY, OREGON

COVER SHEET
VICINITY MAP / LOCATION MA...
GENERAL NOTES / DRAWING R...

DRAWING NUMBER 50027.00
DRAWING NUMBER COVER SHEET
DRAWING NUMBER 1

...wing is full size when 22"x 34" or is reduced to half size when 11"x17"



KEY MAP

Park Place E.D.U. Study Areas (*Historical*)

SHEET TITLE	DWG NUMBER
1. COVER SHEET	*50027.56
2. STUDY AREA 1 Option "A" – With Park Site	*50027.57
3. STUDY AREA 1 Option "B" – Without Park	*50027.58
4. STUDY AREA 2	*50027.59
5. STUDY AREA 3	*50027.60
6. STUDY AREA 4	*50027.61
7. STUDY AREA 5	*50027.62
8. STUDY AREA 6	*50027.63
9. STUDY AREA 7	*50027.64
10. STUDY AREA 8	*50027.65
11. STUDY AREA 9	*50027.66
12. STUDY AREA 10	*50027.67
13. STUDY AREA 11	*50027.68

* (See scanned)

INDEX TO DRAWINGS

SHEET NUMBER	DRAWING NUMBER	DRAWING TITLE
	GENERAL DRAWINGS	
1	G-01	COVER SHEET/VICINITY MAP/DRAWING REFERENCE/LEGEND
2	G-02	INDEX TO DRAWINGS AND KEY MAP
3	G-03	SURVEY CONTROL AND MANHOLE COORDINATES
4	G-04	CIVIL DETAILS
5	G-05	CIVIL DETAILS
6	G-06	CIVIL DETAILS
	CIVIL – SCHEDULE A	
7	C-100	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 0+00 TO 12+50
8	C-101	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 12+50 TO 24+50
9	C-102	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 24+50 TO 37+00
10	C-103	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 37+00 TO 51+00
11	C-104	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 51+00 TO 65+00
12	C-105	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 65+00 TO 79+00
13	C-106	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 79+00 TO 93+00
14	C-107	SCH A: K-INTERCEPTOR / PLAN AND PROFILE STA 93+00 TO END
15	C-108	SCH A: TRUNKS K-1 AND K-2 / PLAN AND PROFILE STA 0+00 TO END
16	C-109	SCH A: TRUNKS K-3 AND K-4 / PLAN AND PROFILE STA 0+00 TO END
17	C-110	SCH A: TRUNK 5-5 / PLAN AND PROFILE STA 0+00 TO 14+00
18	C-111	SCH A: TRUNK K-5 / PLAN AND PROFILE STA 14+00 TO END
19	C-112	SCH A: LATERAL K-5A / PLAN AND PROFILE STA 0+00 TO END
20	C-113	SCH A: LATERALS K-5B AND K-5B-1 / PLAN AND PROFILE STA 0+00 TO END
21	C-114	SCH A: TRUNK K-6/ PLAN AND PROFILE STA 0+00 TO END LATERALS K-5A-1 AND K-5C / PLAN AND PROFILE STA 0+00 TO END
22	C-115	SCH A: TRUNKS K-7 AND K-7A / PLAN AND PROFILE STA 0+00 TO END
23	C-116	SCH A: TRUNK K-8 / PLAN AND PROFILE STA 0+00 TO 11+50
24	C-117	SCH A: TRUNK K-8 / PLAN AND PROFILE STA 11+50 TO END TRUNK K-8B / PLAN AND PROFILE STA 0+00 TO END
25	C-118	SCH A: LATERALS K-8A AND K-8A-1 / PLAN AND PROFILE STA 0+00 TO END
26	C-119	SCH A: TRUNK K-9 / PLAN AND PROFILE STA 0+00 TO END
27	C-120	SCH A: LATERALS K-9A AND K-9B / PLAN AND PROFILE STA 0+00 TO END
28	C-121	SCH A: TRUNK K-10 / PLAN AND PROFILE STA 0+00 TO END
29	C-122	SCH A: LATERAL K-10A, K-10B, AND K-10C / PLAN AND PROFILE STA 0+00 TO END
30	C-123	SCH A: TRUNK K-11 / PLAN AND PROFILE STA 0+00 13+50
31	C-124	SCH A: TRUNK K-11 / PLAN AND PROFILE STA 13+50 TO END
32	C-125	SCH A: LATERAL K-11A / PLAN AND PROFILE STA 0+00 TO 9+00
33	C-126	SCH A: LATERAL K-11A / PLAN AND PROFILE STA 9+00 TO END
34	C-127	SCH A: LATERALS K-11A-1 AND K-11B / PLAN AND PROFILE STA 0+00 TO END
35	C-128	SCH A: LATERAL K-11C / PLAN AND PROFILE STA 0+00 TO END
36	C-129	SCH A: TRUNK K-12 / PLAN AND PROFILE STA 0+00 TO 14+00
37	C-130	SCH A: TRUNK K-12 / PLAN AND PROFILE STA 14+00 TO 28+00
38	C-131	SCH A: TRUNK K-12 / PLAN AND PROFILE STA 28+00 TO 37+50
39	C-132	SCH A: TRUNK K-12 / PLAN AND PROFILE STA 37+50 TO END
40	C-133	SCH A: LATERALS K-12A AND K-12C / PLAN AND PROFILE STA 0+00 TO END
41	C-134	SCH A: LATERALS K-12B AND K-12B-1 / PLAN AND PROFILE STA 0+00 TO END
42	C-135	SCH A: TRUNK K-13 / PLAN AND PROFILE STA 0+00 TO END
43	C-136	SCH A: TRUNK K-9 – NEW SEWER SERVICES ON EXISTING SEWER LINES STA 0+00 TO END
	CIVIL – SCHEDULE B	
44	C-200	SCH B: H-INTERCEPTOR / PLAN AND PROFILE STA 0+00 TO END
45	C-201	SCH B: TRUNK H-3 / PLAN AND PROFILE STA 0+00 TO 9+50
46	C-202	SCH B: TRUNK H-3 / PLAN AND PROFILE STA 9+50 TO 23+00
47	C-203	SCH B: TRUNK H-3 / PLAN AND PROFILE STA 23+00 TO 34+50
48	C-204	SCH B: TRUNK H-3 / PLAN AND PROFILE STA 34+50 TO 48+00
49	C-205	SCH B: TRUNK H-3 / PLAN AND PROFILE STA 48+00 TO END
50	C-206	SCH B: LATERALS H-3A AND H-3B / PLAN AND PROFILE STA 0+00 TO END
51	C-207	SCH B: LATERALS H-3C AND H-3D / PLAN AND PROFILE STA 0+00 TO END
52	C-208	SCH B: LATERAL H-3E / PLAN AND PROFILE STA 0+00 TO END
53	C-209	SCH B: TRUNK H-1 / PLAN AND PROFILE STA 0+00 TO END
54	C-210	SCH B: LATERAL H-2A / PLAN AND PROFILE STA 0+00 TO END
55	C-211	SCH B: TRUNK H-2 – NEW SEWER SERVICES ON EXISTING SEWER LINES STA 0+00 TO END
56	C-212	SCH B: TRUNK H-4 – NEW SEWER SERVICES ON EXISTING SEWER LINES STA 0+00 TO END

AS-BUILT 6/30/93

This drawing is full size when 22"x 34" or is reduced to half size when 11"x17"

50027.01

KCM

Kramer, Chin, & Mayo, Inc.
7080 S.W. Fir Loop
Portland, OR 97223

date	designed by	GM
FEB. 1992	drawn by	GD
scale	checked by	AS
1" = 400'	approved by	JM

REGISTERED PROFESSIONAL ENGINEER 14,162 OREGON JULY 26, 1985 STEPHEN C. WAGNER

REGISTERED PROFESSIONAL ENGINEER 14,042 OREGON JULY 26, 1985 GORDON A. MUNRO

revisions

HOLCOMB - PARK PLACE
SANITARY SEWER COLLECTION SYSTEM
OREGON CITY, OREGON

INDEX TO DRAWINGS
KEY MAP

Exhibit

DRAWING NUMBER 50027.44

Item #1.

The data on this map is the BEST INFORMATION AVAILABLE from the records of the City of Oregon City - errors and omissions may exist.

This drawing is full size when 22"x 34" or is reduced to half size when 11"x17"

KCM

Kramer, Chin, & Mayo, Inc.
7080 S.W. Fir Loop
Portland, OR 97223

date	designed by	GM
FEB. 1992	drawn by	GD
scale	checked by	AS
AS NOTED	approved by	JM

revisions
AS-BUILT 6/30/93

HOLCOMB - PARK PLACE
SANITARY SEWER COLLECTION SYSTEM
OREGON CITY, OREGON

SCH. B - TRUNK H
PLAN & PROFILE
STA. 0+00 TO 9+5

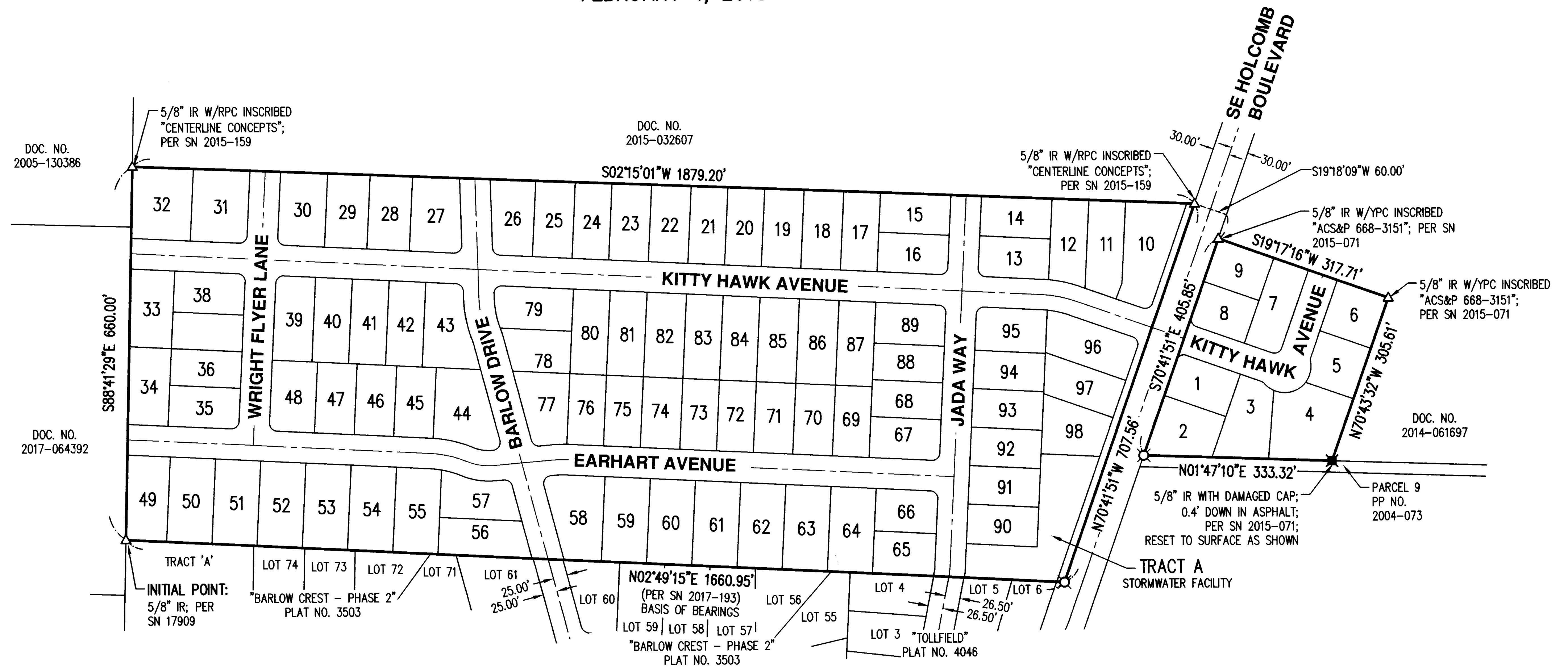
DRAWING NUMBER C-201 sht. 45

Exhibit 6

BOOK 149 PAGE 014
PLAT NO. 4543 SHEET 1 OF 8

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018



SCALE 1" = 150 FEET

LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON:__________.
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON:__________.
- 5/8" X 30" IRON ROD W/ALC INSCRIBED "AKS ENGR." SET ON: 04-04-2018.
- FOUND 5/8" IRON ROD W/YPC INSCRIBED "AKS ENGR."; PER SN 2017-193; HELD
- □ FOUND 5/8" IRON ROD W/YPC INSCRIBED "TOLL LS 2732"; PER THE PLAT "TOLLFIELD" PLAT NO. 4046; HELD UNLESS NOTED OTHERWISE
- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST - PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE
- △ DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
- DOC. NO. DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS

SHEET INDEX

PREPARED FOR

ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

4-19-18
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS
RENEWS: 6/30/19

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

AKS ENGINEERING AND FORESTRY, LLC
12965 SW HERMAN RD
SUITE 100
TUALATIN, OR 97062
PHONE: 503.563.6151
FAX: 503.563.6152

AKS
ENGINEERING · PLANNING · SURVEYING
FORESTRY · LANDSCAPE ARCHITECTURE

Exhibit 7

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018

BOOK 149 PAGE 014
PLAT NO. 4543
SHEET 2 OF 8

LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON:
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON:
- 5/8" X 30" IRON ROD W/ALC INSCRIBED "AKS ENGR." SET ON: 04-04-2018.
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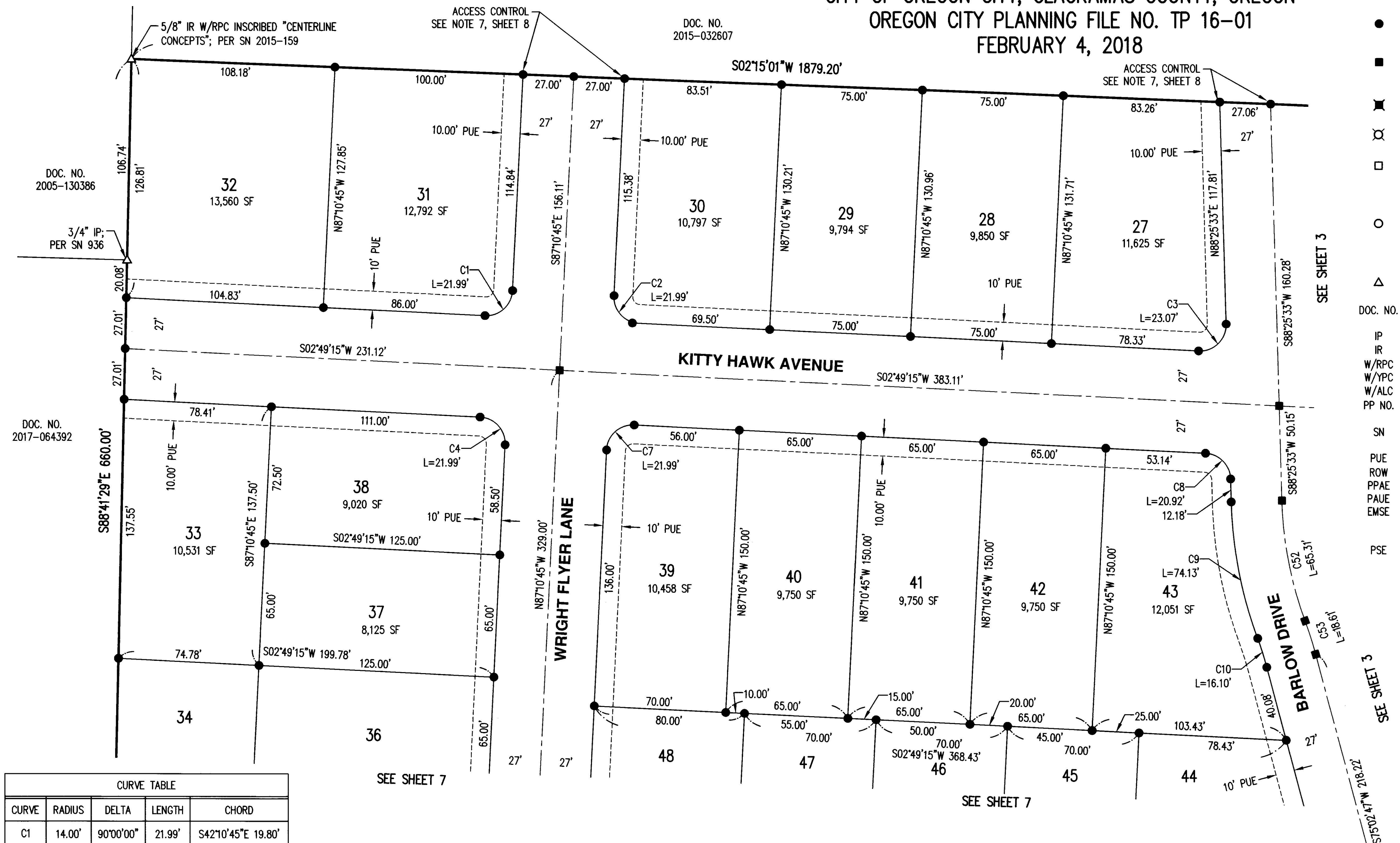
- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST – PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE
- △ DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
- DOC. NO. DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS
- IP IRON PIPE
- IR IRON ROD
- W/RPC WITH A RED PLASTIC CAP
- W/YPC WITH A YELLOW PLASTIC CAP
- W/ALC WITH A ALUMINUM CAP
- PP NO. PARTITION PLAT NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
- SN SURVEY NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
- PUE PUBLIC UTILITY EASEMENT
- ROW RIGHT-OF-WAY
- PPAE PUBLIC PEDESTRIAN ACCESS EASEMENT
- PAUE PRIVATE ACCESS AND UTILITY EASEMENT
- EMSE ENTRY MONUMENT SIGN EASEMENT TO ABERNATHY LANDING HOMEOWNERS ASSOCIATION. SEE SHEET 2, NOTE 11
- PSE PUBLIC SIDEWALK EASEMENT



CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C1	14.00'	90°00'00"	21.99'	S42°10'45"E 19.80'
C2	14.00'	90°00'00"	21.99'	S47°49'15"W 19.80'
C3	14.00'	94°23'42"	23.07'	S44°22'36"E 20.54'
C4	14.00'	90°00'00"	21.99'	N47°49'15"E 19.80'
C7	14.00'	90°00'00"	21.99'	N42°10'45"W 19.80'
C8	14.00'	85°36'18"	20.92'	N45°37'24"E 19.03'
C9	227.00'	18°42'40"	74.13'	S79°04'13"W 73.80'
C10	173.00'	5°19'53"	16.10'	N72°22'50"E 16.09'
C52	200.00'	18°42'40"	65.31'	N79°04'13"E 65.02'
C53	200.00'	5°19'53"	18.61'	N72°22'50"E 18.60'

PREPARED FOR

ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

4-19-18
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS
RENEWS: 6/30/19

Exhibit 7

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

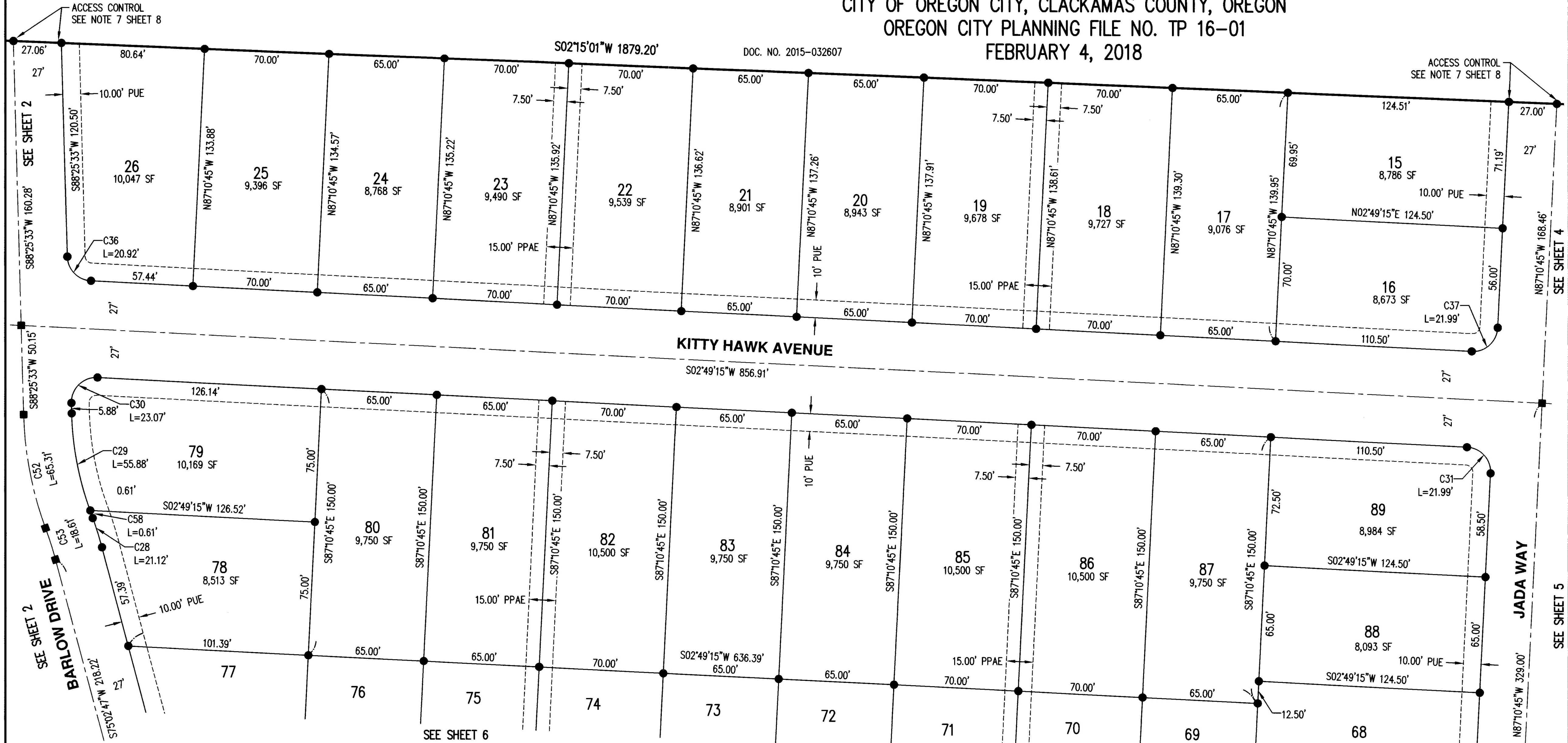
AKS ENGINEERING AND FORESTRY, LLC
12965 SW HERMAN RD
SUITE 100
TUALATIN, OR 97062
PHONE: 503.563.6151
FAX: 503.563.6152
AKS
ENGINEERING · PLANNING · SURVEYING
FORESTRY · LANDSCAPE ARCHITECTURE

BOOK 149 PAGE 014
PLAT NO. 4543 SHEET 3 OF 8

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018

SCALE 1" = 40 FEET



CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C28	227.00'	5°19'53"	21.12'	N72°22'50"E 21.12'
C29	173.00'	18°30'28"	55.88'	S79°10'19"W 55.64'
C30	14.00'	94°23'42"	23.07'	N44°22'36"W 20.54'
C31	14.00'	90°00'00"	21.99'	N47°49'15"E 19.80'
C36	14.00'	85°36'18"	20.92'	S45°37'24"W 19.03'
C37	14.00'	90°00'00"	21.99'	S42°10'45"E 19.80'
C52	200.00'	18°42'40"	65.31'	N79°04'13"E 65.02'
C53	200.00'	5°19'53"	18.61'	N72°22'50"E 18.60'
C58	173.00'	0°12'11"	0.61'	S69°48'59"W 0.61'

LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON: ________
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON: ________
- 5/8" X 30" IRON ROD W/ALC INSCRIBED "AKS ENGR." SET ON: 04-04-2018.
- FOUND 5/8" IRON ROD W/YPC INSCRIBED "AKS ENGR."; PER SN 2017-193; HELD
- □ FOUND 5/8" IRON ROD W/YPC INSCRIBED "TOLL LS 2732"; PER THE PLAT "TOLLFIELD" PLAT NO. 4046; HELD UNLESS NOTED OTHERWISE
- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST – PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE

△	DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
DOC. NO.	DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS
IP	IRON PIPE
IR	IRON ROD
W/RPC	WITH A RED PLASTIC CAP
W/YPC	WITH A YELLOW PLASTIC CAP
W/ALC	WITH A ALUMINUM CAP
PP NO.	PARTITION PLAT NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
SN	SURVEY NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
PUE	PUBLIC UTILITY EASEMENT
ROW	RIGHT-OF-WAY
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
PAUE	PRIVATE ACCESS AND UTILITY EASEMENT
EMSE	ENTRY MONUMENT SIGN EASEMENT TO ABERNATHY LANDING HOMEOWNERS ASSOCIATION. SEE SHEET 2, NOTE 11
PSE	PUBLIC SIDEWALK EASEMENT

4-19-18
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS
RENEWS: 6/30/19

Exhibit 7

PREPARED FOR
ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

AKS ENGINEERING AND FORESTRY, LLC
12965 SW HERMAN RD
SUITE 100
TUALATIN, OR 97062
PHONE: 503.563.6151
FAX: 503.563.6152

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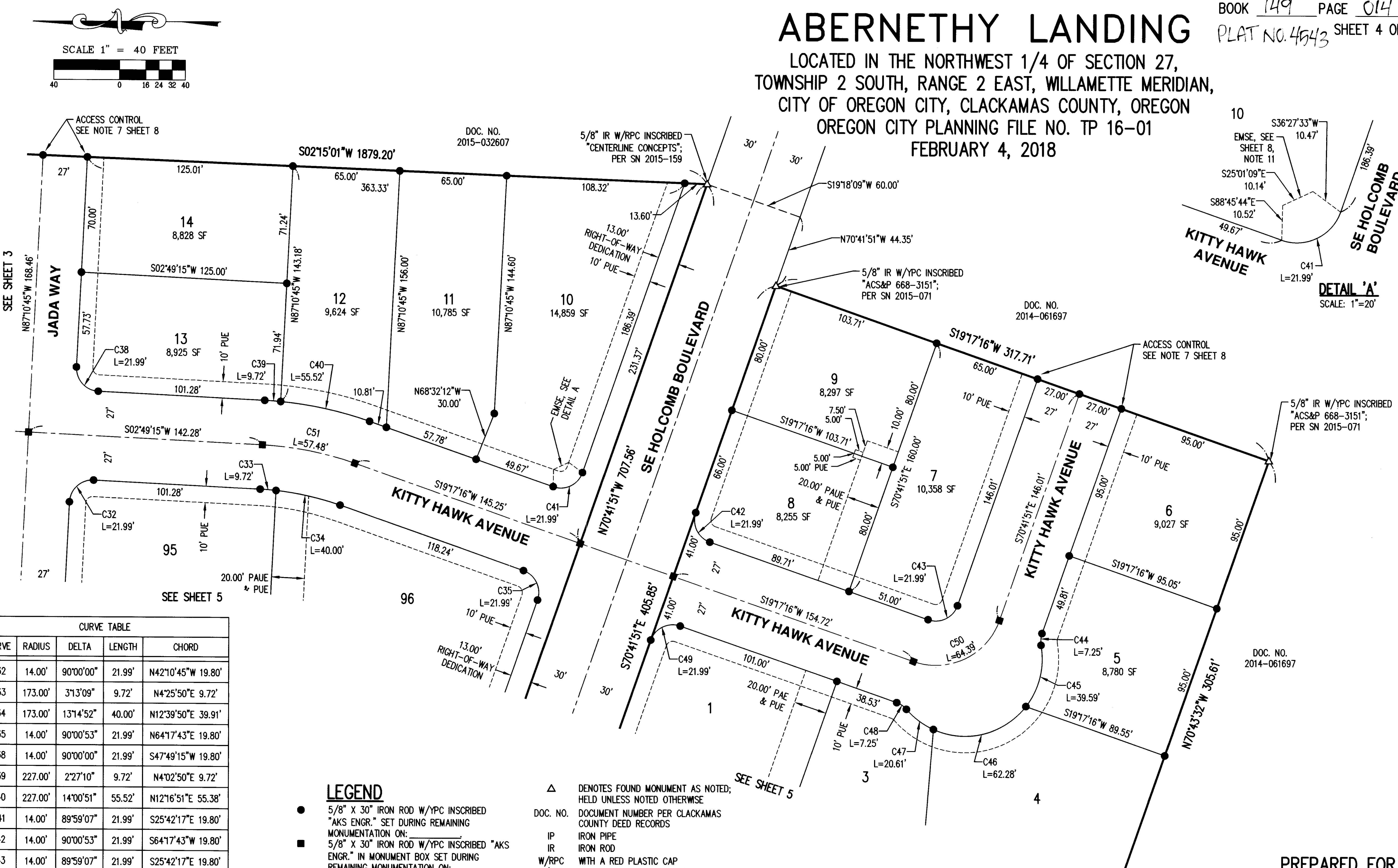
FORESTRY · LANDSCAPE ARCHITECTURE

BOOK 149 PAGE 014
PLAT NO. 4543 SHEET 4 OF 8

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018



CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	CHORD
C32	14.00'	90°00'00"	21.99'	N42°10'45"W 19.80'
C33	173.00'	3°13'09"	9.72'	N4°25'50"E 9.72'
C34	173.00'	13°14'52"	40.00'	N12°39'50"E 39.91'
C35	14.00'	90°00'53"	21.99'	N64°17'43"E 19.80'
C38	14.00'	90°00'00"	21.99'	S47°49'15"W 19.80'
C39	227.00'	2°27'10"	9.72'	N4°02'50"E 9.72'
C40	227.00'	14°00'51"	55.52'	N12°16'51"E 55.38'
C41	14.00'	89°59'07"	21.99'	S25°42'17"E 19.80'
C42	14.00'	90°00'53"	21.99'	S64°17'43"W 19.80'
C43	14.00'	89°59'07"	21.99'	S25°42'17"E 19.80'
C44	14.00'	29°39'54"	7.25'	N85°31'48"W 7.17'
C45	47.00'	48°16'04"	39.59'	S76°13'43"E 38.43'
C46	47.00'	75°55'15"	62.28'	S14°08'04"E 57.82'
C47	47.00'	25°07'41"	20.61'	S36°23'23"W 20.45'
C48	14.00'	29°39'57"	7.25'	N34°07'15"E 7.17'
C49	14.00'	89°59'07"	21.99'	N25°42'17"W 19.80'
C50	41.00'	89°59'07"	64.39'	S25°42'17"E 57.98'
C51	200.00'	16°28'01"	57.48'	S11°03'16"W 57.28'

LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON:__________.
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON:__________.
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- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST – PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE

△	DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
DOC. NO.	DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS
IP	IRON PIPE
IR	IRON ROD
W/RPC	WITH A RED PLASTIC CAP
W/YPC	WITH A YELLOW PLASTIC CAP
W/ALC	WITH A ALUMINUM CAP
PP NO.	PARTITION PLAT NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
SN	SURVEY NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
PUE	PUBLIC UTILITY EASEMENT
ROW	RIGHT-OF-WAY
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
PAUE	PRIVATE ACCESS AND UTILITY EASEMENT
EMSE	ENTRY MONUMENT SIGN EASEMENT TO ABERNATHY LANDING HOMEOWNERS ASSOCIATION. SEE SHEET 2, NOTE 11
PSE	PUBLIC SIDEWALK EASEMENT
PAE	PRIVATE ACCESS EASEMENT

Exhibit 7

4-19-18

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS
RENEWS: 6/30/19

PREPARED FOR

ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

AKS ENGINEERING AND FORESTRY, LLC
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PHONE: 503.563.6151
FAX: 503.563.6152

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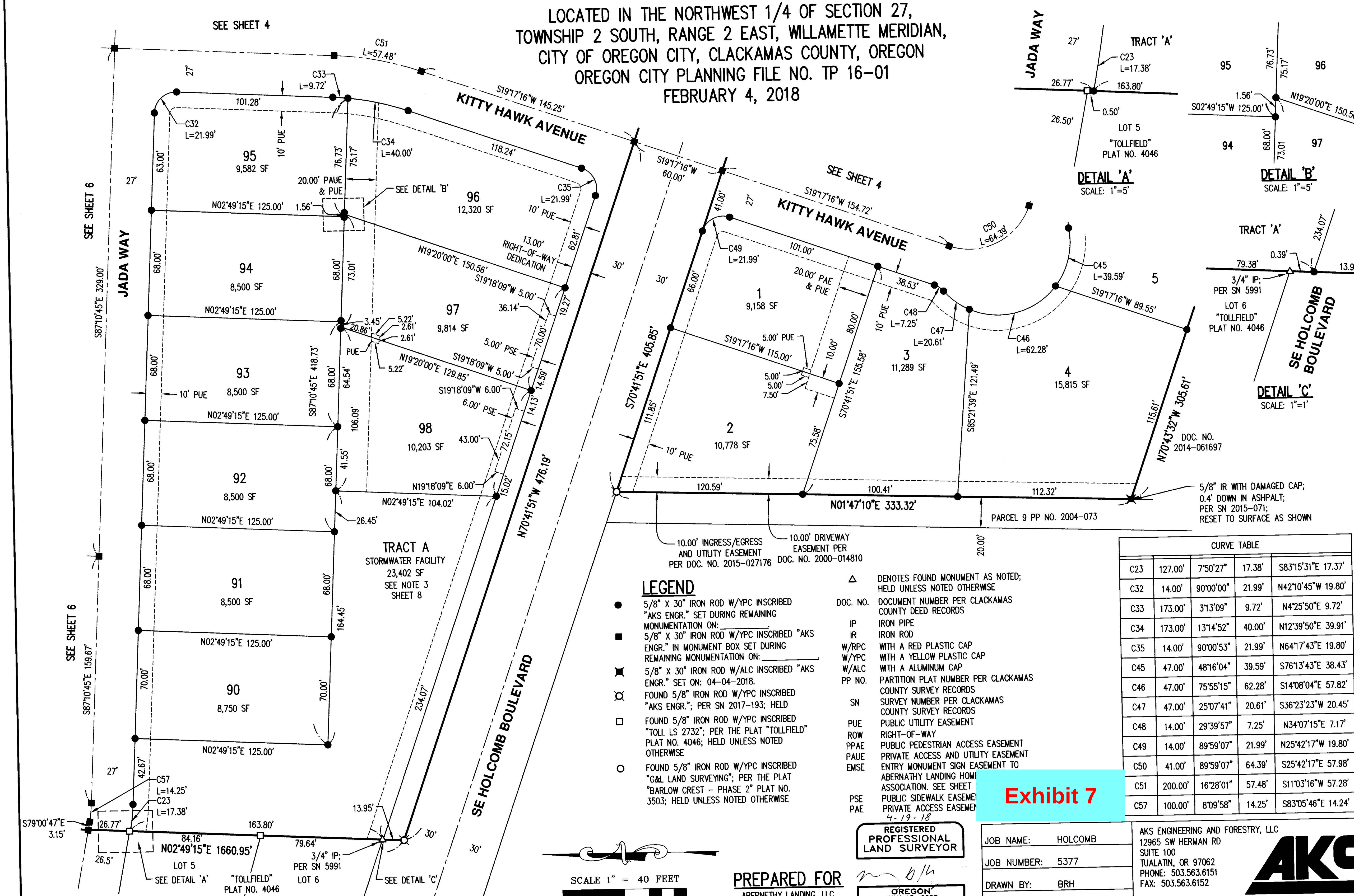
Item #1.

BOOK 149 PAGE 0184
PLAT NO. 4543 SHEET 5 OF 8

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018



LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON: ______.
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON: ______.
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- FOUND 5/8" IRON ROD W/YPC INSCRIBED "AKS ENGR."; PER SN 2017-193; HELD
- □ FOUND 5/8" IRON ROD W/YPC INSCRIBED "TOLL LS 2732"; PER THE PLAT "TOLLFIELD" PLAT NO. 4046; HELD UNLESS NOTED OTHERWISE
- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST - PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE

△	DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
DOC. NO.	DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS
IP	IRON PIPE
IR	IRON ROD
W/RPC	WITH A RED PLASTIC CAP
W/YPC	WITH A YELLOW PLASTIC CAP
W/ALC	WITH A ALUMINUM CAP
PP NO.	PARTITION PLAT NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
SN	SURVEY NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
PUE	PUBLIC UTILITY EASEMENT
ROW	RIGHT-OF-WAY
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
PAUE	PRIVATE ACCESS AND UTILITY EASEMENT
EMSE	ENTRY MONUMENT SIGN EASEMENT TO ABERNATHY LANDING HOME[...] ASSOCIATION. SEE SHEET [...]
PSE	PUBLIC SIDEWALK EASEME[...]
PAE	PRIVATE ACCESS EASEME[...]

Exhibit 7

CURVE TABLE

C23	127.00'	7°50'27"	17.38'	S83°15'31"E 17.37'
C32	14.00'	90°00'00"	21.99'	N42°10'45"W 19.80'
C33	173.00'	3°13'09"	9.72'	N4°25'50"E 9.72'
C34	173.00'	13°14'52"	40.00'	N12°39'50"E 39.91'
C35	14.00'	90°00'53"	21.99'	N64°17'43"E 19.80'
C45	47.00'	48°16'04"	39.59'	S76°13'43"E 38.43'
C46	47.00'	75°55'15"	62.28'	S14°08'04"E 57.82'
C47	47.00'	25°07'41"	20.61'	S36°23'23"W 20.45'
C48	14.00'	29°39'57"	7.25'	N34°07'15"E 7.17'
C49	14.00'	89°59'07"	21.99'	N25°42'17"W 19.80'
C50	41.00'	89°59'07"	64.39'	S25°42'17"E 57.98'
C51	200.00'	16°28'01"	57.48'	S11°03'16"W 57.28'
C57	100.00'	8°09'58"	14.25'	S83°05'46"E 14.24'

SCALE 1" = 40 FEET
40 0 16 24 32 40

PREPARED FOR
ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

4-19-18
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS
RENEWS: 6/30/19

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

AKS ENGINEERING AND FORESTRY, LLC
12965 SW HERMAN RD
SUITE 100
TUALATIN, OR 97062
PHONE: 503.563.6151
FAX: 503.563.6152

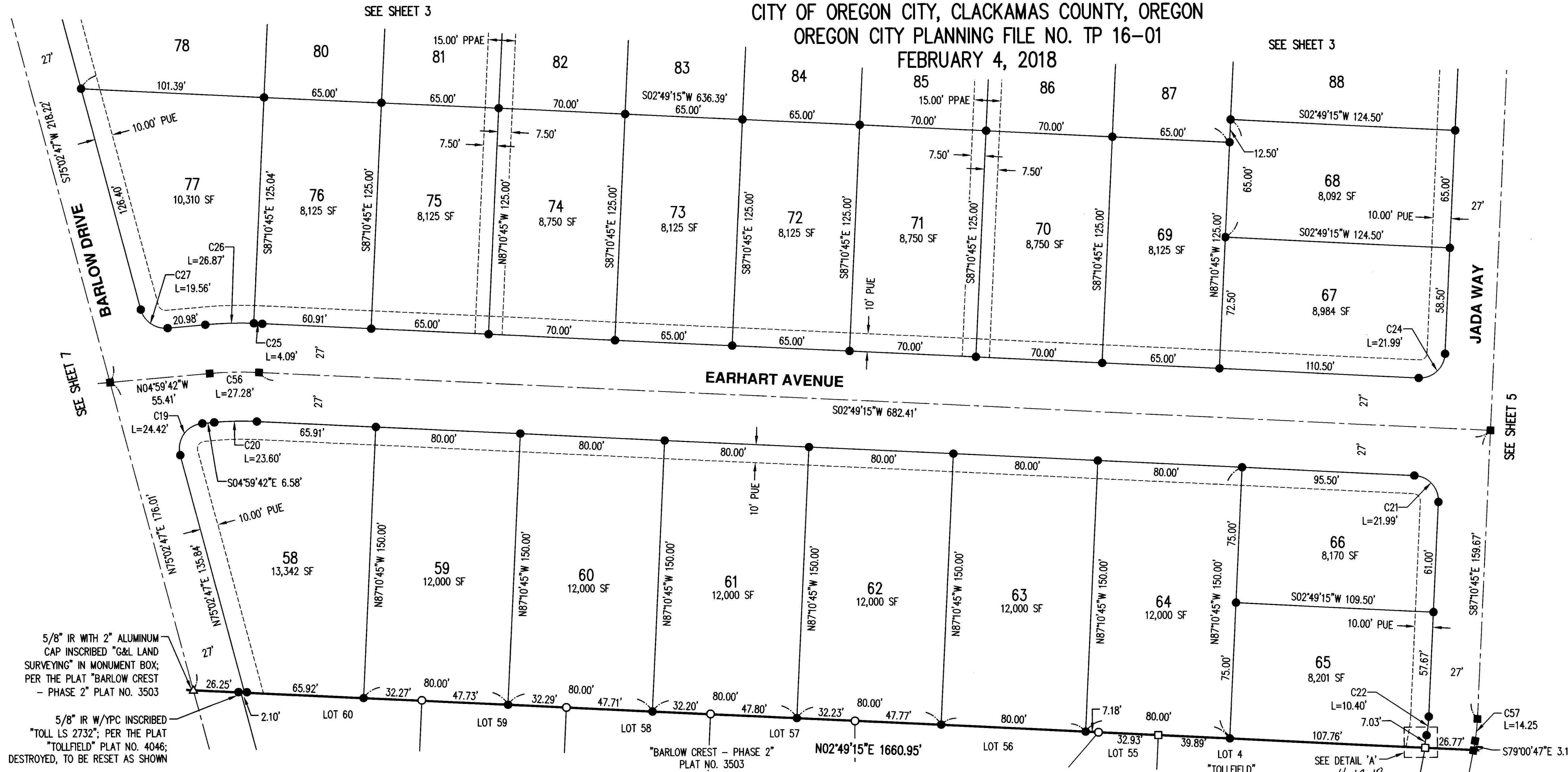
ENGINEERING · PLANNING · SURVEYING
FORESTRY · LANDSCAPE ARCHITECTURE

BOOK 149 PAGE 014
PLAT NO. 4543 SHEET 6 OF 8

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018

SCALE 1" = 40 FEET



CURVE TABLE				
C19	14.00'	99°57'31"	24.42'	N54°58'28"W 21.44'
C20	173.00'	7°48'57"	23.60'	N1°05'13"W 23.58'
C21	14.00'	90°00'00"	21.99'	N47°49'15"E 19.80'
C22	73.00'	8°09'58"	10.40'	S83°05'46"E 10.40'
C24	14.00'	90°00'00"	21.99'	S42°10'45"E 19.80'
C25	227.00'	1°01'58"	4.09'	N2°18'16"E 4.09'
C26	227.00'	6°46'59"	26.87'	N1°36'12"W 26.86'
C27	14.00'	80°02'29"	19.56'	S35°01'32"W 18.01'
C56	200.00'	7°48'57"	27.28'	N1°05'13"W 27.26'
C57	100.00'	8°09'58"	14.25'	S83°05'46"E 14.24'

LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON: ________.
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON: ________.
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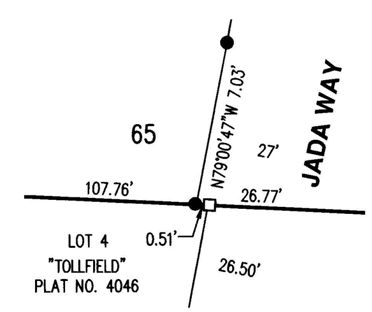
- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST - PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE

△	DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
DOC. NO.	DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS
IP	IRON PIPE
IR	IRON ROD
W/RPC	WITH A RED PLASTIC CAP
W/YPC	WITH A YELLOW PLASTIC CAP
W/ALC	WITH A ALUMINUM CAP
PP NO.	PARTITION PLAT NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
SN	SURVEY NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
PUE	PUBLIC UTILITY EASEMENT
ROW	RIGHT-OF-WAY
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
PAUE	PRIVATE ACCESS AND UTILITY EASEMENT
EMSE	ENTRY MONUMENT SIGN EASEMENT TO ABERNATHY LANDING HOMEOWNERS ASSOCIATION. SEE SHEET 2, NOTE 11
PSE	PUBLIC SIDEWALK EASEMENT



DETAIL 'A'
SCALE: 1"=5'

4-19-18
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS
RENEWS: 6/30/19

Exhibit 7

PREPARED FOR
ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
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FORESTRY · LANDSCAPE ARCHITECTURE

BOOK 149 PAGE 014
PLAT NO. 4543
SHEET 7 OF 8

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
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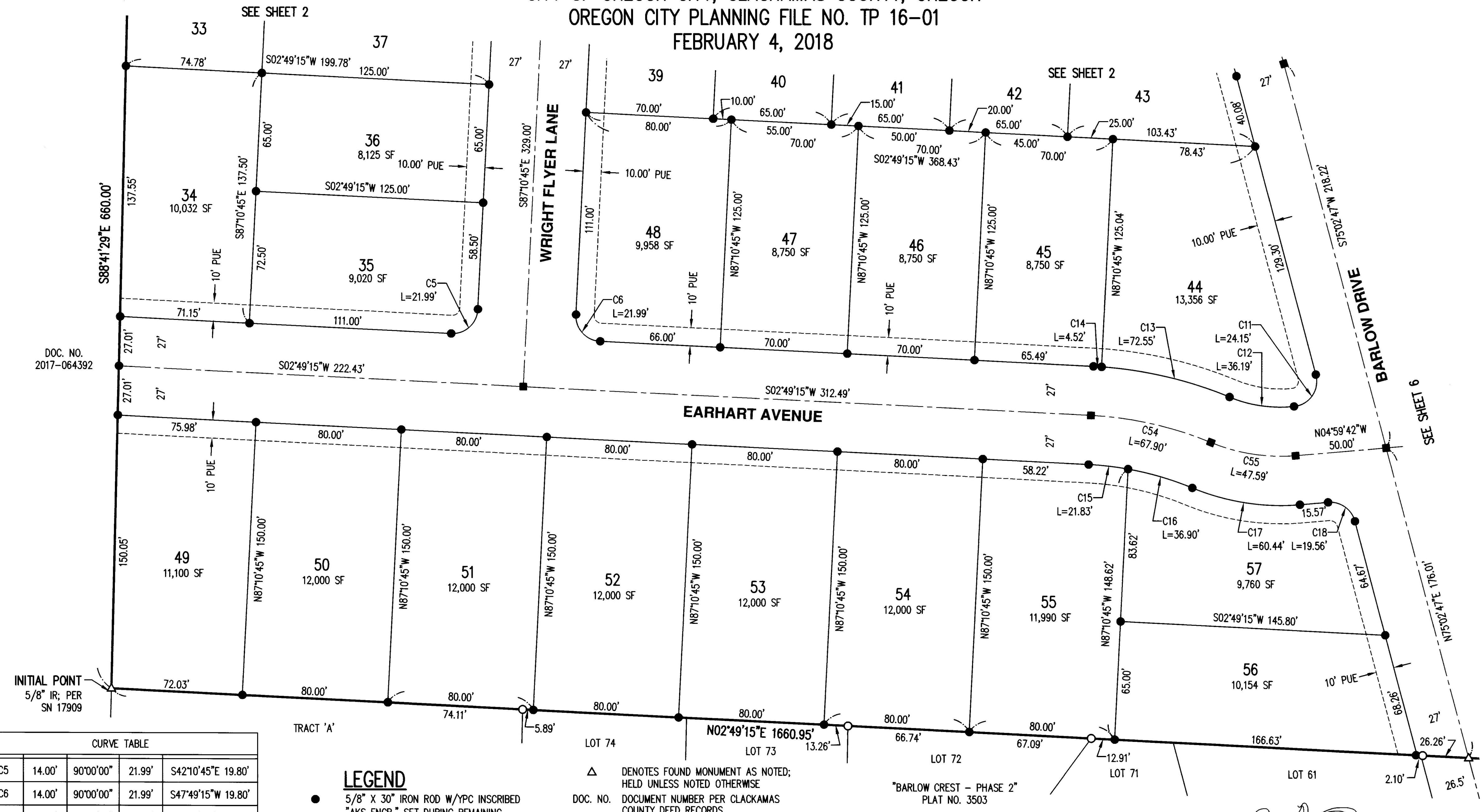

CURVE TABLE				
C5	14.00'	90°00'00"	21.99'	S42°10'45"E 19.80'
C6	14.00'	90°00'00"	21.99'	S47°49'15"W 19.80'
C11	14.00'	98°49'15"	24.15'	S55°32'36"E 21.26'
C12	73.00'	28°24'16"	36.19'	S8°04'09"W 35.82'
C13	227.00'	18°18'40"	72.55'	N13°06'57"E 72.24'
C14	227.00'	1°08'23"	4.52'	N3°23'26"E 4.51'
C15	173.00'	7°13'52"	21.83'	N6°26'11"E 21.82'
C16	173.00'	12°13'10"	36.90'	N16°09'42"E 36.83'
C17	127.00'	27°15'59"	60.44'	S8°38'18"W 59.87'
C18	14.00'	80°02'29"	19.56'	N35°01'32"E 18.01'
C54	200.00'	19°27'02"	67.90'	N12°32'46"E 67.57'
C55	100.00'	27°15'59"	47.59'	N8°38'18"E 47.14'

LEGEND

- ● 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." SET DURING REMAINING MONUMENTATION ON: ________.
- ■ 5/8" X 30" IRON ROD W/YPC INSCRIBED "AKS ENGR." IN MONUMENT BOX SET DURING REMAINING MONUMENTATION ON: ________.
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- ○ FOUND 5/8" IRON ROD W/YPC INSCRIBED "G&L LAND SURVEYING"; PER THE PLAT "BARLOW CREST – PHASE 2" PLAT NO. 3503; HELD UNLESS NOTED OTHERWISE

△	DENOTES FOUND MONUMENT AS NOTED; HELD UNLESS NOTED OTHERWISE
DOC. NO.	DOCUMENT NUMBER PER CLACKAMAS COUNTY DEED RECORDS
IP	IRON PIPE
IR	IRON ROD
W/RPC	WITH A RED PLASTIC CAP
W/YPC	WITH A YELLOW PLASTIC CAP
W/ALC	WITH A ALUMINUM CAP
PP NO.	PARTITION PLAT NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
SN	SURVEY NUMBER PER CLACKAMAS COUNTY SURVEY RECORDS
PUE	PUBLIC UTILITY EASEMENT
ROW	RIGHT-OF-WAY
PPAE	PUBLIC PEDESTRIAN ACCESS EASEMENT
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EMSE	ENTRY MONUMENT SIGN EASEMENT TO ABERNATHY LANDING HOMEOWNERS ASSOCIATION. SEE SHEET 2, NOTE 11
PSE	PUBLIC SIDEWALK EASEMENT

SCALE 1" = 40 FEET
40 0 16 24 32 40

Exhibit 7

4-19-18
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 15, 2003
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DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

AKS ENGINEERING AND FORESTRY, LLC
12965 SW HERMAN RD
SUITE 100
TUALATIN, OR 97062
PHONE: 503.563.6151
FAX: 503.563.6152

ENGINEERING · PLANNING · SURVEYING
FORESTRY · LANDSCAPE ARCHITECTURE

Item #1.

ABERNETHY LANDING

LOCATED IN THE NORTHWEST 1/4 OF SECTION 27,
TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN,
CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON
OREGON CITY PLANNING FILE NO. TP 16-01
FEBRUARY 4, 2018

BOOK 149 PAGE 014
PLAT NO. 4543 SHEET 8 OF 8

CITY OF OREGON CITY APPROVALS

APPROVED THIS 6th DAY OF July, 2018

BY: Aleta Froman Goodrich, P.E.
OREGON CITY - CITY ENGINEER

****

APPROVED THIS 19 DAY OF June, 2018

BY:
OREGON CITY PLANNING MANAGER

CLACKAMAS COUNTY APPROVALS

APPROVED THIS 11th DAY OF July, 2018
CLACKAMAS COUNTY ROAD OFFICIAL

BY:
DEPUTY

****

APPROVED THIS 11th DAY OF July, 2018

CLACKAMAS COUNTY SURVEYOR; AND CLACKAMAS COUNTY BOARD OF COMMISSIONERS DELEGATE PER COUNTY CODE CHAPTER 11.02

****

ALL TAXES, FEES, ASSESSMENTS, OR OTHER CHARGES AS PROVIDED BY O.R.S. 92.095 HAVE BEEN PAID THROUGH JUNE 30 2019
APPROVED THIS 12 DAY OF JULY, 2018

CLACKAMAS COUNTY ASSESSOR AND TAX COLLECTOR

BY: Craig Fors
DEPUTY

****

STATE OF OREGON } SS
COUNTY OF CLACKAMAS

I DO HEREBY CERTIFY THAT THE ATTACHED PLAT WAS RECEIVED FOR RECORD ON THE 17TH DAY OF July, 2018
AT 3:17 O'CLOCK P M

AS PLAT NO. 4543

DOCUMENT NO. 2018-44361

SHERRY HALL,
CLACKAMAS COUNTY CLERK

BY:
DEPUTY

REMAINING CORNER MONUMENTATION

IN ACCORDANCE WITH O.R.S. 92.070, THE REMAINING CORNERS OF THIS SUBDIVISION HAVE BEEN CORRECTLY SET WITH THE PROPER MONUMENTS. AN AFFIDAVIT HAS BEEN PREPARED REGARDING THE SETTING OF SAID MONUMENTS AND IS RECORDED IN DOCUMENT NO. ______, CLACKAMAS COUNTY DEED RECORDS.

APPROVED THIS _____ DAY OF _____________, 20___.

CLACKAMAS COUNTY SURVEYOR

DECLARATION

KNOW ALL PEOPLE BY THESE PRESENTS THAT ABERNETHY LANDING, LLC, AN OREGON LIMITED LIABILITY COMPANY, OWNER OF THE LAND DEPICTED HEREON, DOES HEREBY MAKE, ESTABLISH, AND DECLARE THE ANNEXED PLAT OF "ABERNETHY LANDING" AS DESCRIBED IN THE ACCOMPANYING SURVEYOR'S CERTIFICATE TO BE A TRUE AND CORRECT MAP AND PLAT THEREOF, ALL LOTS AND TRACTS BEING OF THE DIMENSIONS SHOWN HEREON AND ALL STREETS OF THE WIDTHS THEREON SET FORTH, AND DOES HEREBY DEDICATE TO THE PUBLIC AS PUBLIC WAYS FOREVER, ALL STREETS, AND DOES HEREBY CREATE AND ESTABLISH PRIVATE EASEMENTS AS SHOWN, NOTED, OR STATED ON SAID MAP FOR THE USES INDICATED, AND DOES HEREBY GRANT ALL PUBLIC EASEMENTS AS SHOWN, NOTED, OR STATED ON SAID MAP, AND HEREBY CONVEYS TRACT A, STORMWATER FACILITY BY SEPARATE DEED DOCUMENT TO THE CITY OF OREGON CITY FOR THE USES INDICATED. THE DECLARANT DOES FURTHER STATE THAT THE PROPERTY PLATTED HEREIN IS SUBJECT TO PLAT RESTRICTIONS AS NOTED, ALL IN ACCORDANCE WITH THE PROVISIONS OF CHAPTER 92 OF THE OREGON REVISED STATUTES. THE DECLARANT MAKES NO CLAIM TO LAND BEYOND THE BOUNDARY AS MONUMENTED.

GREG KUBICEK, MANAGER
ABERNETHY LANDING, LLC

ACKNOWLEDGMENT

STATE OF ~~OREGON~~ WASHINGTON) SS
COUNTY OF CLARK)

THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON THIS 21 DAY OF MAY, 2018,
BY GREG KUBICEK, MANAGER OF ABERNETHY LANDING, LLC, AN OREGON LIMITED LIABILITY COMPANY

NOTARY SIGNATURE Chantell A. Wilsey

NOTARY PUBLIC - ~~OREGON~~ WASHINGTON Chantell A. Wilsey

COMMISSION NUMBER 197731

MY COMMISSION EXPIRES 02/01/2022

PLAT NOTES

1. THIS PLAT IS SUBJECT TO CONDITIONS OF APPROVAL PER CITY OF OREGON CITY FILE NUMBER TP 16-01.
2. A 10-FOOT PUBLIC UTILITY EASEMENT SHALL EXIST ALONG THE FRONTAGE OF ALL LOTS ABUTTING A PUBLIC STREET FOR CONSTRUCTION AND MAINTENANCE OF NATURAL GAS, COMMUNICATIONS, ELECTRICAL SERVICES AND OTHER FRANCHISE UTILITIES THAT MAY BE PERMITTED BY THE CITY AND SHALL BE FOR EXCLUSIVE USE OF PERMITTED FRANCHISE UTILITIES. CITY OF OREGON CITY AND PERMITTED FRANCHISE UTILITIES SHALL RETAIN THE RIGHT OF ENTRY TO ENTER EASEMENT PROPERTY AT ANY TIME FOR PURPOSES OF THE EASEMENT.
3. TRACT A IS STORMWATER FACILITY TO BE MAINTAINED BY THE CITY OF OREGON CITY AND IS CONVEYED TO THE CITY OF OREGON CITY BY SEPARATE DEED DOCUMENT NUMBER 2018-044364, CLACKAMAS COUNTY DEED RECORDS.
4. THIS PLAT IS SUBJECT TO COVENANTS, CONDITIONS, AND RESTRICTIONS PER DOCUMENT NUMBER 2018-044365, CLACKAMAS COUNTY DEED RECORDS.
5. LOTS 1, 2, 8, 9 & 96-98 ARE SUBJECT TO A PRIVATE DRIVEWAY APPROACH MAINTENANCE AGREEMENT PER DOCUMENT NUMBER 2018-044363, CLACKAMAS COUNTY DEED RECORDS.
6. DOCUMENT NUMBER 2016-089045 SHALL EXPIRE UPON RECORDING OF THIS PLAT.
7. THE ACCESS CONTROL SHOWN AT THE END OF PUBLIC ROADS HEREON ARE CREATED IN FAVOR OF THE CITY OF OREGON CITY. THIS RESTRICTION SHALL RELINQUISH WHEN A PUBLIC ROAD WITHIN THE ADJACENT PROPERTY ADJOINS THE PLATTED ROAD.
8. ACCESS CONTROL GRANTED PER THE ADJOINING PLATS "BARLOW CREST-PHASE 2" AT THE END OF BARLOW DRIVE AND "TOLLFIELD" AT THE END OF JADA WAY ARE HEREBY TERMINATED UPON THE RECORDING OF THIS PLAT PER "BARLOW CREST-PHASE 2" PLAT NOTE 9 AND "TOLLFIELD" PLAT NOTE 3.
9. THIS PLAT IS SUBJECT TO AN ANNEXATION AGREEMENT AND CONDITIONS THEREOF RECORDED IN DOCUMENT NUMBER 2007-010426, CLACKAMAS COUNTY DEED RECORDS.
10. THIS PLAT IS SUBJECT TO AN AGREEMENT TO FACILITATE CLEANUP AND PRODUCTIVE REUSE OF PROPERTY RECORDED IN DOCUMENT NUMBER 2017-001366, CLACKAMAS COUNTY DEED RECORDS.
11. LOT 10 IS SUBJECT TO A SIGNAGE EASEMENT FOR AN ENTRY MONUMENT TO THE ABERNATHY LANDING HOMEOWNERS ASSOCIATION, AS SHOWN. THIS EASEMENT IS SUBJECT TO SECTION 1.2 COMMON AREA, 4.2 MAINTENANCE OBLIGATIONS, OF THE DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS PER NOTE 4.
12. THE OREGON TRAIL-BARLOW ROAD HISTORIC CORRIDOR EXISTS WITHIN THE RIGHT-OF-WAY OF SOUTH BARLOW DRIVE AS INDICATED IN CHAPTER 16.08.030.B.5 OF CITY OF OREGON CITY FILE NUMBER TP 16-01.
13. THIS PLAT IS SUBJECT TO A RESTRICTIVE COVENANT TO WAIVE REMONSTRANCE PER DOCUMENT NUMBER 2018-044362, CLACKAMAS COUNTY DEED RECORDS.
14. PERMANENT STRUCTURES INCLUDING FOUNDATIONS, OVERHANGS OR PROTRUSIONS SHALL BE PROHIBITED IN PUBLIC EASEMENTS.

SURVEYOR'S CERTIFICATE

I, MONTGOMERY B. HURLEY, PLS 58542LS, DO HEREBY CERTIFY THAT I HAVE CORRECTLY SURVEYED AND MARKED WITH PROPER MONUMENTS, THE LANDS SHOWN ON THE ACCOMPANYING MAP, DESCRIBED AS FOLLOWS:

TRACTS OF LAND LOCATED IN THE NORTHWEST 1/4 OF SECTION 27, TOWNSHIP 2 SOUTH, RANGE 2 EAST, WILLAMETTE MERIDIAN, CITY OF OREGON CITY, CLACKAMAS COUNTY, OREGON

TRACT 1:
BEGINNING AT THE INITIAL POINT, BEING A 5/8 INCH IRON ROD AT THE NORTHEAST CORNER OF TRACT A OF "BARLOW CREST-PHASE 2" PLAT NUMBER 3503; THENCE ALONG THE SOUTHERLY LINE OF THE TRACT PER DEED DOCUMENT NUMBER 2017-064392 SOUTH 88°41'29" EAST 660.00 FEET TO A 5/8 INCH IRON ROD WITH A RED PLASTIC CAP INSCRIBED "CENTERLINE CONCEPTS" AT THE NORTHWEST CORNER OF THE TRACT PER DEED DOCUMENT NUMBER 2015-032607; THENCE ALONG THE WESTERLY LINE OF SAID TRACT SOUTH 02°15'01" WEST 1879.20 FEET TO A 5/8 INCH IRON ROD WITH A RED PLASTIC CAP INSCRIBED "CENTERLINE CONCEPTS" ON THE NORTHEAST RIGHT-OF-WAY LINE OF SE HOLCOMB BOULEVARD (30.00 FEET FROM CENTERLINE); THENCE ALONG SAID NORTHEAST RIGHT-OF-WAY LINE NORTH 70°41'51" WEST 707.56 FEET TO A 5/8 INCH IRON ROD WITH A YELLOW PLASTIC CAP INSCRIBED "AKS ENGR." ON THE SOUTHERLY EXTENSION OF THE EASTERLY LINE OF THE PLAT "TOLLFIELD" PLAT NUMBER 4046; THENCE ALONG SAID SOUTHERLY EXTENSION AND THE EASTERLY LINES OF THE PLATS "TOLLFIELD" AND "BARLOW CREST-PHASE 2" NORTH 02°49'15" EAST 1660.95 FEET TO THE INITIAL POINT.

THE ABOVE DESCRIBED TRACT CONTAINS 27.17 ACRES, MORE OR LESS.

TRACT 2:
COMMENCING AT THE INITIAL POINT, BEING A 5/8 INCH IRON ROD AT THE NORTHEAST CORNER OF TRACT A OF "BARLOW CREST-PHASE 2" PLAT NUMBER 3503; THENCE ALONG THE SOUTHERLY LINE OF THE TRACT PER DEED DOCUMENT NUMBER 2017-064392 SOUTH 88°41'29" EAST 660.00 FEET TO A 5/8 INCH IRON ROD WITH A RED PLASTIC CAP INSCRIBED "CENTERLINE CONCEPTS" AT THE NORTHWEST CORNER OF THE TRACT PER DEED DOCUMENT NUMBER 2015-032607; THENCE ALONG THE WESTERLY LINE OF SAID TRACT SOUTH 02°15'01" WEST 1879.20 FEET TO A 5/8 INCH IRON ROD WITH A RED PLASTIC CAP INSCRIBED "CENTERLINE CONCEPTS" ON THE NORTHEAST RIGHT-OF-WAY LINE OF SE HOLCOMB BOULEVARD (30.00 FEET FROM CENTERLINE); THENCE SOUTH 19°18'09" WEST 60.00 FEET TO THE SOUTHWEST RIGHT-OF-WAY LINE OF SE HOLCOMB BOULEVARD (30.00 FEET FROM CENTERLINE); THENCE ALONG SAID SOUTHWEST RIGHT-OF-WAY LINE NORTH 70°41'51" WEST 44.35 FEET TO A 5/8 INCH IRON ROD WITH YELLOW PLASTIC CAP INSCRIBED "ACS&P 668-3151" AT THE MOST NORTHERLY CORNER OF THE TRACT PER DEED DOCUMENT NUMBER 2014-061697 AND THE POINT OF BEGINNING; THENCE ALONG THE NORTHERLY WEST LINE OF SAID TRACT SOUTH 19°17'16" WEST 317.71 FEET TO A 5/8 INCH IRON ROD WITH YELLOW PLASTIC CAP INSCRIBED "ACS&P 668-3151"; THENCE ALONG THE WESTERLY NORTH LINE OF SAID TRACT NORTH 70°43'32" WEST 305.61 FEET TO A 5/8 INCH IRON ROD WITH AN ALUMINUM CAP INSCRIBED "AKS-ENGR." ON THE EAST LINE OF PARCEL 9 PARTITION PLAT NUMBER 2004-073; THENCE ALONG THE EASTERLY LINE OF SAID PARCEL 9 NORTH 01°47'10" EAST 333.32 FEET TO A 5/8 INCH IRON ROD WITH A YELLOW PLASTIC CAP INSCRIBED "AKS ENGR." ON THE SOUTHWEST RIGHT-OF-WAY LINE OF SE HOLCOMB BOULEVARD (30.00 FEET FROM CENTERLINE); THENCE ALONG SAID SOUTHWEST RIGHT-OF-WAY LINE SOUTH 70°41'51" EAST 405.85 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIBED TRACT CONTAINS 2.60 ACRES, MORE OR LESS.

AS PER O.R.S. 92.070(2), I ALSO CERTIFY THAT THE MONUMENTATION OF THE REMAINING MONUMENTS IN THIS SUBDIVISION WILL BE ACCOMPLISHED WITHIN 90 CALENDAR DAYS FOLLOWING THE COMPLETION OF PAVING IMPROVEMENTS OR ONE YEAR FOLLOWING THE ORIGINAL PLAT RECORDATION, WHICHEVER COMES FIRST, IN ACCORDANCE WITH O.R.S. 92.060.

NARRATIVE

THE PURPOSE OF THIS PLAT IS TO SUBDIVIDE AND MONUMENT THE LANDS DESCRIBED IN DOCUMENT NUMBERS 2016-089044 AND 2016-088994, CLACKAMAS COUNTY DEED RECORDS. THE BASIS OF BEARINGS AND BOUNDARY DETERMINATION ARE PER SURVEY NUMBER 2017-193, CLACKAMAS COUNTY SURVEYOR'S OFFICE RECORDS.

CONSENT AFFIDAVIT

A SUBDIVISION PLAT CONSENT AFFIDAVIT BY SHAUGHNESSY CAPITAL LLC, A DELAWARE LIMITED LIABILITY COMPANY, BENEFICIARY UNDER DEED OF TRUST RECORDED IN 2017-069103, HAS BEEN EXECUTED AND RECORDED IN DOCUMENT NUMBER 2018-044360 OF THE CLACKAMAS COUNTY DEED RECORDS.

4-19-18

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
JULY 15, 2003
MONTGOMERY B. HURLEY
58542LS

RENEWS: 6/30/19

PREPARED FOR

ABERNETHY LANDING, LLC
604 W EVERGREEN BLVD
VANCOUVER, WA 98660

Exhibit 7

JOB NAME:	HOLCOMB
JOB NUMBER:	5377
DRAWN BY:	BRH
CHECKED BY:	RDR
DRAWING NO.:	5377CROS

AKS ENGINEERING AND FORESTRY, LLC
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SCALE: 1"=100 FEET

SCALE AT FULL SIZE: 1"=100 FEET
SCALE AT HALF SIZE: 1"=200 FEET

NOTES:

1. INFORMATION SHOWN IS BASED ON A VARIETY OF SOURCES, INCLUDING GEOGRAPHIC INFORMATION SYSTEMS (GIS), AERIAL PHOTOGRAPHS, AS-BUILT INFORMATION, AND TAX ASSESSOR MAP INFORMATION.
2. DIMENSIONS SHOWN ARE APPROXIMATE.
3. WETLAND AND NROD BOUNDARIES SHOWN ARE HAND-MAPPED BASED ON DESKTOP REVIEW AND ARE CONSIDERED APPROXIMATE ONLY. FULL WETLAND AND WATERS DELINEATION REQUIRED FOR DEVELOPMENT.

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S HOLCOMB BLVD SERRES

OREGON CITY OR

TAX LOTS 2100, 2200, 2300; & 500, 2200, 2300 CLACKAMAS CO. TAX MAPS 22E21D & 22E28A

R-10 PRELIMINARY SUBDIVISION LAYOUT

DESIGNED BY:	VN
DRAWN BY:	VN
CHECKED BY:	CG/MH
SCALE:	AS NOTED
DATE: 09/29/2020	

PRELIMINARY

REVISIONS

JOB NUMBER
7332

AKS DRAWING FILE: 7332 PRE-LAYOUT 7.DWG | LAYOUT: DIM

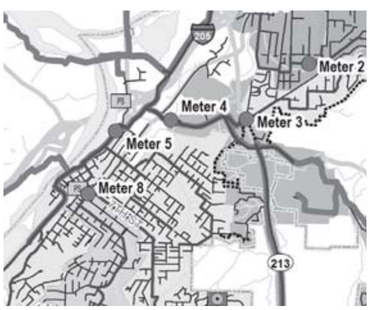
Item #1.

Exhibit 9

Prepared for
City of Oregon City

Sanitary Sewer Master Plan

November 2014



Brown AND Caldwell

3.5 Future Flows

Base flows and RDII from future developments were estimated and routed through the model to estimate future capacity deficiencies in the trunk sewer system. Three types of future development areas were included in the analysis:

- Large future development areas at the boundaries of the City's urban growth area: South End Road, Park Place, and Beavercreek Road.
- Expected development areas within the city limits. This category includes all parcels identified by the City excluding those considered to be un-developable (e.g., existing parks) and lots considered not to have future development potential (e.g., small single residential lots with existing connections to the sewer system).
- Individual land parcels within the city limits with redevelopment potential. These consist of both vacant parcels and parcels where the existing land use is less dense than the parcel zoning. This category also includes individual parcels in unincorporated areas (within the urban growth area) with single family residential land use. It was assumed these parcels are currently serviced by onsite septic systems and will connect to the sanitary sewer system in the future.

3.5.1 Future Base Flows

Future average daily base flows were estimated from industry standard rates for each land use designation. For the large development areas, the proposed gross acreage for each land use designation was provided by the City. For parcels with areas greater than 1 acre, the net acreage was calculated assuming that 20 percent of the gross acreage would be used for local roads, easements, and other utilities. Table 3-2 lists the rates used to develop future base flows.

Table 3-2. Future Sewer Base Flow Unit Rates

Land use	Unit type	Unit flow
Residential[a,b]	Gallons per capita per day	80
Commercial[c]	Gallons per acre per day (gpad)	1,000
Industrial[c]	gpad	2,000

[a] *An average of 2.5 people per household was assumed.*

[b] *Development densities specified in the 2004 Oregon City Comprehensive Plan were used to determine the number of dwellings per acre. LDR = 5 dwellings per acre, MDR = 10 dwellings per acre, HDR = 22 dwellings per acre.*

[c] *Unit flow rates for commercial and industrial areas were based on industry standard.*

3.5.2 Future Wet Weather Flows

RDII from future areas was calculated by estimating the amount of future sewered areas and applying an infiltration/inflow (I/I) rate of 1,000 gpad. I/I was not applied to parcels within the city limits that are already developed, because it was assumed the I/I contribution from these parcels already would be accounted for in the existing conditions model.

16. ID those parcels located in concept plan areas
    a. Add field, type string, named "CONCEPT"
    b. Select by location parcels in "taxlot_model" with their centroid within any of the 3 concept plan polygons provided by the City.
    c. Field calculate "CONCEPT"="YES"
17. Determine area of constrained land on each parcel
    a. Union "taxlot_model" and selection of "All_Constraints" that intersects "BASE_UGB_Fill"
        i. Resulting fc is named "taxlot_constrained_union"
        ii. Note: Set definition query on "All_Constraints" of "Building" = 'N'. This omits buildings from the constrained layer.
    b. Union "taxlot_constrained_union" and selection of "Vacant_Lands" that intersects "BASE_UGB_Fill"
        i. Resulting fc is named "taxlot_cnstrnd_vacant_union"
    c. Calculate vacant area slices
        i. Add field, type double, named "AREA_CONSTR"
        ii. Select features in "FID_All_Constraints" <> -1. This is all the constrained features.
        iii. Calculate geometry of "AREA_CONSTR" attribute, which represents "constrained land" area
        iv. Add field, type double, named "AREA_CONSTR_PRTL"
        v. Select features in "FID_All_Constraints" = -1 AND "FID_Vacant_Lands"<> "-1". This is vacant land that is also constrained (i.e. vacant and constrained land overlap).
        vi. Calculate geometry of "AREA_CONSTR_PRTL" attribute, which represents "constrained vacant land" area
    d. Dissolve "taxlot_cnstrnd_vacant_union" based on "TLID" attribute
        i. During dissolve, calculate sum of "AREA_CONSTR" and "AREA_CONSTR_PRTL" attributes.
        ii. Resulting fc is named "taxlot_cnstrnd_vcnt_union_dissolv"
    e. Transfer constrained land information to the "taxlot_model" fc
        i. Add field to "taxlot_model" fc named "CONSTR_AREA" – type Double.
        ii. Add field to "taxlot_model" fc named "CONSTR_VAC_AREA" – type Double.
        iii. Join "taxlot_constrained_union_Dissolv" fc to "taxlot_model" fc based on "TLID" attribute
        iv. Calculate "CONSTR_AREA" = "AREA_CONSTR"
            1. Select null values and set to 0
        v. Calculate "CONSTR_VAC_AREA" = "AREA_CONSTR_PRTL"
            1. Select null values and set to 0
18. Estimate net developable acres
    a. Add field to "taxlot_model", type double, named "NET_DEV_ACRES"
    b. Select those parcels where only the vacant portion will be developed. Select features from "taxlot_model" where "DEV_MOD" = "YES_PARTIAL"
    c. Field calculate "NET_DEV_ACRES" = ("AREA"* "PRCNT_VACANT"- "CONSTR_VAC_AREA") /43560
    d. Switch the selection
    e. Field calculate "NET_DEV_ACRES" = ([AREA]- ["CONSTR_AREA"])/43560
19. Identify Model Junction where development drains
    a. Add field to "taxlot_model", type long, named "MANHOLE"
    b. Use "Tax_parcel_redevelopment_5" as a start – join this fc based on Tlid
20. Flow assumptions
    a. MFR is 5 units
21. Estimate ex and future flow

a. Add fields to “taxlot model”
   i. LU_UNIT_Q, type long
   ii. LU_UNIT_Q_TYPE, type text
   iii. EX_Q, type double
   iv. ZONE_UNIT_Q, type long
   v. ZONE_UNIT_Q_TYPE, type text
   vi. FUT_Q, type double
   vii. “AREA_RED”, type double
b. Create lookup tables
c. Join tables
d. Estimate flow by following logic
   i. Existing
      1. If gpd, then same
      2. if gpad, then unit q by area
   ii. Future
      1. Select features with “NET_DEV_ACRES” > 1
      2. Field calc “AREA_RED” = 0.8
      3. Switch selection
      4. Field calc “AREA_RED” = 1.0
      5. if gpd, then unit q x (“NET_DEV_ACRES” x “AREA_RED” x 43560) / “ZONE_MINLOTSF”
      6. if gpad, then unit q x (“NET_DEV_ACRES” x “AREA_RED”)
e. Identify areas where additional I/I could be expected (i.e. currently unsewered areas)
   i. Add field named “II_GPD”, type double
   ii. Select “SEPTIC” = “SEPTIC” and “VACANT_ID”=”VACANT” and “LANDUSE_COMPILE” = “RUR” and “LANDUSE_COMPILE” = “FOR” and “LANDUSE_COMPILE” = “AGR”
   iii. Field calc “II_GPD” = 1000 x “NET_DEV_ACRES”
      1. Assume 1,000 acre/day I/I
   iv. Switch selection, and calculate “II_GPD”= 0

22. Estimate additional flow
   a. Add field named “ADD_FLOW_GPD”, type double
      i. Select “SEPTIC” = “SEPTIC” and "DVLPMNT_MOD" = 'YES_PARTIAL'
      ii. Calc “ADD_FLOW_GPD” = “FUT_Q”
      iii. Select all features with no value for “ADD_FLOW_GPD”
      iv. Calc “ADD_FLOW_GPD” --

```
dim flow
if ([FUT_Q] + [II_GPD])  < [EX_FLOW] then
flow = 0
elseif ([FUT_Q]  - [EX_FLOW]) < 0 then
flow = 0
else
flow = [FUT_Q]  - [EX_FLOW]
end if
```

AKS DRAWING FILE: 7404 PARK PLACE LAYOUT EXHIBIT.DWG | LAYOUT: LAYOUT1

DESIGNED BY:	CLS	
DRAWN BY:	CLS	
MANAGED BY:	MBH	
CHECKED BY:	MBH	
DATE: 9.30.2020		

REVISIONS

JOB NUMBER 7404

PARK PLACE CONCEPT AREA LAYOUT AND SANITARY SEWER BASIN MAP

PARK PLACE VILLAGE

OREGON CITY OREGON

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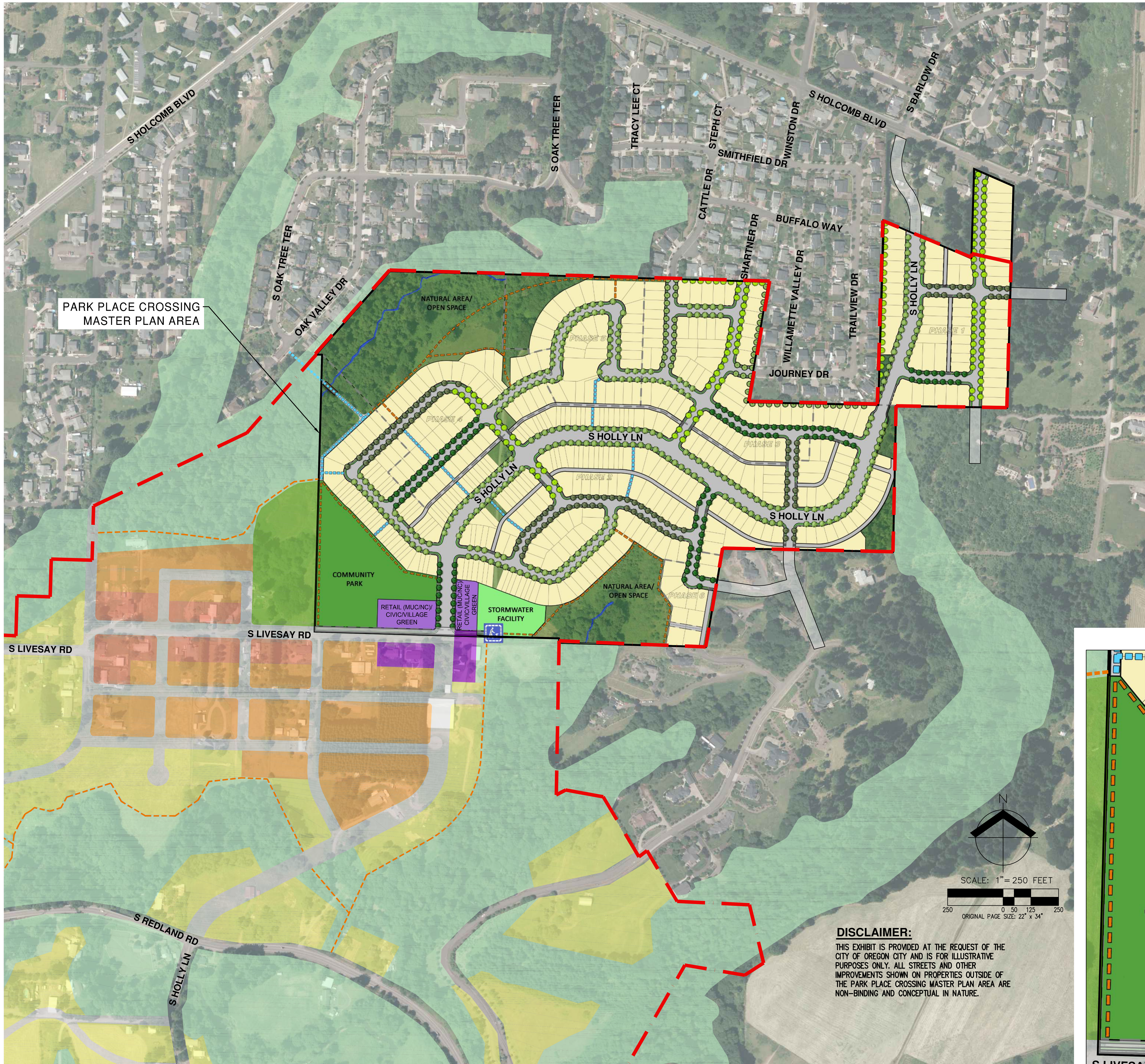

DISCLAIMER:

THIS EXHIBIT IS PROVIDED AT THE REQUEST OF THE CITY OF OREGON CITY AND IS FOR ILLUSTRATIVE PURPOSES ONLY. ALL STREETS AND OTHER IMPROVEMENTS SHOWN ON PROPERTIES OUTSIDE OF THE PARK PLACE CROSSING MASTER PLAN AREA ARE NON-BINDING AND CONCEPTUAL IN NATURE.

ONSITE NORTH VILLAGE CENTER ENLARGEMENT

SCALE: 1" = 100'

PARK PLACE CROSSING MASTER PLAN OPEN SPACE LEGEND

- RESIDENTIAL LOTS
- RETAIL (MUC/NC)/ CIVIC/ VILLAGE GREEN
- COMMUNITY PARK
- NATURAL AREA/ OPEN SPACE
- SOFT SURFACE TRAIL
- PAVED PEDESTRIAN ACCESSWAY
- TRAILHEAD

OREGON CITY PARK PLACE CONCEPT PLAN LEGEND:

- LOW/MEDIUM DENSITY RESIDENTIAL
- MEDIUM/HIGH DENSITY RESIDENTIAL
- RETAIL (MUC/NC)/CIVIC/VILLAGE GREEN
- COMMUNITY PARK
- CONSTRAINED LAND (OPEN SPACE)
- MIXED-USE COMMERCIAL
- PARK PLACE CONCEPT PLAN LIMITS
- PARK PLACE CROSSING MASTER PLAN LIMITS
- SOFT SURFACE TRAIL
- PAVED PEDESTRIAN ACCESSWAY

ACHIEVED CONCEPTUAL PARK PLACE CROSSING MASTER PLAN AREA SUMMARY PER THIS PLAN:

	ONSITE:	OFFSITE:	TOTAL:
RETAIL (MUC/NC)/ CIVIC/VILLAGE GREEN:	±1.3 AC	±1.2 AC	±2.5 AC
COMMUNITY PARK*:	±4.4 AC	±4.0 AC	±8.4 AC

MEASURED PARK PLACE CONCEPT PLAN LAND USE AREA SUMMARY PER OCWEBMAPS^:

	ONSITE:	OFFSITE:	TOTAL:
RETAIL (MUC/NC)/ CIVIC/VILLAGE GREEN:	±1.3 AC	±1.2 AC	±2.5 AC
COMMUNITY PARK:	±5.6 AC	±1.6 AC	±7.2 AC

*PER DISCUSSIONS WITH CITY STAFF, THE PARK PLACE CROSSING MASTER PLAN IS EXPECTED TO PROVIDE A PROPORTIONATE PERCENTAGE OF PARK LAND FOR ITS RESIDENTS. APPROXIMATELY 51 PERCENT OF THE PLANNED DWELLING UNITS FOR THE PARK PLACE CONCEPT PLAN AREA NORTH VILLAGE ARE INCLUDED WITHIN THIS MASTER PLAN (±476 PLANNED PARK PLACE CROSSING UNITS/937 TOTAL NORTH VILLAGE UNITS). THE NEIGHBORHOOD PARK REPRESENTS 8.0± ACRES IN THE PARK PLACE CONCEPT PLAN; THEREFORE, PARK PLACE CROSSING WOULD BE EXPECTED TO CONTRIBUTE PROPORTIONALLY ±51 PERCENT OF THE NEEDED AREA, OR ±4.1 ACRES. THIS PLAN ANTICIPATES THAT ±4.4 ACRES WITHIN THE PARK PLACE CROSSING MASTER PLAN AREA WILL BE DEDICATED FOR THE PARK LAND.

^AREAS SHOWN ARE BASED ON MEASURING THE EXTENTS OF VARIOUS LAND USES IN THE OREGON CITY PARK PLACE CONCEPT PLAN AS SHOWN ON OCWEBMAPS.

AKS
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FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE
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CONCEPTUAL PARK PLACE NORTH VILLAGE PLAN W/ENLARGEMENT

PARK PLACE CROSSING MASTER PLAN

OREGON CITY, OR

REVIEW COPY ONLY

JOB NUMBER:	7404
DATE:	03/18/2022
DESIGNED BY:	CMS
DRAWN BY:	NRA
CHECKED BY:	CMS

EXH-1

AKS DRAWING FILE: 7404 COLOR OFFSITE VICINITY.DWG | LAYOUT: EXH-2

ENGINEERING & FORESTRY

March 18, 2022

Park Place Crossing & The Park Place Concept Plan

Park Place Concept Plan

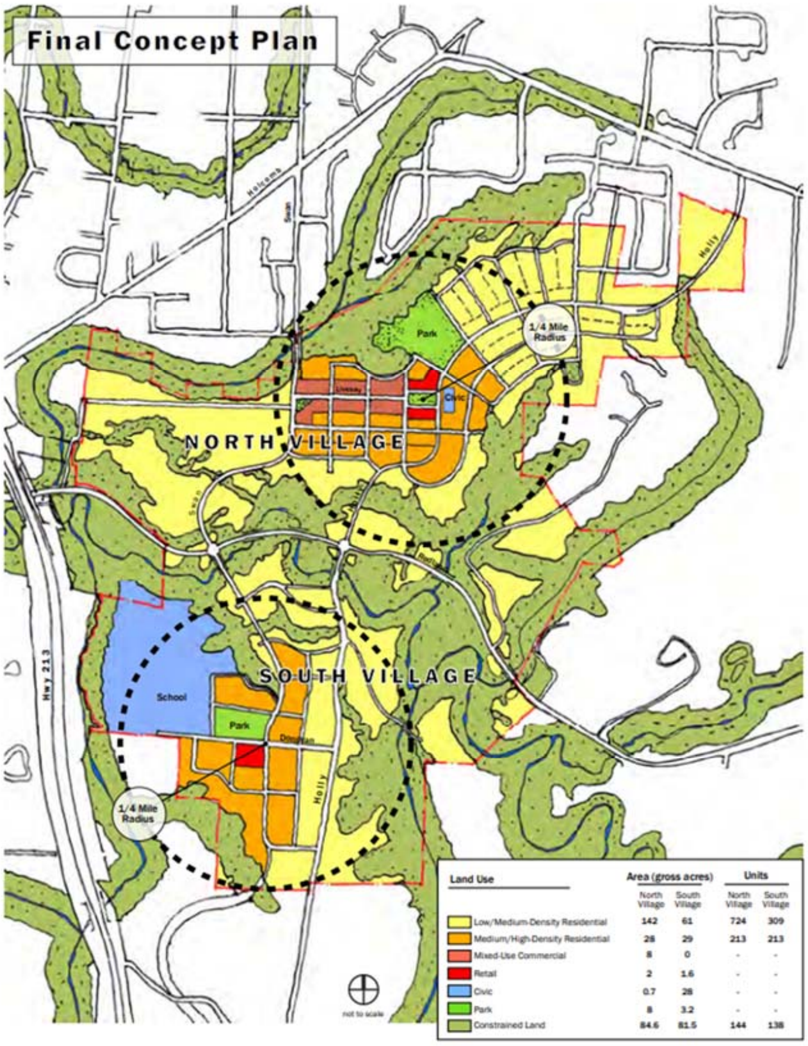

Figure 1-1. Park Place Concept Plan Urban Growth Diagram

This map is for concept planning purposes only. The specific locations of natural resource boundaries, open space, parks, land uses, roads, trails, infrastructure and related improvements may change and is subject to on-site verification and design at the time of development.

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As stated above, the Park Place Concept Plan is a high-level, aspirational document that is intended to be flexible and implemented through the City's planning processes based upon field verified information/data.

3. Park Place Concept Plan

1. Introduction

A series of growth alternatives for the Park Place study area were developed during a multi-day planning charrette the week of October 15, 2006 in Oregon City. The charrette (*summarized on page 22; see Appendix C for detailed descriptions and sketches*) consisted of interactive meetings, site tours, design sessions, and a series of public forums. Charrette participants included members of the project's Project Advisory and Technical Advisory Committees, local and regional service providers, Oregon City staff, property owners, developers, and citizens living in and around the Park Place study area. This intensive and transparent planning process resulted in a mutually agreed upon vision for the study area that became the foundation of the Park Place Concept Plan ("Concept Plan"). Following the charrette, the Park Place Concept Plan was refined to more accurately reflect the location of existing and proposed streets, natural resource areas, buildable lands, and to respond to remarks from the final public meeting.

The Concept Plan identifies the approximate location of land uses, public facilities and roads. Specific locations for these elements will be determined as part of more detailed future planning and development processes.

The Park Place Crossing Master Plan is the first planning process envisioned for this portion of the Park Place Concept Plan.

The Park Place Crossing Master Plan (PPCMP) represents ±91.7 acres of the ±500-acre expanse addressed by the Park Place Concept Plan (PPCP). It involves ±476 residential dwelling units, multi-modal connectivity, preservation of natural areas, park and trail amenities, and commercial, Civic, and "Village Green" gathering places. The Park Place Crossing Master Plan represents efficient growth which protects the natural resources within the Park Place Concept Plan area, provides effective connections for all transportation modes, and provides appropriate density and transition to the Livesay Main Street area. The Park Place Crossing Master Plan represents an attractive, functional, and efficient initial project within the Park Place Concept Plan area.

2. Concept Plan

The vision for the Park Place Concept Plan is to provide a framework for growth that respects and augments the area's context, history, and natural systems. The Park Place Concept Plan emphasizes good urban design, connectivity, opportunities for place-making and cultivating community, diversity, and, above all, a way to provide for future growth in a sustainable manner.

The key components of the Concept Plan (Figure 3-1) include:

- Two primary north-south connections between Holcomb Boulevard and Redland Road (Swan Avenue and Holly Lane)

Figure 1: PPCMP Holly Lane (Blue) /Swan Avenue (Green) Location

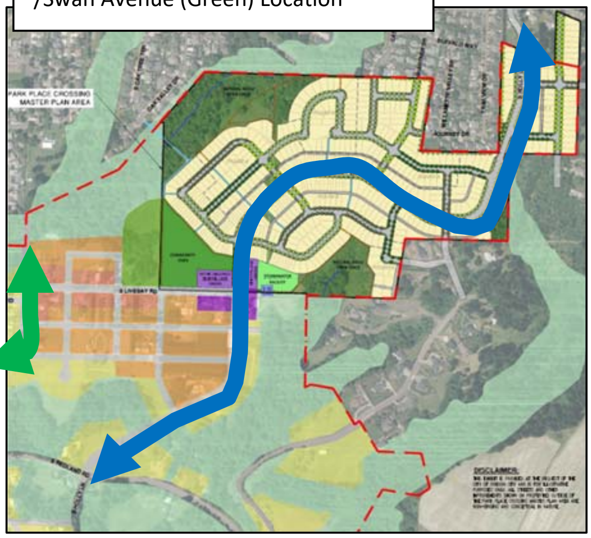
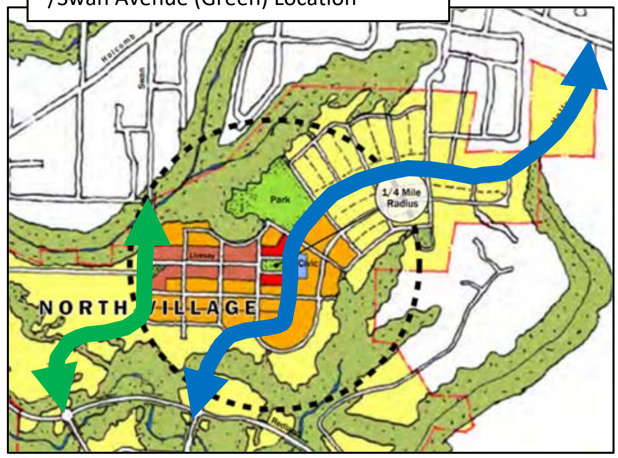


Figure 2: PPCP Holly Lane (Blue) /Swan Avenue (Green) Location



The primary north-south connection within the Park Place Crossing area is Holly Lane. As demonstrated by the above figures, the alignment of Holly Lane mimics the Concept Plan, but also considers topographic, natural resource, and design level information. The Park Place Crossing Master Plan is consistent with this key component of concept plan.

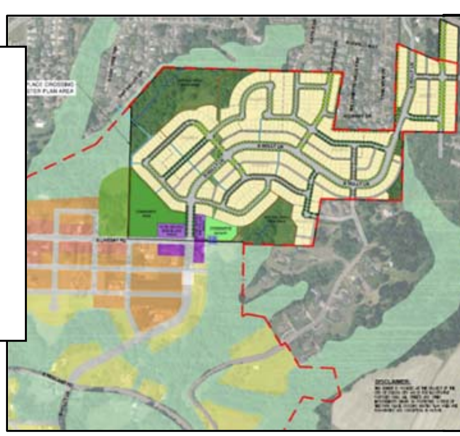
- Two distinct mixed-use neighborhoods (North Village and South Village) that accommodate 1,459 new dwelling units

Park Place Crossing is slated to provide ±476 new dwelling units, within the North Village area that support Mixed-Use and Neighborhood Commercial uses.

- Neighborhood-oriented commercial nodes that integrate commercial land uses, residential land uses, and public open space

As demonstrated within the Preliminary Plans, Park Place Crossing provides, at a location similar to those shown within the Park Place Concept Plan map, neighborhood commercial, residential land uses, and public open spaces in a way that create neighborhood centers that act as the heart of the North Village and provide a sense of place. The areas provided are similar as illustrated below.

Figure 3 (left): Planned PPCMP area with adjacent conceptual land uses
Figure 4 (right): PPCP Final Concept Plan



ACHIEVED CONCEPTUAL PARK PLACE CROSSING MASTER PLAN AREA SUMMARY PER THIS PLAN:

	ONSITE:	OFFSITE:	TOTAL:
RETAIL (NC/MUC):	0.81± AC	0.60± AC	1.41± AC
CIVIC:	0.26± AC	0.28± AC	0.54± AC
VILLAGE GREEN:	0.29± AC	0.36± AC	0.65± AC
COMMUNITY PARK*:	4.07± AC	4.03± AC	8.10± AC

MEASURED PARK PLACE CONCEPT PLAN LAND USE AREA SUMMARY PER OCWEBMAPS^:

	ONSITE:	OFFSITE:	TOTAL:
RETAIL (NC/MUC)	0.79± AC	0.58± AC	1.37± AC
CIVIC:	0.26± AC	0.28± AC	0.54± AC
VILLAGE GREEN:	0.24± AC	0.33± AC	0.57± AC
COMMUNITY PARK:	5.65± AC	1.55± AC	7.20± AC

Land Use	Area (gross acres) North Village	Area (gross acres) South Village	Units North Village	Units South Village
Low/Medium-Density Residential	142	61	724	309
Medium/High-Density Residential	28	29	213	213
Mixed-Use Commercial	8	0	-	-
Retail	2	1.6	-	-
Civic	0.7	28	-	-
Park	8	3.2	-	-
Constrained Land	84.6	81.5	144	138

Figure 5 (left): PPCMP/PPCP Final Concept Plan Area Comparison
Figure 6 (above): PPCP Final Concept Plan Legend

- An area for a new civic institution, such as a library or community center

Figure 7: Planned PPCMP area with conceptual civic and commercial areas in purple

Figure 8: PPCP Final Concept Plan map Civic and commercial areas at the southwest corner of the PPCMP project site

An area has been established for Civic purposes within the southern corner of Park Place Crossing. The area was considered for these purposes because of its proximity to Holly Lane and S Livesay Road, close vicinity to the Community Park, commercial areas, and higher density residential areas. This project is consistent with this PPCP key component.

- An 8-10 acre community park and a 3-5 acre neighborhood park

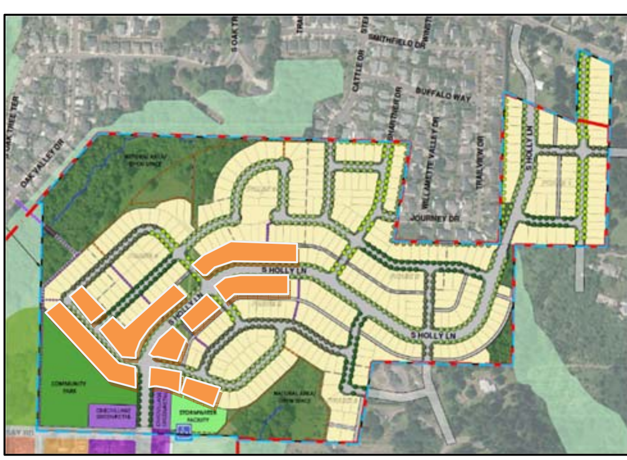
The Park Place North Village Community Park is planned near the southwest corner of Park Place Crossing as it is flat and close to higher intensity uses (e.g. commercial, denser housing, Livesay Road, etc.). This area is also adjacent to properties which also feature flat, cleared land.

Figure 9: Planned PPCMP area with conceptual park area

Figure 10: Conceptual PPCP park area

- A mix of housing types and ranges of affordability

Consistent with the PPCP, housing within the PPCMP is planned to consist of detached and attached housing on a diverse range of lot sizes that can accommodate a mix of home styles and sizes. Future commercial projects may be mixed-use, involving above-ground floor residential as permitted by the Oregon City Municipal Code. These housing options will appeal to a wide variety of residents.



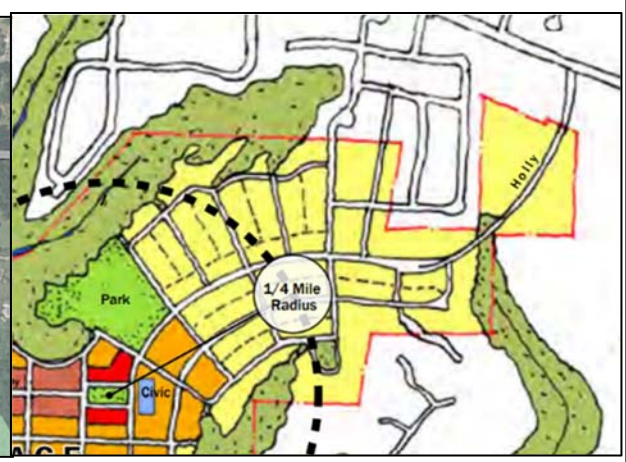


Figure 11: PPCMP planned attached homes (orange) & detached homes (yellow)

Figure 12: PPCP conceptual higher-density housing areas (orange) and lower-density housing (yellow)

- An extensive system of off-street and on-street trails and pedestrian/bicycle Connections

The Oregon City Trails Master Plan pictures several conceptual local trails and a trailhead located within the Park Place Crossing area. The Park Place Crossing Master Plan application demonstrates these connections and trails where feasible, including the trailhead location. The connections are provided through a variety of off-street and on-street trails and pedestrian/bicycle facilities, as demonstrated on the project's Preliminary Plans. The project is consistent with this key component.

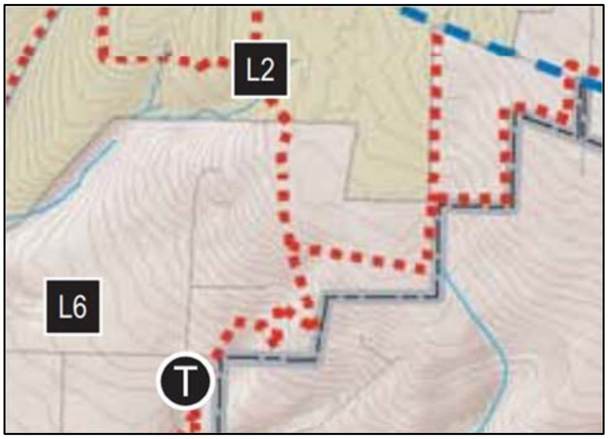


Figure 13: Excerpt from Oregon City Trails Master Plan showing conceptual trails through the area

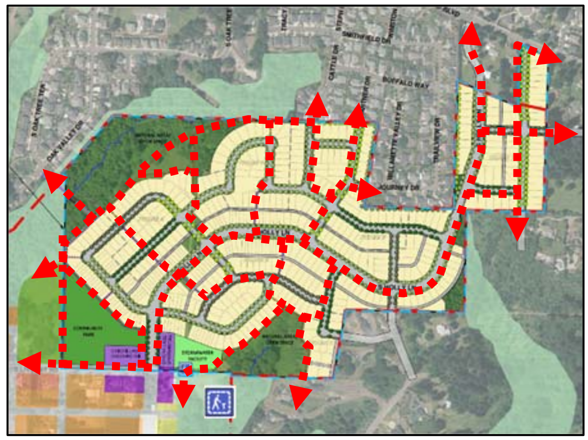


Figure 14: PPCMP trail connections through Park Place Crossing with planned trailhead

- Innovative, "green" on-site stormwater treatment methods

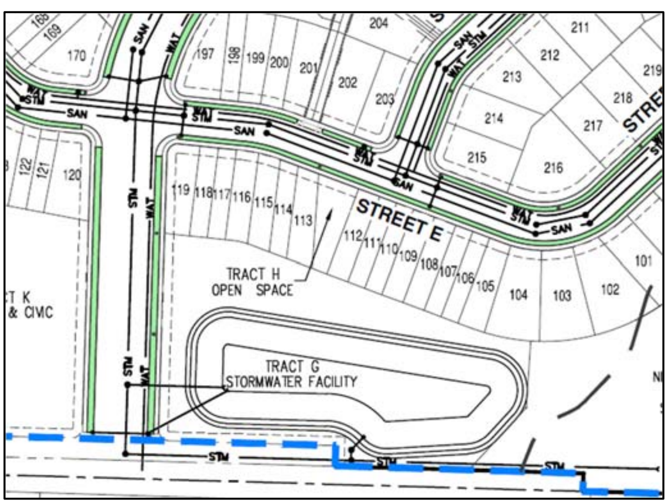


Figure 15: Conceptual locations for on-street stormwater planters and/or swales in the PPCMP

The Park Place Crossing Master Plan incorporates "green" streetside stormwater planters/swales where feasible and a LIDA vegetated stormwater management pond.

- Protected sensitive areas, including drainages and steep slopes

Park Place Crossing Master Plan sets aside ±15.7 acres of land to protect and preserve sensitive areas, such as drainages and steep slopes, from areas planned for residences, parks, streets, commercial areas, etc. The PPCP Final Concept Plan map assumed that ±11.4 acres will be retained as open spaces, shown as "green fingers" on the map, whereas the actual site conditions require that ±15.7 acres be retained as open space in the PPCMP.

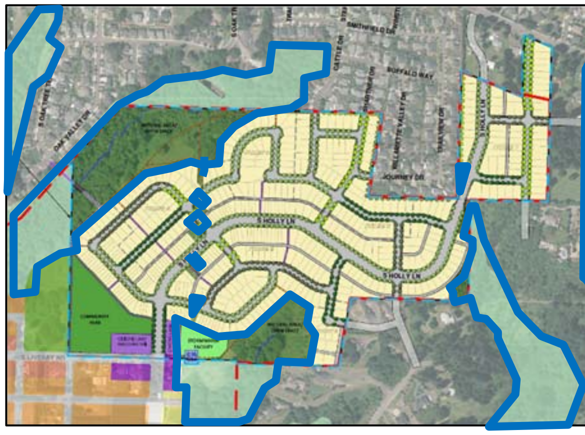


Figure 16: PPCMP sensitive areas (outlined in blue)- ±15.7 acres onsite

Figure 17: PPCP Final Concept Map sensitive areas (outlined in blue) - ±11.4 acres onsite

- Streets and buildings oriented for solar access

Streets have been designed and lots have been oriented to allow the maximum solar access practicable thus allowing for greater daylight exposure and ventilation, and providing opportunities for using renewable energy systems, and improved energy efficiency of buildings.

- The use of green edges to define neighborhoods and buffer developments

As shown above within Figures 18 and 19, Park Place Crossing is set within green edges created by existing NROD and sloped areas. These areas allow buffering from existing neighborhoods while also defining the Park Place Crossing neighborhood. The project is consistent with this key component.

- Integration of parks and open spaces into existing and future neighborhoods

Consistent with the PPCP, open spaces are planned along much of the perimeter of Park Place Crossing. These open space areas provide transition between existing and future neighborhoods as well as providing preserved areas for slopes and vegetation. The chosen location of the park permits its future expansion and its location provides for convenient access to existing and future nearby neighborhoods.

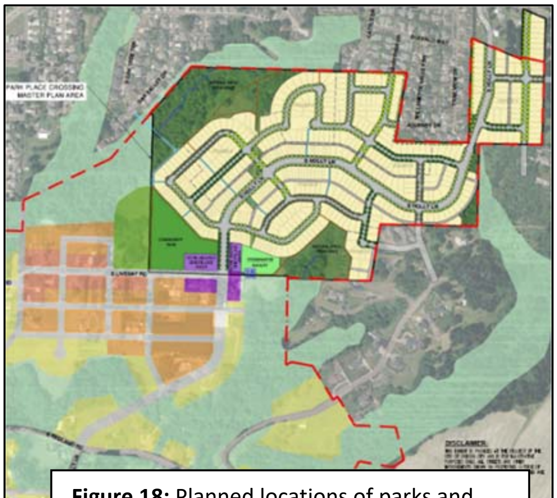


Figure 18: Planned locations of parks and open spaces within the PPCMP

Figure 19: Planned locations of parks and open spaces within the PPCP

3. Plan Elements

The following section describes the elements of the Park Place Concept Plan in detail and how the evaluation criteria and design principles are applied.

The Plan accommodates a minimum of 1,458 dwelling units with a variety of housing types. An additional ~280 units can be accommodated in the "green fingers" or constrained land. These figures were derived from the Buildable Lands Analysis, which is summarized in Chapter 2 and in its entirety in Appendix E.

A market analysis conducted in Fall 2006 determined that the study area can support approximately 40,000 square feet of new commercial development: 30,000 square feet in the North Village and 10,000 square feet in the South Village.

The Park Place Crossing Master Plan includes ±476 dwelling units. Rather than developing within the "green fingers," the PPCMP preserves the green fingers as open spaces. An appropriate quantity of commercial lands have been set aside to form the easternmost segment of the Livesay Main Street corridor.

Land Use: The Villages

The Park Place Concept Plan proposes a mix of residential, commercial, park and open space, and civic land uses. Redland Road serves as the logical division between two neighborhoods: North Village and South Village. Neighborhood-oriented nodes serve as the heart of these new neighborhoods and provide a variety of civic and commercial spaces. These nodes are centrally located in the neighborhoods along existing and future roadways and are surrounded by medium density residential land uses that transition to lower-density residential land uses. In response to the market analysis findings, the Concept Plan appropriates enough land for 30,000 square feet of commercial development in the North Village and 10,000 square feet of commercial development in the South Village.

The Park Place Crossing Master Plan provides for ±34,000 square feet of commercial lands within the ±1.3 acre commercial/Civic/Village Green area. The North Village requires, per the Park Place Concept Plan market analysis, ±30,000 square feet of commercial floor space and assumed a building coverage of each area of approximately 50 percent (PPCP "Commercial Development," page 65). Combined with the other Neighborhood Commercial area illustrated within the PPCP "Final Concept Plan" map (Figure 1-1), these commercial areas can be provided.

North Village

The majority of new growth (approximately 936 units) is proposed to be accommodated in the North Village neighborhood, north of Redland Road (Figure 3-2). A new main street along Upper Livesay Road between the Holly Lane and Swan Avenue Extensions, called "Livesay Main Street," serves as the heart of the North Village. The Livesay Main Street is envisioned to have wide sidewalks, landscaped stormwater facilities (bioswales), pedestrian-scale lighting, street trees, and benches. The roadway terminates at the junction of the Holly Lane Extension with a Village Green and civic building (i.e., library, community center, environmental interpretative center, or post office). This mixed-use district is surrounded by medium-density housing (figures at right), which is within walking distance of the core area, and single-family housing that blends into the surrounding existing single-family residential neighborhoods. Small-scale commercial businesses, like a coffee shop, bookstore, dry cleaners, or café, are proposed to anchor the intersection of Holly Lane Extension and Livesay Main Street and surround the Village Green.

Park Place Crossing includes ±476 of the ±936 residential units anticipated within the North Village. It also includes ±35,000 square feet of North Commercial/Mixed-Use Commercial retail area, ±10,400 square feet of Village Green, and ±11,000 square feet of Civic area within a ±1.3 acre area. These areas are in keeping with the quantities envisioned within the Park Place “Final Concept Plan” map (Figure 1-1).

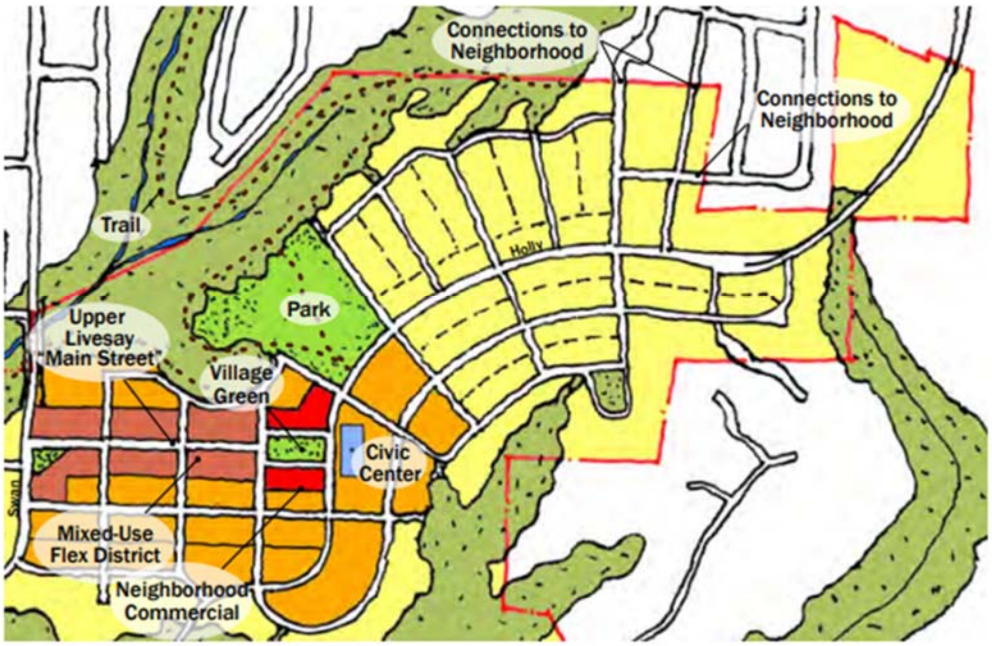


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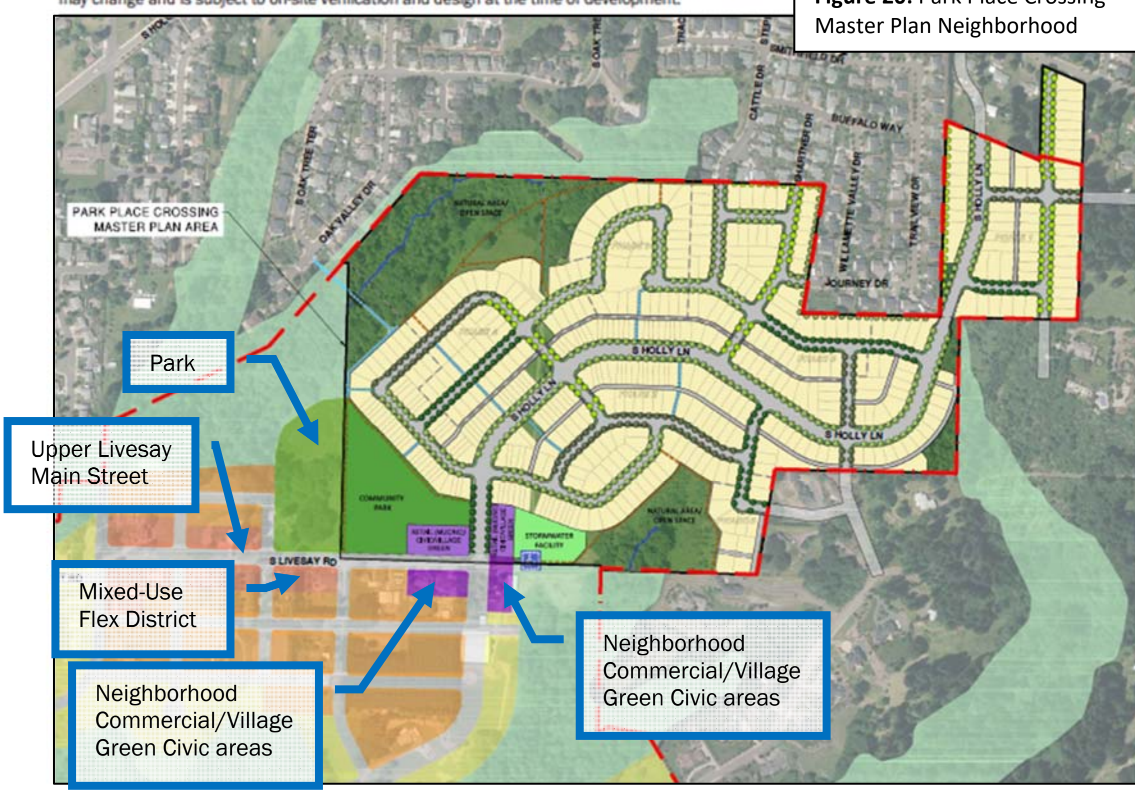
Figure 3-2. North Village Neighborhood

Figure 20: Park Place Crossing Master Plan Neighborhood



The land uses along Livesay Main Street are envisioned to be a mix of residential and commercial uses (e.g., ground-floor, neighborhood-oriented commercial with housing or offices above). The buildings should convey a rich palette of architectural elements that distinguish the Village from the existing auto-oriented commercial uses and a proposed regional shopping center in the area bounded by Washington Street, Abernethy, and Highway 213. The types of elements incorporated into the design of the street facing façade should include large storefront windows, recessed entry ways, awnings and canopies, building lighting, and a rhythm of columns and/or pilasters that break the façade into smaller, more intimate modules.

New mixed-use development and civic node in the North Village

Areas along the Livesay Main Street are planned to feature a mix of residential and commercial uses.

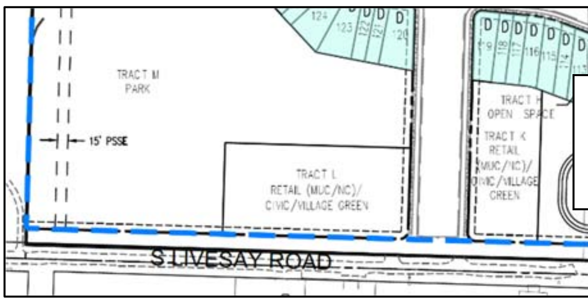


Figure 21: Park Place Crossing Master Plan Livesay Main Street Area

A variety of housing types and densities is proposed in both the North Village and the South Village

In order to ensure that architectural design elements are integrated into future development in the North Village, it is necessary to develop implementation measures that reflect these elements. As part of the implementation measures proposed for Park Place, the City's existing Neighborhood Commercial (NC) zone will be modified to include "main street" standards for use in creating vibrant neighborhood centers in the North and South Villages.

The Park Place Concept Plan includes a general street plan and street cross-sections as well as an overview of natural resource planning in Park Place, with recommended extension of density transfer provisions to all natural resource overlay zones occurring in the Park Place plan area. These implementation measures are described in more detail in Chapter 4 of this document and Appendix I.

Taller buildings and a mix of uses provide a desirable sense of enclosure around the civic space in the North Village

The Park Place Crossing Master Plan implements the general street plan and cross-sections required by OCMC and Public Works standards. The Master Plan provides greater quantities of open spaces than originally conceived within the PPCP for the protection of natural resource areas. These density transfer provisions are used to allow the number of housing units desired in the Park Place Concept Plan to be provided within the Park Place Crossing Master Plan.

Street trees, on-street parking, pedestrian-scale lighting, and street furniture create interesting places to meet in the community

Housing

The primary land use proposed in the Park Place Concept Plan is residential. Of the approximately 408 net buildable acres in the study area, approximately 360 acres are proposed for residential use. Residential land will be provided in a range of very low-density (R-10) zones to neighborhood commercial (NC) zones. In order to provide attractive and affordable housing for a variety of incomes and household types. It is recommended that a new residential zone (R-5), modifications to existing zones, additional design standards forattached single-family housing (townhouses and rowhouses), and multi-family housing be instituted to implement the Park Place Concept Plan. Recommended residential types and zones include:

Low-Density Residential (R-10, maximum 4 units/acre)

- Single-family detached dwelling units (including manufactured homes)
- Accessory dwelling units (ADUs)

When annexed, a portion of the Park Place Crossing properties were zoned R-10. The maximum density of 4 dwelling units per acre required by this zoning is reflected in an overall reduction of density for the PPCMP.

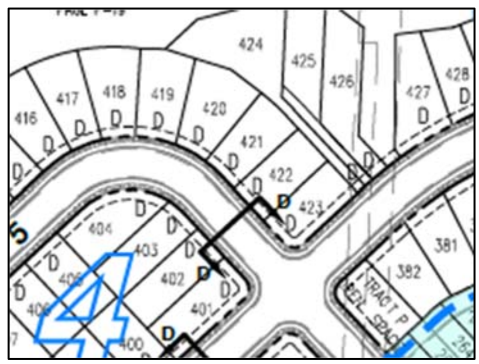
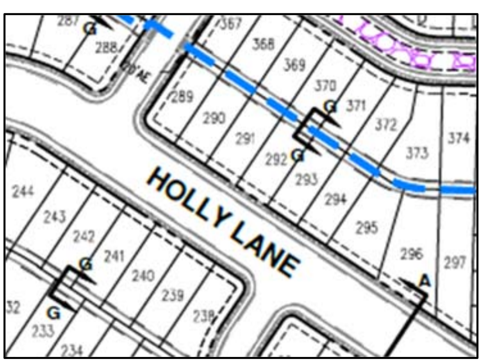


Figure 22: Park Place Crossing Master Plan excerpt

Low/Medium-Density Residential (proposed R-5, minimum 6 units/acre)

- Single-family detached dwelling units (including manufactured homes)
- Accessory dwelling units (ADUs)
- Single-family attached dwelling units (townhouses/rowhouses)
- Two-family dwelling units (duplexes)



The majority of the site is located within the R-5 zoning district. As such, Park Place Crossing largely provides density within the range specified for the R-5 zoning district.

Figure 23: Park Place Crossing Master Plan residential excerpt

Medium/High-Density Residential (R-3.5, minimum 9 units/acre)

- Single-family detached dwelling units (including manufactured homes)
- Single-family attached dwelling units
- Two-family dwelling units (duplexes)
- Multi-family dwelling units (proposed)

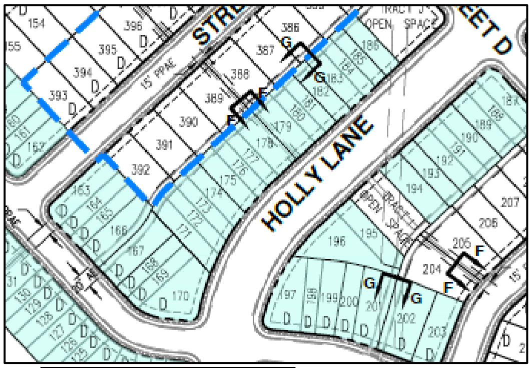


Figure 24: Park Place Crossing Master Plan residential excerpt

Following annexation of the property, the Park Place Crossing properties were not designated with areas of R-3.5 zoning; however, because the PPCP desired a Medium/High Density Residential designation that was not provided and because multiple residential types are required for General and Detailed Development Plan applications (none greater than 75% of the planned housing types), attached housing was included as part of the PPCMP. Those attached housing types included within Park Place Crossing are located near the Livesay Main Street area, as originally envisioned by the PPCP, and features desired densities matching those that would be provided through housing within an R-3.5 Medium/High Density Residential zoning district.

Neighborhood Commercial (NC)

- Dwelling units above ground floor (if in conjunction with a permitted or conditional use)

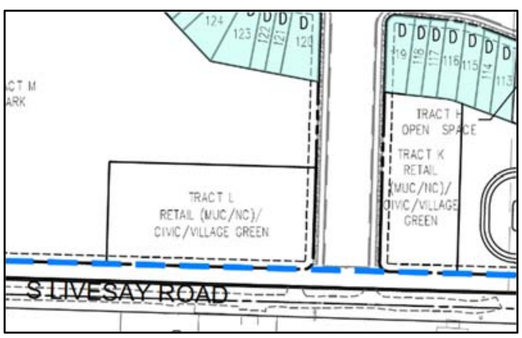


Figure 25: Park Place Crossing Master Plan commercial excerpt

Following annexation of the property, the Park Place Crossing properties were not designated with areas of R-3.5 zoning; however, because the PPCP desired a Medium/High Density Residential designation that was not provided and because multiple residential types are required for General and Detailed Development Plan applications (none greater than 75% of the planned housing types), attached housing was included as part of the PPCMP. Those attached housing types included within Park Place Crossing are located near the Livesay Main Street area, as originally envisioned by the PPCP, and features desired densities matching those that would be provided through housing district.

The needed mix of housing units is shown in Table 3-1. These figures mirror the ratio of existing housing types in Oregon City according to the 2000 Census. Additional information about the affordability of housing is provided in the following section.

Park Place Crossing Planned Housing	Number of Units
Single-Family Residential Detached	±350
Single-Family Residential Attached	±126
Accessory Dwelling Units	-
TOTAL	**±476**

Type of Housing	Number of Units Needed
Single-Family Residential Detached	950
Two-Family Residential Attached (Duplex)	87
Manufactured Home in Park	48
Single-Family Residential Attached	9
Multi-Family Residential	282
Accessory Dwelling Units	17
Group Quarters	65
TOTAL	**1,458**

The Park Place Crossing Master Plan includes ±476 dwelling units. Rather than developing within the "green fingers," the PPCMP preserves the green fingers as open spaces. An appropriate quantity of commercial lands have been set aside to form the easternmost segment of the Livesay Main Street corridor.

The City's lowest-density zoning is recommended for the "green fingers" of natural resource and environmentally sensitive lands in Park Place. These areas are appropriate for low-density development and will be protected, in part, by the City environmental overlay zones which restrict development altogether in certain areas or reduce the allowable density of residential development in other areas

Table 3-2 identifies the potential number of housing units of different types that could be developed within the concept planning area based on proposed zoning. The low/medium-density zone is more likely to be the site of manufactured homes and ADUs than the medium/high-density zone. The distribution of housing types in Table 3-2 however, represents only one scenario for accommodating needed housing within zones proposed for Park Place. **It is possible that housing types may develop in different ratios, including development of attached single-family housing in the low/medium-density residential zone.**

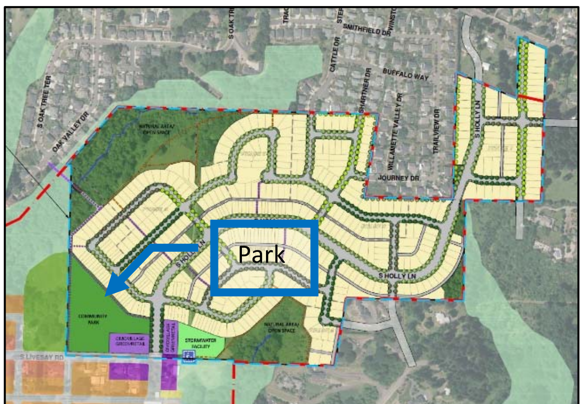
The Park Place Crossing Master Plan provides an appropriate mix of housing unit types. The percentages shown within the Park Place Concept Plan (2008) are outdated/superseded by the City's 2021 Housing Needs Analysis and/or code updates. The Park Place Crossing project is consistent with these current requirements by providing a mixture of housing types, approximately 26 percent single-family attached homes and approximately 74 percent single-family detached. Opportunities for residential units above ground-floor commercial is also possible within the future Livesay main street area.

Parks and Open Space

The Park Place Concept Plan incorporates a significant amount of open space, mostly attributed to environmentally-constrained natural areas within the planning area. This open space network takes the form of "green fingers." These "green fingers" consist of sensitive habitat and drainage areas that frame pockets of development while protecting the existing natural habitat. The proposed "green fingers" provide a buffer between resource areas, existing development, and new development. The "green fingers" also serve as a signature element for the burgeoning neighborhood, especially when they are combined with the Plan's proposed system of trails and pathways. This open space concept can be realized through local regulation, sensitive development practices, and through public acquisition. The amount of open space proposed in the Plan exceeds Metro and City guidelines.

The area selected for the community park is the best location as it is a large, contiguous flat area that can accommodate play fields. Future expansion of the park to the west areas through contributions by adjacent properties and future projects is also possible.

The Community Park identified within the Park Place Crossing Master Plan boundary has been located south and west of the location pictured within the PPCP Final Concept Plan map as to allow expansion of the park through contribution by adjacent properties. The Park Place Crossing Master Plan area contributes approximately 51 percent of the North Village residential units and therefore contributes this same percentage of the conceptual park area. The park as planned achieves the 8 acre size envisioned by the PPCP.



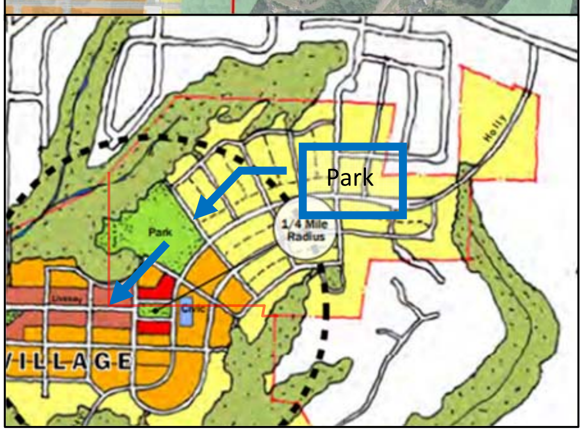


Figure 26 (Top): PPCMP Community Park area
Figure 27 (Bottom): PPCP conceptual park area

As discussed, the Park Place Concept Plan includes a neighborhood park in both the North Village and the South Village. These parks are shown in locations that optimize the following concept planning criteria:

- Locate parks adjacent to future village centers in order to maximize proximity and therefore walkability for the greatest number of residents;
- Locate parks adjacent to civic uses such as schools or other facilities in order to synergize with existing or planned public amenities;

- Locate parks on sites that are relatively flat in order to accommodate the need for play fields; and
- Locate parks adjacent to existing natural areas so as to integrate open spaces with parks. This may allow for reduced park areas by allowing passive recreation areas to occur in natural open space areas.

The park will be adjacent to planned civic, Village Green, retail, and open space areas with trails planned to lead between those areas and adjacent existing neighborhoods. Sidewalk and street connections are planned to adjacent Local and Collector streets. This location also places the park adjacent to the future village center in order to provide the maximum walkability for area residents.

There may be other locations within the proposed neighborhood fabric that meet these criteria and the locations indicated on the Urban Growth Diagram should not be taken as absolute. The parks were shown in these locations because they meet these criteria. It is essential that any alternative sites identified in the future meet the same or similar criteria.

The park location meets the above criteria for location and is therefore planned within an appropriate location. The park overlaps the location shown within the Final Concept Plan map and is better suited to the topography of the site and access to the adjacent main street areas.

The City's existing Park and Master Plan identifies the need for two developed parks in this area to meet its standard of having neighborhood or community parks within ½ mile of all residents. According to conversation with Jim Row, (former) Oregon City Park and Recreation Planner, The Oregon City Park and Recreation Master Plan, National Recreation and Park Association's park and recreation facility guidelines, and information compiled by Cogan Owens Cogan, a single park would not meet this standard. Such national and local guidelines typically indicate standards of between 1-3 acres of neighborhood parks per 1,000 residents, 2-4 acres of community parks per 1,000 residents and overall goals of six to 10 acres of developed park facilities per 1,000 residents. These standards indicate the need for 18-30 acres of developed parks, including neighborhood and community or other developed park facilities in the planning area, assuming a buildout population of about 3,000 residents. The proposed number of facilities and acres of developed parks is generally consistent with these targets.

The planned park and the shown conceptual expansion are able to meet these standards. Park Place Crossing will contribute ±4.1 acres of the required 8 acres, meeting the standard for the number of anticipated residents within the PPCP area.

The parks shown on the Urban Growth Diagram are located in their respective neighborhood centers and are surrounded by commercial, civic uses, and medium density housing. The parks are intended to provide basic recreational opportunities for residents and may include amenities such as play equipment, athletic fields, picnic tables or shelters, walking trails, and other features. The neighborhood park in the North Village is approximately eight to ten acres and within walking distance of the Livesay Main Street. The South Village neighborhood park is approximately three to five acres and surrounded by medium/high-density residential. These two parks are consistent with the type of parks identified as needed in the City's *Parks and Recreation Master Plan* (2004) and with recommended national acreage guidelines and service areas.

Open Space – Natural Area

Neighborhood Park

The planned park and natural open space areas are consistent with the intent of the Park Place Concept Plan. The area is adjacent to commercial, Village Green, and civic areas, as well as higher density housing to provide greater access and walkability.

Transportation

The core values and guiding principles of the Park Place Concept Plan describe a multi-modal transportation system that is fully integrated with the land uses it serves. By design, the system is inherently sustainable, safe, and interconnected and serves the local and regional travel anticipated for the area.

Holly Lane and Swan Avenue Extensions

Holly Lane serves a vital role in both the local and the regional context as the only continuous north/south travel corridor on the east side of HWY 213. Holly Lane connects the northern area of Oregon City to many key destinations in the hilltop area of the city, such as Berryhill Shopping Center, Clackamas Community College, Oregon City High School, City Hall, and many other retail and employment locations. As a result, this corridor is expected to see travel demands increase by nearly 13,000 vehicles per day to a total of more than 16,000 vehicles per day. Were this to occur, Holly Lane would need to provide five lanes near its intersection with Redland Road and three lanes for the remainder of its length. In addition, Redland Road would need to provide six lanes (unless a smaller cross section is proven adequate) near its intersection with Holly Lane and five lanes for the remainder of its length to Abernethy Road.

The cost and feasibility of these improvements is questionable. Much of the Holly Lane corridor has a very narrow right-of-way with many single-family residences that take direct access from Holly Lane. Climbing sections of Holly Lane will be very costly to reconstruct and face several engineering challenges. The existing two-lane bridge across Abernethy Creek would need to be demolished and replaced with at least a five-lane bridge. Finally, much of Redland Road is significantly constrained by topography on the north side and the Abernethy Creek on the south side.

The primary north-south connection within the Park Place Crossing area is Holly Lane. As demonstrated below, the alignment of Holly Lane mimics the concept plan but also considers topographic, natural resource, and design level information. The Park Place Crossing Master Plan is consistent with the intent of the Park Place Concept Plan.

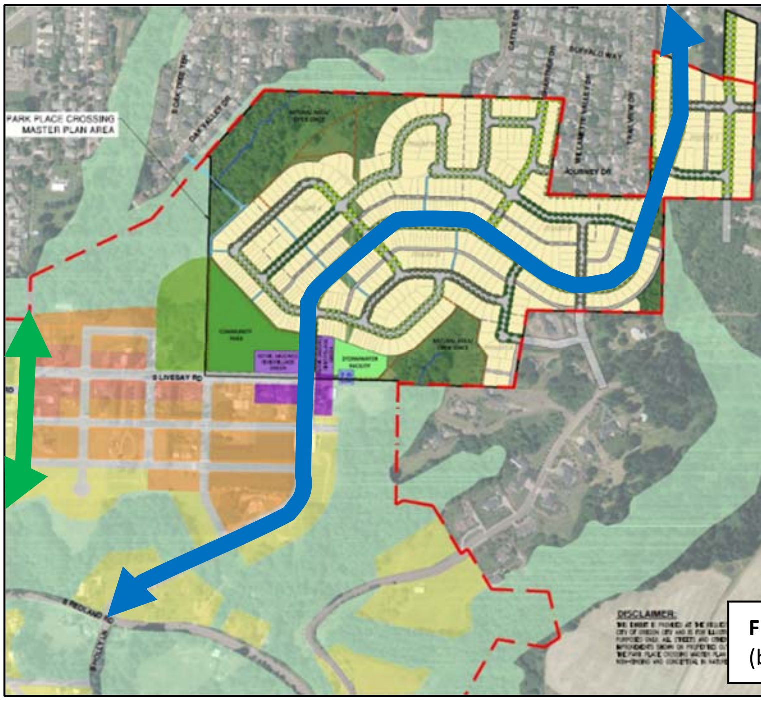


Figure 28: Planned alignment of Holly Lane (blue) and Swan Avenue (green) extensions

Sustainability

A sustainable transportation system is achieved through a number of specific components. The pattern of classified streets in the Plan naturally accommodates transit service to and through the area, creating a viable alternative to vehicular travel for most types of trips. The redundant and interconnected network of facilities distributes traffic, shortens trip lengths, and optimizes opportunities for non-auto travel.

These components work in combination to provide a sustainable transportation system and minimize the adverse impacts of impervious surface and vehicular travel.

The Park Place Crossing area will be designed for on-site storm water management facilities within street side swales (where feasible) and a regional facility. The transportation network of the PPCMP has been designed to allow viable transportation opportunities throughout the area by means other than motor vehicles throughout Park Place. These streets, sidewalks, bicycle lanes, accessways, hard-surface trails, and soft-surface trails allow shortened trip lengths, safe travel, and sustainable transportation options.

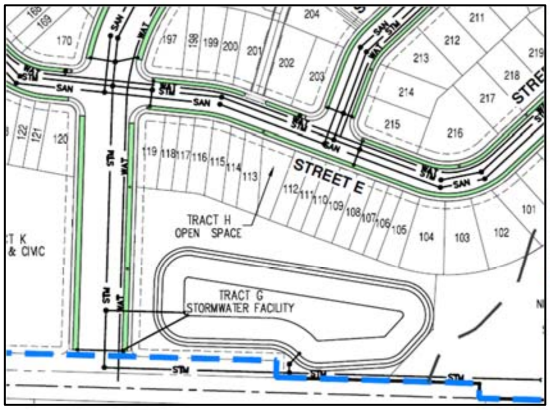
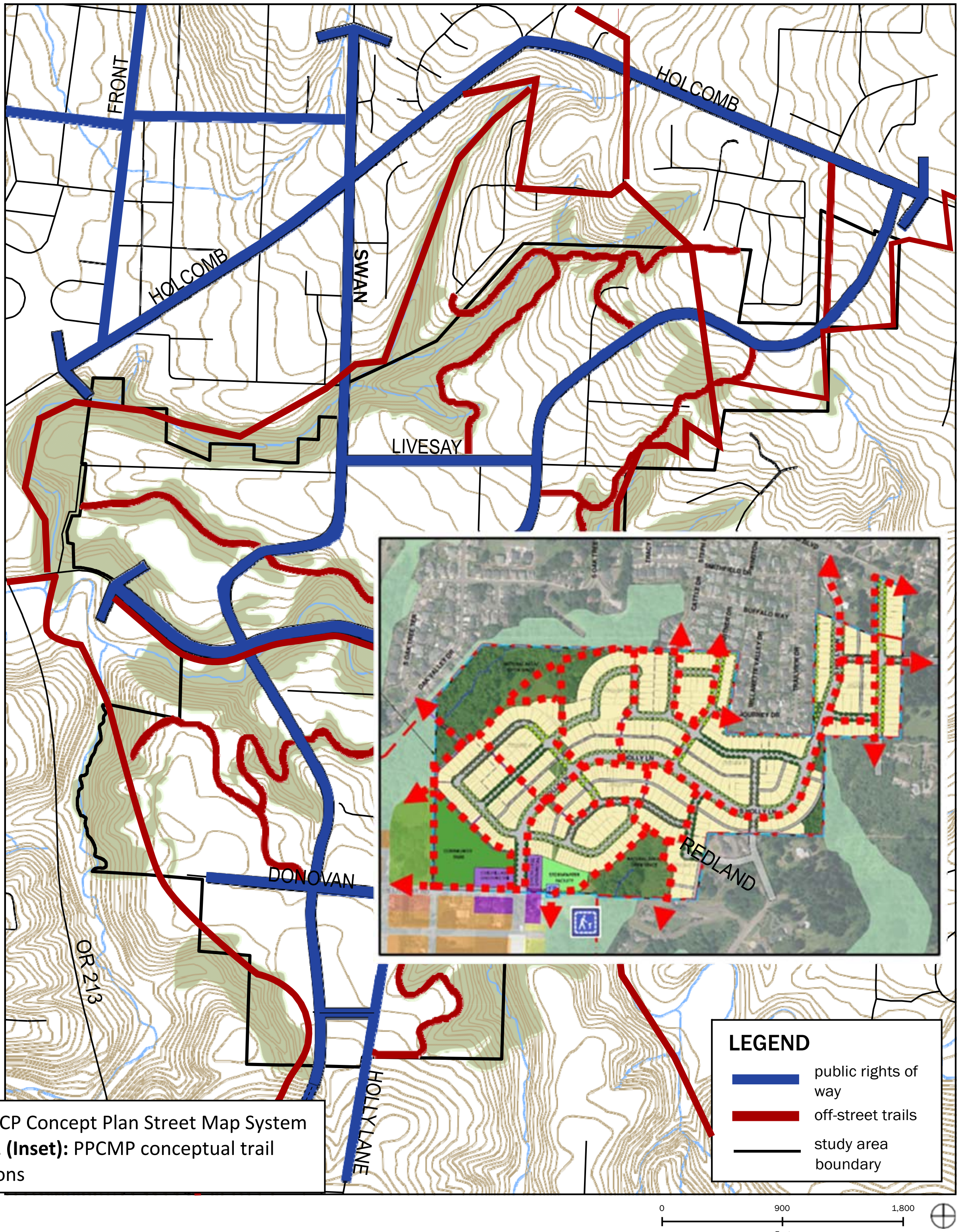


Figure 29 (Top): PPCMP conceptual stormwater facility locations
Figure 30 (Right): PPCMP conceptual trail connections

Nature and the Pedestrian/Bicycle System

The natural beauty of the Park Place area is a tremendous asset that justifies a high-quality pedestrian and bicycle system to access it. People are drawn to this beauty and desire to see it, as they travel, and spend time in it, as they recreate. The natural surroundings will be a stimulus for activity, which is best served by a pedestrian and bicycle system associated with public rights-of-way and on trails. Therefore, all public streets (any street owned by a public agency) will be equipped with sidewalks on both sides, sized appropriately to the adjacent land uses and expected pedestrian activity. On-street striped bike lanes will exist on most of the classified roadways (any roadway functionally classified as a collector or above by any public agency) to safely accommodate and delineate bike routes. A system of hard- and soft-surface trails will intertwine with the public rights-of-way to provide direct access to nature for both modes. The result is a natural environment, complemented by a robust pedestrian/bicycle network that is expected to stimulate a much higher level of pedestrian and bicycling activity than in many other areas of the region.

The Park Place Crossing Master Plan area has been designed with a system of hard and soft surface trails throughout. The PPCMP transportation system provides a variety of on and off-street facilities to connect residents with the planned commercial retail, civic, Village Green, extensive open spaces within the PPCP area, and the planned community park. These facilities will accommodate bicyclists and pedestrians and allow efficient and safe transportation within the Park Place Concept Plan area and adjacent future and existing neighborhoods.



Right: PPCP Concept Plan Street Map System
Figure 31 (Inset): PPCMP conceptual trail connections

Figure 3-4. Concept Plan Street System Map

This map is for concept planning purposes only. The specific locations of natural resource boundaries, open space, parks, land uses, roads, trails, infrastructure and related improvements may change and is subject to on-site verification and design at the time of development.

The following sections provide a description of each mode of travel in Park Place and the recommended multi-modal system to support those modes.

Street System

A network of streets is necessary to satisfy the core values of the Plan and meet the needs of the traveling public. The Concept Plan Street System Map (Figure 3-4) and the Concept Plan Functional Classification Map (Figure 3-5), depict this system of streets and the way in which each is anticipated to function. Each street is carefully sized to carry the expected travel demand it is intended to serve, while minimizing the impact of unnecessary impervious surface. Described below are the functional classifications applied to roadways within the planning area. Other improvements (e.g., intersection improvements) will be evaluated and designed in more detail as development occurs. They could include a mix of traffic signals and/or roundabouts, as well as additional turn lanes.

Functional Classification

Roadways within the plan area are categorized into different groups. These groups are referred to as “functional classifications” and are defined in the City of Oregon City’s Transportation System Plan (TSP). Roadway classifications applied within the Park Place neighborhood include Minor Arterial, Collector, Neighborhood Collector, and Local Street.

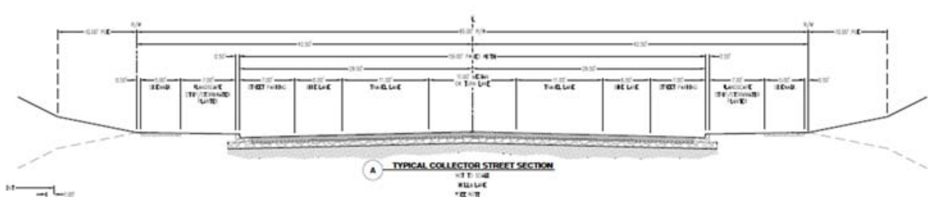
Minor Arterial streets are roadways that “connect principal traffic generators; carry local traffic between neighborhoods and to community and regional facilities within a city.”

Collector

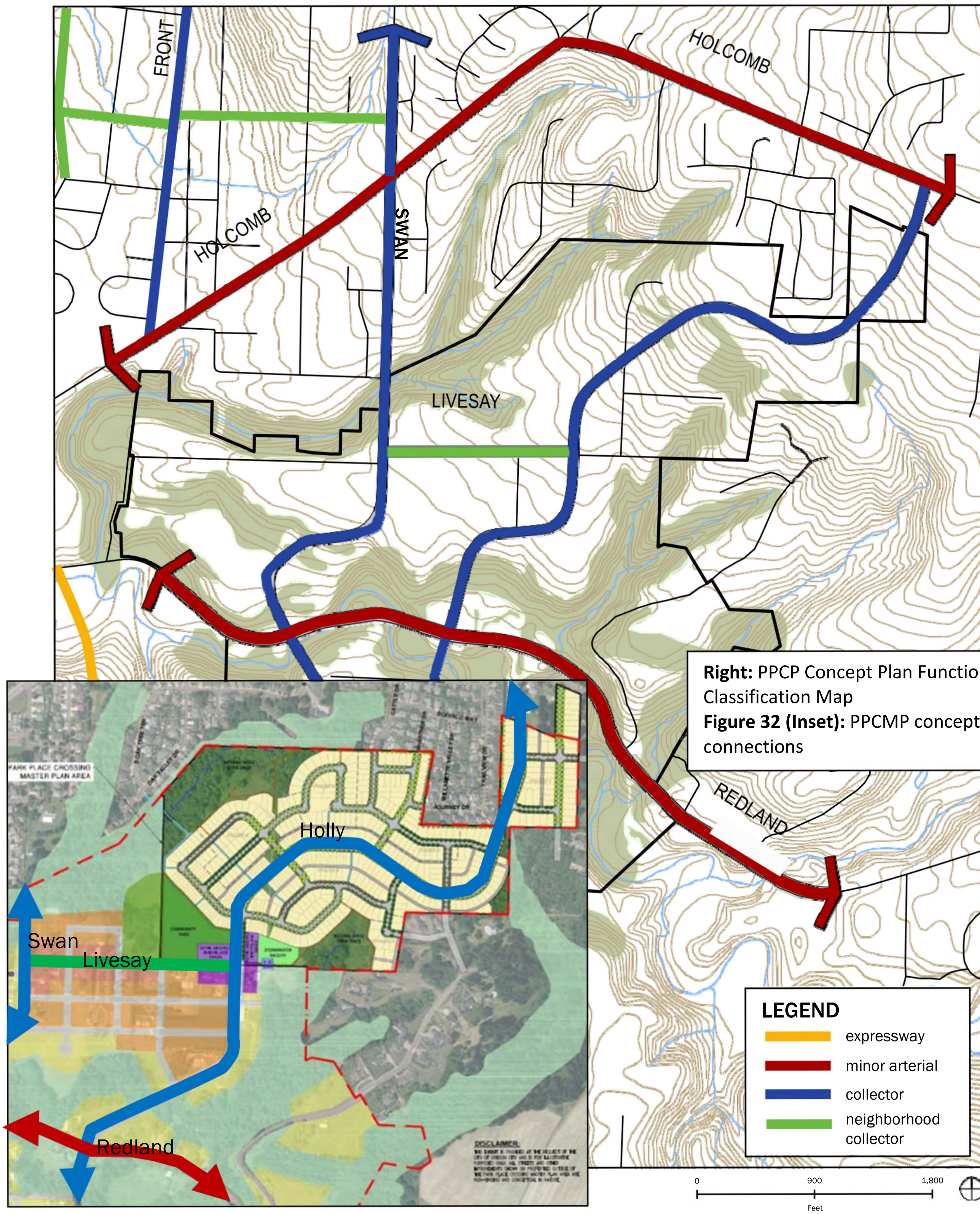
The existing Holly Lane is designated a Collector street, because it connects area residents to Redland Road and Maplelane Road, both of which are Minor Arterials. Other Collector streets in the vicinity include Forsythe Road, Front Avenue and Swan Avenue, north of Holcomb Boulevard. The extensions of Swan Avenue (from Holcomb Boulevard to south of Donovan) and Holly Lane (from Redland Road north to Holcomb Boulevard) are also designated as Collector facilities. This designation is chosen because of the anticipated function each extension will serve, connecting between Minor Arterial streets and linking neighborhoods to several areas of the city.

Collector streets are typically characterized by a 2 or 3-lane cross-section, low to moderate traffic volumes, trip lengths, and traffic speeds.

The PPCMP features Holly Lane (pictured below) as the primary route through the project area. The design of Holly Lane within the PPCMP allows for the future connection of Holly Lane with Holcomb Boulevard and Redland Road.



The primary function of Neighborhood Collectors is to provide local access and circulation. The roadway typically has low traffic volumes and speeds to ensure livability and safety.



Right: PPCP Concept Plan Functional Classification Map
Figure 32 (Inset): PPCMP conceptual street connections

Figure 3-5. Concept Plan Functional Classification Map

This map is for concept planning purposes only. The specific locations of natural resource boundaries, open space, parks, land uses, roads, trails, infrastructure and related improvements may change and is subject to on-site verification and design at the time of development.

Neighborhood Collector

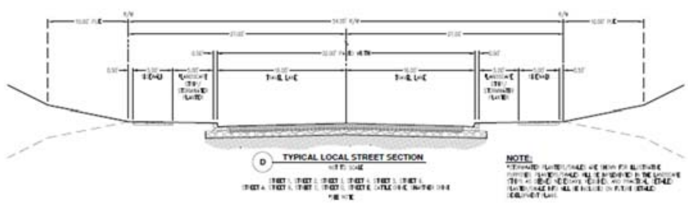
Livesay Road, between Swan Avenue and Holly Lane, and Donovan Road, from Holly Lane to Ogden Middle School, are designated as Neighborhood Collectors. Apperson Boulevard and Cleveland Street are other Neighborhood Collectors in the vicinity.

The Park Place Crossing Master Plan area is adjacent to Livesay Road. Future projects within the commercial retail/civic/Village Green areas will improve the adjacent Livesay Road facilities to the City's applicable Neighborhood Collector standards.

Local Street

A Local street is one that "provides direct access to adjacent properties and land uses within neighborhoods; lowest mobility function and highest accessibility function; low traffic volumes and speeds; through traffic discouraged; typically 2-lane sections; on-street parking encouraged; typically stop-sign control at intersections with collector and arterial streets; sidewalks and landscaping are required; and, bicycle lanes are optional." All roadways not depicted in Figure 3-5 will be constructed as local streets.

The Park Place Crossing Master Plan provides a network of interconnected local streets. These streets are anticipated to see low traffic volumes, little through traffic, and high accessibility. Local streets are anticipated to be provided according to the cross-section below.



Pedestrian and Bicycle

Area residents will be able to travel throughout the Park Place planning area by walking or biking on a system of trails and on-street facilities that are seamlessly interconnected with the local and regional trails system.

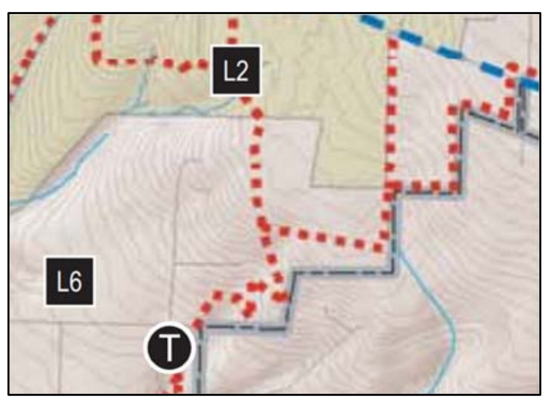
Trails

Figure 3-8 illustrates the trail system throughout the planning area. Local, community, and regional trails connect to the Park Place Concept Plan trails that link to parks, open space, and community destinations. Many of these trails could include a soft-surface to accommodate equestrian activity, while others would have an all-weather surface. (The Park Place Concept Plan is aspirational with respect to equestrian facilities. Equestrian facilities are likely to occur outside of public street rights-of-way.) These trails provide recreational opportunities in addition to providing safe routes of travel for bicyclists and pedestrians. The following trail types and standards are described in greater detail in the Oregon City Trails Master Plan.

Community Trails: These trails serve residents throughout the community and provide links both within and between different neighborhoods and community destinations within the city. They are designated as community trails in the Oregon City Trails Master Plan map. Community trails typically are wider than local trails and provide access to multiple types of users, similar to regional trails. Trails surfaces (paved or unpaved) and widths may vary depending on topography, other environmental conditions and level of use.

Local Trails: Local trails primarily serve residents within a single neighborhood or portion of the city. They provide links within neighborhoods to or between local destinations such as schools, parks or shopping areas, or within natural areas or parks. Trails surfaces (paved or unpaved) and widths may vary depending on topography, other environmental conditions and level of use. Due to the constrained Redland Road corridor, pedestrian and bicycle facilities will occur as a part of the typical cross section, or shall be separated and treated as a multi-use, accessible all-weather trail system.

The Park Place Crossing Master Plan (below, left) provides trail connections identified within the Oregon City Trails Master Plan map (below, right).



On-Street Bicycle and Pedestrian Facilities

Figure 3-9 depicts the on-street facilities for bicycles and pedestrians. **Sidewalks will be constructed on both sides of all new roads and will be added to both sides of all collector- and arterial-level roadways within the planning area, in order to accommodate pedestrians.** On-street bike lanes are anticipated for Holly, Swan, and Donovan. Livesay will operate as a shared-use facility, equal in treatment to all Local streets. Due to the constrained Redland Road corridor, pedestrian and bicycle facilities may occur as a part of the typical cross section, or separated and treated more like an all-weather trail system.

These two systems of bicycle and pedestrian facilities will connect Park Place residents to parks, open spaces, centers of commercial activity, and the regional transportation system without requiring them to step into a car. The robustness of these systems is in response to the desires of the community and the quality of the natural environment.

Within this section of the Park Place Concept Plan area, Holly Lane is the primary north/south travel route. Bicycle and pedestrian travel routes are planned along the Collector and Local streets to connect to off-street trails that provide connectivity to adjacent existing neighborhoods. It is through these planned systems that pedestrians and bicyclists can avoid vehicle travel to reach the PPCMP Livesay Main Street or other neighboring areas. Pedestrians will be accommodated on sidewalks on both sides of each Local and Collector street. Bicycle lanes will be provided on Holly Lane. Accessways are planned through many of the PPCMP blocks to reduce block length and out of direction travel.

Water, Wastewater, Stormwater Improvements

The area is comprised of three drainage basins: Abernethy Creek, Newell Creek and Livesay Creek. As noted in the existing conditions, no major stormwater infrastructure exists within the Park Place Concept Plan area other than roadside ditches and natural drainage channels. It is recommended that a low-impact stormwater approach be developed with a goal of mimickingthe natural hydrological conditions of the three watersheds of the Park Place Concept Plan area. These three drainage basins should be used to delineate the stormwater approach for the Park Place Concept Plan.

Stormwater Management Approach

The general approach of the stormwater management system for the Park Place Concept Plan is to establish a system that mimics the natural hydrology of the site to the extent practicable. In pursuing this design goal, the Park Place Concept Plan area has been separated into three distinct systems based on the boundaries of the existing watersheds. The stormwater system within each drainage basin should utilize the combination of centralized and decentralized low-impact stormwater best management practices to manage stormwater generated from the Park Place Concept Plan area.

Central to the stormwater approach of the Concept Plan, is a stormwater hierarchy focused on managing stormwater in a naturalistic manner at three separate scales: site, street and neighborhood (vs. a one-size fits all approach).

Tier 2 – Green Streets Stormwater Management Facilities (Street)

In urban environments, much of the stormwater quantity and pollution issues are attributed to streets. An innovative, low-impact manner in which to address this reality is through the use of Green Streets. Green Streets are streets that integrate the management of stormwater into the street design itself to provide a stormwater management benefit as well as an urban design element and they may potentially reduce the need for downstream stormwater facilities such as large stormwater ponds.

Examples of Tier 1 and Tier 2 stormwater facilities

Green streets can serve as both stormwater management facilities and stormwater conveyance facilities. As a stormwater management facility, their objective is to minimize stormwater runoff generated from streets and reduce pollutants. As a stormwater conveyance facility, their objective is to convey stormwater from both private property and streets to regional stormwater management facilities. Green Streets typically take the form of vegetated swales located along the street with curb cuts to allow street runoff to enter them. In more urban areas, stormwater planter boxes mimicking the look of street tree wells may be used. Most Green Street stormwater facilities should be publicly owned and maintained.

Tier 3 – Regional Stormwater Management Facilities (Neighborhood)

Regional stormwater management facilities are focused on managing large stormwater flows and volumes that may be passed through Tier 1 and Tier 2 facilities. Moreover, they provide additional water quality benefits prior to discharging stormwater to the existing creeks. These stormwater facilities are typically to be located adjacent to the existing streams and should take on a more naturalistic form such as a wetland pond. Most regional stormwater management facilities should be publicly owned and maintained.

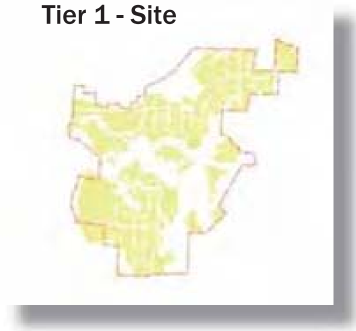
The stormwater system concept plan (Figure 3-12) shows generally how this stormwater approach should be implemented for the Park Place Concept Plan area.

Stormwater Conveyance Approach

Surface conveyance, in the form of swales and ditches, should be provided as a means to convey stormwater via gravity from private property and streets to the existing creeks to the extent practicable. Piped conveyance will be required but should be kept to a minimum if possible.

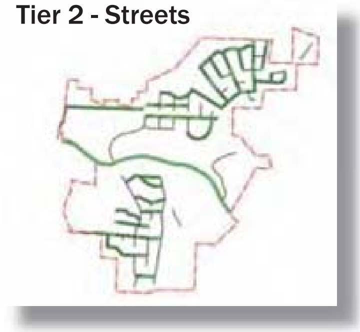
Park Place Crossing features stormwater management facilities within street rights-of-way where required and feasible in order to minimize the need/size of downstream stormwater facilities. The Composite Utility Plans included within the Preliminary Plans include the possible locations for stormwater planters within street rights-of-way, a temporary facility to manage stormwater for Phase 1, and an ultimate regional facility to manage stormwater for much of Park Place Crossing's phases, where feasible.

Tier 1 - Site



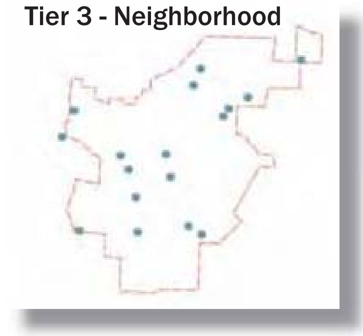
Site Specific

Tier 2 - Streets

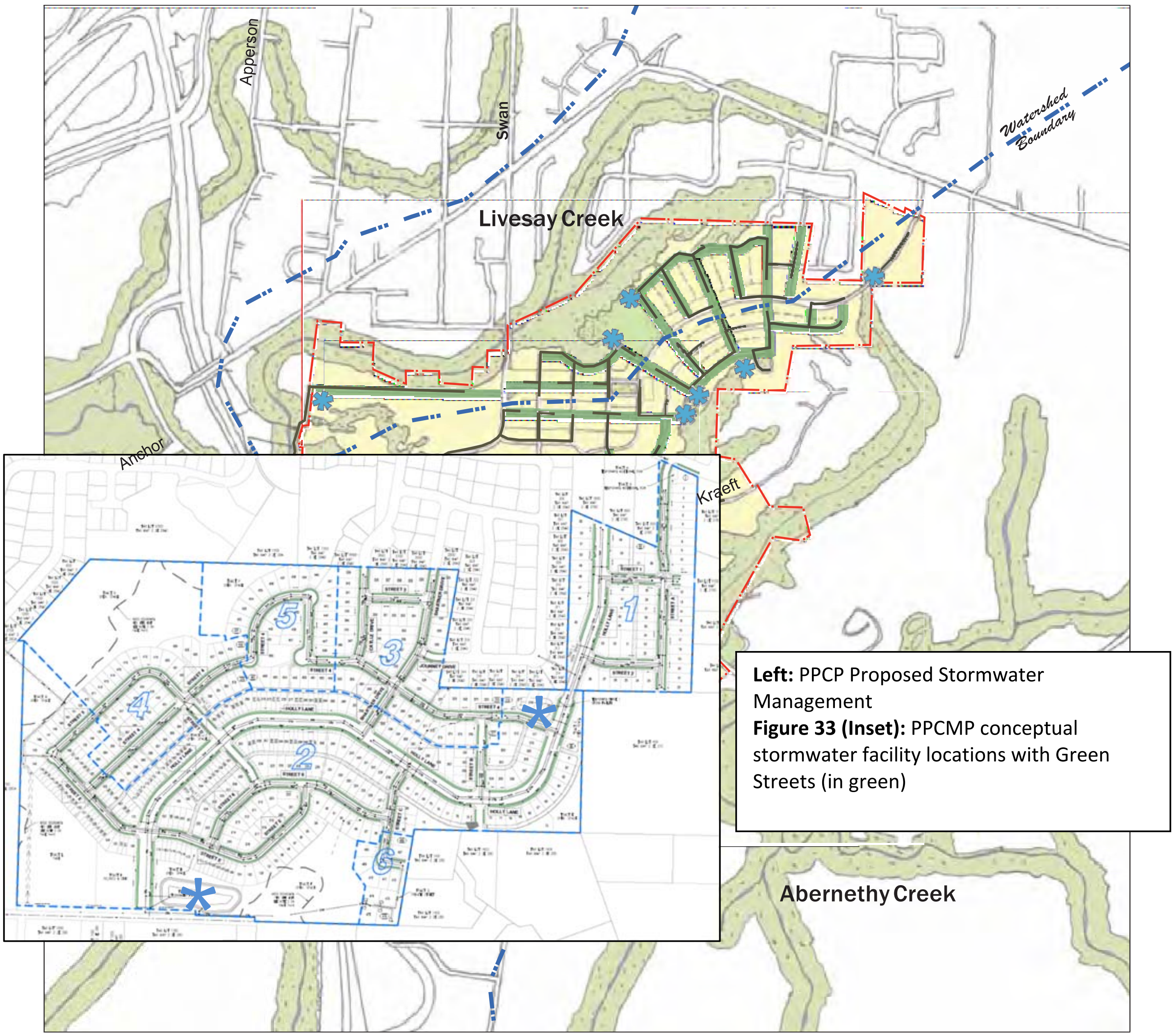


Green Streets and Pipes

Tier 3 - Neighborhood



Regional Facilities



Left: PPCP Proposed Stormwater Management
Figure 33 (Inset): PPCMP conceptual stormwater facility locations with Green Streets (in green)

Figure 3-12. Proposed Stormwater Management

This map is for concept planning purposes only. The specific locations of natural resource boundaries, open space, parks, land uses, roads, trails, infrastructure and related improvements may change and is subject to on-site verification and design at the time of development.

4. Implementation

1. Compliance with Title 11

Land Use

Following are land use policies related to housing, commercial, and industrial developments. Other land uses (e.g., schools, parks, and public facilities) are addressed separately.

Housing

The following steps have been taken in the concept planning process to comply with Title 11 as it relates to housing.

- Zone adequate land to allow for a variety of housing types and densities as outlined in more detail in Chapter 3. The zoning mix allows the City to meet Metro targets for housing based on average densities required in the two different portions of the planning area.
- Create opportunities for mixed residential and commercial uses through amendments to and application of the city's mixed use zone.
- Locate denser housing types adjacent to commercial areas and civic uses.
- Zone land in a way that allows for housing types and densities typically more affordable to households with low and moderate incomes (see Chapter 3 for an assessment of this issue).

While the Park Place Concept Plan allows for opportunities to meet affordable housing needs without subsidy, the reality of the housing market in Oregon City and the Portland Metropolitan region is that some subsidy by public agencies and non-profit organizations will be required to achieve affordable housing goals for this area. The following goal, policies and implementation strategies can be used to meet affordable housing objectives, as well as more general housing goals.

Housing Goals, Policies, and Implementation Strategies

Goal

The concept planning area should incorporate Comprehensive Plan and zoning designations that allow for a wide range of housing types and densities that meet the needs of households with a range of incomes.

Policies

- Apply zoning designations that allow for achievement of the goal above.

Following annexation, the Park Place Crossing area was assigned with zoning district designations that would allow for the goal of providing a wide range of housing types and densities to meet the needs of households with a wide range of incomes. The project designates areas for both single-family attached and detached homes at densities that meet the intent of the Park Place Concept Plan.

- Create flexibility in development standards to allow for alternative housing types such as zero lot-line development, cluster housing, and accessory dwelling units.

The Park Place Crossing Master Plan has planned areas of attached housing. Code changes currently being undertaken by the City will allow for alternative housing types.

- Ensure connectivity of residential areas to commercial areas and parks and open space by creating regular street grid patterns where topography allows and providing a complete sidewalk network.

The PPCMP follows the general framework established by the Park Place Concept Plan to connect residential areas to commercial, park, and open space areas that will serve residents of the community. The Park Place Crossing layout creates street grid patters where feasible and provides a sidewalk and off-street trail network to allow for greater connectivity.

- Ensure that residential neighborhoods are bordered by parks and/or open space. Streets should be integrated with a network of bikeways, trails and/or pedestrian paths where possible.

Park Place Crossing is generally surrounded by open space. Trails and street networks connect residential areas to the planned community park. Off-street trails, pedestrian paths, and on-street facilities such as sidewalks and bicycle lanes are planned to provide non-vehicle transportation options for area residents where feasible due to topographic, natural resource, and block length constraints.

- Orient residential streets to maximize solar exposure for energy conservation where possible.

Housing density, street alignments, and lot orientation to maximize solar exposure have been considered when deciding on the residential layout for Park Place Crossing.

- Link the density of housing to the hierarchy of the street network.

Housing density within Park Place Crossing generally follows the street network hierarchy. Denser housing, such as the planned single-family attached residences, is intended to follow the Holly Lane Collector Street and be centered around the future commercial area at the intersection of Holly Lane and S Livesay Road.

- Provide a transition or buffer between existing and new residential development.

Park Place Crossing provides wide natural open spaces and other buffers between many of the new residences and existing neighborhoods. These open spaces combined with larger residential lot sizes along the perimeter of the project allow for a transition to the higher density called for through the Park Place Concept Plan.

- Support architectural integrity and variety in residential and mixed-use neighborhoods.

The architectural composition of the residential and mixed-use portions of Park Place Crossing have not yet been determined but are expected to be in keeping with both the architectural provisions of the Park Place Concept Plan and the Oregon City Municipal Code.

Table 4-3. Proposed Area of Commercial Uses in Park Place

Type of Commercial Use	Proposed Zone	Land Area (SF)	Floor Area (SF)
Retail	Neighborhood Commercial (NC)	79,191	39,595

Commercial and Industrial Development

Commercial Development

The Neighborhood Commercial (NC) zone recommended in the North and South Villages will accommodate commercial development. The NC zone will be targeted for primarily retail use. Table 4-3 identifies the amount of land proposed for each of this zone and targeted uses.

Assuming an approximately 50% lot coverage, the NC zone yields about 0.91 acre (39,595 sq. ft.) of building area and the same for parking and landscaping. This falls within the range of retail building area that market consultant Johnson Gardner estimated that Park Place could support.

Economic and Commercial Development Goals, Policies, and Implementation Strategies

Goal

Establish opportunities to create neighborhood commercial and mixed use centers which provide area residents with opportunities to shop and work, consistent with the core values of this plan.

Policies

- Establish two neighborhood commercial/mixed use centers that allow for small scale, neighborhood oriented commercial development, as well as mixed residential/commercial development and public buildings and gathering places.

Park Place Crossing is located northwest of the North Village commercial/mixed-use center. The PPCMP plans to provide a retail area for small-scale at the sizes called for within the Park Place Concept Plan. The Master Plan also provides Civic and Village Green areas similar to those envisioned by the PPCP to serve as public and gathering places.

- Locate neighborhood commercial and mixed use centers in close proximity to denser residential development, as well as parks and community facilities.

Higher density attached single-family residences within Park Place Crossing are located close to the Livesay Main Street mixed-use area, community park, and other community amenities. These locations closely align with those envisioned by the Park Place Concept Plan.

- Ensure that roads, pathways and other transportation facilities are designed in a way that supports mixed use/commercial areas and provides adequate access to them by all modes of travel.

Transportation facilities within Park Place Crossing have been designed to provide access by many modes of travel. The vehicle network allows efficient and safe travel along the Holly Lane Collector Street. Streets allow safe and efficient travel by pedestrians and bicycles on both on- and off-street facilities. Trails allow additional connectivity to surrounding areas of existing and future neighborhoods

Natural Resources and Hazards

A key part of protecting existing natural resources is to use the best development practices available in these areas. For the Park Place Concept Plan development, Metro's Nature in Neighborhood design guidelines were followed. These guidelines, though voluntary, are very applicable to achieving the environmental protection goals of the Park Place Concept Plan. As the Park Place Concept Plan develops, the Table 4-4 provides a list of best development practices that should Implementation 68 Final Concept Plan be considered. The implementation measures described in Appendix I identify the City code sections which could incorporate these best development practices.

Natural Resources and Hazards Goals, Policies, and Implementation Strategies

Goal

- Manage and conserve natural resources and values within the planning area, including riparian areas, woodlands, wetlands and wildlife and plant habitat.

Creeks, including adjacent habitat areas are planned to be conserved within open space tracts. These tracts will allow woodlands, wetlands, flora, and fauna to remain as undisturbed as feasible within this area of the North Village.

- Minimize impacts to areas that pose hazards to personal property and the natural environment, including steep slopes, areas potentially susceptible to land slides and other such areas.

Many of the areas which pose hazards due to steep slopes and land slides are also within the above-described natural resource areas. These areas will also be preserved and will remain undeveloped as part of the Park Place Crossing Master Plan.

Policies

- Conserve and improve streamside, wetland, and floodplain habitat and their connections.

The Park Place Crossing Master Plan intends to conserve the nearby creek and Natural Resource Overlay District areas within open spaces tracts. These tracts will prevent disturbance related to the construction of homes and public improvements associated with future phases of the project. The areas included are not currently connected, but it is anticipated that connections between the wooded areas would be maintained through the creation of preservation areas as shown within the PPCP Final Concept Plan map.

- Conserve large areas of contiguous habitat and avoid habitat fragmentation.

"Fingers" of preserved habitat areas will link to areas on adjacent properties to form contiguous habitat for wildlife.

Implementation Strategies

- Require applicants geotechnical engineer to field verify during construction to ensure that the subsurface conditions/assumptions made as part of their geotechnical evaluation/investigation are appropriate.
- Require the applicants geotechnical engineer to prepare a summary letter stating that the soils- and foundation-related project elements were accomplished in substantial conformance with their recommendations.

Geotechnical materials have been provided with this submittal and with each phase of Detailed Development Plan applications as well as when appropriate before, during, and after construction.

Public Facilities and Services

Conceptual public facility plans have be developed for the provision of wastewater, and storm drainage. These plans have been developed to comply with goals of the local community, City of Oregon City, Metro and the following documents:

- City of Oregon City Water Master Plan
- City of Oregon City Sanitary Sewer Master Plan
- City of Oregon City Drainage Master Plan
- City of Oregon City Draft Stormwater Management Plan
- City of Oregon City Stormwater and Grading Design Standards

The City of Oregon City Water Master Plan was referenced to determine anticipated water demands within the Park Place Concept Plan area. Average daily demand as well as peak demand and fire demand were evaluated at a preliminary level. In general, water demand from planned development within the Park Place Concept Plan area is consistent with demands anticipated in the Water Master Plan.

The City of Oregon City Sanitary Sewer Master Plan was referenced to determine anticipated wastewater generation within the Park Place Concept Plan area. In general, similar wastewater flows were developed. As a result, wastewater flows generated by development within the Park Place Concept Plan area are consistent with those found in the Sanitary Sewer Master Plan.
All three stormwater documents emphasize minimizing the amount of post-development stormwater runoff to pre-development conditions and reducing pollution loads. The Park Place Concept Plan stormwater approach was developed to meet these goals (Appendix J).

Public Facilities and Services Goals, Policies, and Implementation Strategies

Goal

- Plan for and provide adequate facilities for water, wastewater and stormwater service.

The Park Place Crossing Master Plan plans for adequate water, wastewater, and stormwater for both the project and as needed for adjacent future projects.

Policies

- Ensure that water, wastewater and stormwater facilities have adequate capacity to meet public facility and service needs within the planning area.

Park Place Crossing plans to provide adequate public facilities as outlined within the PPCP. Future Detailed Development Plan applications will verify the sizing needed for both the project and adjacent future projects.

- Plan and pay for needed improvements in an equitable manner with the costs of new growth borne by future developments

It is expected that the Park Place Crossing project will bear the costs of construction and provision of the needed utility improvements, except where additional capacity for adjacent future projects, or "upsizing" is required.

- Identify and implement best practices for on-site treatment of stormwater, water conservation and other practices to reduce service needs and impacts.

Stormwater management methods have been selected from proven best practices to fit the site as appropriate to its soils, infiltration rates, and other needs.

Implementation Strategies

- Identify areas within the Park Place Concept Plan planning area for slope stability hazards and infiltration areas to determine if stormwater should be allowed, limited, or restricted.

Stormwater from Park Place Crossing generally follows the natural drainage patterns for the area. Furthermore, stormwater will be detained and directed to a drainage area currently used by the Trailview Subdivision and appropriate for such continued use.

- Develop a stormwater management system that utilizes a combination of regional detention facilities, green streets and on-site stormwater detention and filtration to minimize runoff and impacts on local waterways.

Park Place Crossing integrates vegetated on-street and regional detention facilities to manage stormwater per best practices for "green streets" to minimize impacts to local waterways.

Parks

The Concept Plan includes two neighborhood parks, each located in a neighborhood center adjacent to commercial, civic, and medium and/or higher density residential land uses. The parks are intended to provide basic recreational opportunities for residents and may include amenities such as play equipment, athletic fields picnic table or shelters, walking trails and other features. The North Village neighborhood includes an 8-10 acre neighborhood park; the South Village park is about 3-5 acres.

Parks needs are consistent with those generally identified the City of Oregon City's existing Parks and

Open Spaces Master Plan. That plan identifies a community park and a neighborhood park service area within the Park Place Concept Plan study area. Local and national guidelines for these types of parks indicate a need for about 10 – 30 acres of developed park land in the planning Implementation City of Oregon City 73 Implementation area. The City is currently updating its Parks and Open Spaces Master Plan, which may provide more specific guidance on the size of future parks in the area and/or needed amenities within them.

The open spaces identified in environmentally constrained portions of the study area are also are expected to provide extensive opportunities for outdoor recreation including an extensive trail system.

Parks and Open Spaces Goals, Policies and Implementation Strategies

Goal

- **Provide parks, open space, and trails consistent with City or national standards, including trail or open space connections between centers.**

The planned park will be connected to Park Place Crossing through on and off-street pedestrian and bicycle facilities. Future connections to the envisioned South Village park area may be accomplished through future projects. The provided park will be ±4.1 acres, proportional with the number of homes provided by the project as a percentage of those imagined within the North Village.

Policies

- Plan for neighborhood parks that are intended for low-impact active and passive recreational activities.

It is anticipated that the provided park, in addition to neighboring property that could be used for an expansion of park areas, could be utilized for a number of different recreational activities. The area, dimensionally, could provide space for football, softball, volleyball, basketball, or any number of other sports fields and general play areas.

- Locate neighborhood parks within comfortable walking distance (e.g. one-half mile) of most residences and easily accessible to pedestrians and bicyclists.

The park would be located centrally within the North Village area, which would locate it within one-half mile of the majority of the Park Place Concept Area. Planned connections allow the park to serve surrounding existing neighborhoods as well without out-of-direction travel to or along Holcomb Boulevard.

- Develop and maintain a system of neighborhood trails to provide a variety of recreational opportunities, such as walking, bicycling and jogging.

On and off-street trail connections have been planned to accommodate recreational opportunities such as walking, bicycling, and jogging. These facilities, including a planned trailhead at the intersection of S Livesay Road and Holly Lane, will allow pedestrians easy access and navigation of the Park Place Crossing area and provide future connections to City trail networks.

- Design the trail system to connect parks and open spaces and provide connections to established neighborhoods where possible.

The planned location of the park and Park Place Crossing's open space areas allows for easy pathway connections between these areas and surrounding neighborhoods. The connections also allow for connections to established neighborhoods, such as S Livesay Road, Journey Drive, Cattle Drive, Shartner Drive, and across natural resource areas via a bridge connection to Oak Valley Drive.

- Promote the location of neighborhood parks adjacent to higher-density residential housing to provide outdoor recreational opportunities for residents of attached housing and to enhance the quality of the neighborhood.

The best location for the park has been determined to be at the southwest corner of the site to allow for expansion to adjacent properties, to benefit from generally flat topography, and the benefit from a more centralized location within the North Village area. This location also places the park adjacent to higher-density residential housing and a planned street intersection with frontage on two future streets. This proximity to planned attached housing and neighborhood commercial areas will allow for greater use and enjoyment of residents and visitors of the Park Place Concept Plan area.

- Allow for flexibility in the siting of future parks while ensuring that locations meet the criteria identified in the Park Place Concept Plan.

The park, as illustrated within the Final Concept Plan map, has been shifted south for the Park Place Crossing Master Plan in order to better locate the facility for the community. Flexibility in the siting of the park will allow for future expansion of the park area and easy access by residents of Park Place Crossing. Adjacent commercial and civic areas will attract foot traffic from those seeking recreation opportunities in the area and align better with future commercial areas west of the PPCMP area. Connecting trails and nearby trailhead facilities will allow easy access to other areas of Oregon City, existing neighborhoods, and additional park facilities. A strict interpretation of the park location within the PPCP Final Concept Plan map would not consider topographic issues, the size of the nearby natural resource area, and these essential connections to its surroundings.

- Support joint uses of community facilities such as schools and parks.

While schools have not been planned within the Park Place Crossing Master Plan area, it is anticipated that planned eventual street and trail extensions will allow easy access to the planned park from existing schools, such as Tumwata Middle School, and future schools that may be sited within the area.

- Conserve and protect natural areas, including environmentally constrained areas unsuitable for development.

Park Place Crossing provides for a greater quantity of open spaces than originally envisioned by the PPCP. This greater provision will allow for habitat areas to be preserved, greater buffers to be provided from existing neighborhoods, and a greater opportunity for recreational trails to be provided. Other areas of the open spaces not improved with soft-surface trails will be protected from encroachment by buildings and activities. These areas are likely to remain under the ownership of a Homeowner's Association and may be acquired by the City in the future.

Implementation Strategies

- Evaluate natural areas for capacity to support recreation uses, such as hiking or biking. Limit or protect human activity as appropriate.
- Coordinate with private property owners regarding development of the trail system.

The open spaces planned will allow for the preservation of habitat areas as well as light recreational uses such as hiking or biking within improved soft-surface trails. Human activity outside of these immediate areas is anticipated to be limited.

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Date: 4/15/2022
To: Kelly Reid, AICP – Oregon City Planning Division
From: Glen Southerland, AICP
Project Name: Park Place Crossing General Development Plan (GDP)
AKS Job No.: **7404**
Subject: **Supplemental Information & Alternative Density Calculations**

In response to staff requests for information, the Applicant's team provides the following information. These supplemental responses are relevant to Oregon City Municipal Code (OCMC) 17.65.050.C due to the to overlay district designations within the Park Place Crossing GDP boundaries.

GDP Supplemental Information

When the subject properties were brought into the Portland Metropolitan Urban Growth Boundary (UGB) in 2002, the City began working on a concept plan to address the needs of the area. The Park Place Concept Plan was adopted in 2008 to focus on these issues. The Park Place Crossing properties were annexed into the City in 2018 through Ordinance No. 18-1007. A condition of annexation approval required a General Development Plan/Master Plan be submitted for the properties – satisfied by this application. A General Development Plan does not authorize any physical alterations to the project site. Those alterations will occur following the submittal and approval of future reviews such as Detailed Development Plans (DDP), NROD Reviews, and Geologic Hazard Reviews for each future phase of the project.

While an application for General Development Plan/Master Plan is not subject to these reviews, reports and other items addressing NROD and Geologic Hazard areas have been included in the record (Exhibits G, K, L, and M) to address the relevant code criteria as they relate to the General Development Plan and demonstrate consistency with these overlay zones. As such, additional information regarding the applicable criteria of OCMC 17.65 is also included below.

17.65.050 - General development plan.

C. Approval Criteria for a General Development Plan. The planning commission may approve an application for general development plan only upon finding that the following approval criteria are met:

4. The proposed general development plan protects any inventoried Goal 5 natural, historic or cultural resources within the proposed development boundary consistent with the provisions of applicable overlay districts.

7. The proposed general development plan is consistent with the underlying zoning district(s) and any applicable overlay zone or concept plans.

Response: To further address this section of OCMC 17.65.050, the portions of OCMC 17.44 and OCMC 17.49 included below which are contextually relevant. Additional information to satisfy the above listed requirements have been included within Exhibits G, K, L, and M as part of this application for a General Development Plan. The General Development Plan does not authorize any physical alteration of the site. Future applications for Detailed

Development Plans will be accompanied by the appropriate applications for Geologic Hazard Review and/or NROD permit, as applicable. With the appropriate responses below, the criteria are adequately addressed and met.

Supplemental Overlay Information

Natural Resource Overlay District

NROD areas within the subject site consist of ravines located at the northwest and south-central portions of the site. The Park Place Crossing GDP is designed to largely avoid these areas and clearly includes them as open space. As discussed previously, approval of a GDP does not authorize physical alteration of the site. For the Park Place Crossing project to move forward, a Detailed Development Plan (DDP) is required. That application is required to be consistent with this GDP and provide a greater level of detail regarding natural resources on the site. At that time, a Natural Resource Overlay Permit will be necessary and ready for City review.

17.49.010 - Purpose.

The natural resource overlay district designation provides a framework for protection of Metro Titles 3 and 13 lands, and Statewide Planning Goal 5 resources within Oregon City. The natural resource overlay district (NROD) implements the Oregon City Comprehensive Plan Natural Resource Goals and Policies, as well as Federal Clean Water Act requirements for shading of streams and reduction of water temperatures, and the recommendations of the Metro ESEE Analysis. It is intended to resolve conflicts between development and conservation of habitat, stream corridors, wetlands, and floodplains identified in the city's maps. The NROD contributes to the following functional values:

A. Protect and restore streams and riparian areas for their ecologic functions and as an open space amenity for the community.

B. Protect floodplains and wetlands, and restore them for improved hydrology, flood protection, aquifer recharge, and habitat functions.

C. Protect upland habitats, and enhance connections between upland and riparian habitat.

D. Maintain and enhance water quality and control erosion and sedimentation through the revegetation of disturbed sites and by placing limits on construction, impervious surfaces, and pollutant discharges.

E. Conserve scenic, recreational, and educational values of significant natural resources.

The NROD ecological functions listed above are planned for integration with existing neighborhoods, new residential and commercial developments. The long-term goal of the NROD is to restore and enhance stream corridors, wetlands, and forests to more natural vegetated conditions, recognizing that existing homes and other existing uses will continue in the district. This chapter does not regulate the development within the identified water resource. Separate permits from the Division of State Lands and the Army Corp of Engineers may be required for work within a stream or wetland.

Response: This purpose statement is aspirational in nature and provides content for the standards and criteria that are relevant to the NROD. The Park Place Crossing General Development Plan preserves NROD areas through the designation of open space areas. The open space tracts will protect streams and riparian areas for their ecological functions and as amenities for the community. Trails, including some pictured within the City's Trails Master Plan, have been planned to allow the enjoyment of NROD areas by the community while protecting upland habitats that maintain and enhance water quality.

NROD areas (as mapped by the City) are shown on Sheet P-19 of Exhibit A. Some of these areas, such as those within Phase 5, are outside of the Applicant's current areas of control and, as such, may require some refinement of the site plan at the time of application for a Detailed Development Plan and NROD permit.

17.49.040 - NROD permit and review process.

An NROD permit is required for those uses regulated under OCMC 17.49.090, Uses Allowed under Prescribed Conditions. An NROD permit shall be processed under the Type II development permit procedure, unless an adjustment of standards pursuant to OCMC 17.49.200 is requested or the application is being processed in conjunction with a concurrent application or action requiring a Type III or Type IV development permit.

Response: As described previously, an NROD permit will be submitted with future Detailed Development Plan applications which such activities are proposed. This application is for a General Development Plan, which does not provide authorization to divide property, alter the site, or construct anything on the property.

17.49.040 - NROD permit and review process.

An NROD permit is required for those uses regulated under OCMC 17.49.090, Uses Allowed under Prescribed Conditions. An NROD permit shall be processed under the Type II development permit procedure, unless an adjustment of standards pursuant to OCMC 17.49.200 is requested or the application is being processed in conjunction with a concurrent application or action requiring a Type III or Type IV development permit.

Response: At such time that the uses regulated by OCMC 17.49.090 are proposed, an NROD permit application will be submitted. It is understood that such a permit will be processed as described above.

17.49.070 - Prohibited uses.

The following development and activities are not allowed within the NROD:

A. **Any new gardens, lawns, structures, development, other than those allowed outright (exempted) by the NROD or that is part of a regulated use that is approved under prescribed conditions. Note: Gardens and lawns within the NROD that existed prior to the time the overlay district was applied to a subject property are allowed to continue but cannot expand further into the overlay district.**

B. **New lots that would have their buildable areas for new development within the NROD are prohibited.**

C. **The dumping of materials of any kind is prohibited except for placement of fill as provided in subsection D. below. The outside storage of materials of any kind is prohibited unless they existed before the overlay district was applied to a subject property. Uncontained areas of hazardous materials as defined by the Oregon Department of Environmental Quality (ORS 466.005) are also prohibited.**

D. **Grading, the placement of fill in amounts greater than ten cubic yards, or any other activity that results in the removal of more than ten percent of the existing native vegetation on any lot within the NROD is prohibited, unless part of an approved development activity.**

Response: These standards are understood and the listed activities are not relevant to this GDP application.

17.49.080 - Uses allowed outright (exempted).

The following uses are allowed within the NROD and do not require the issuance of an NROD permit:

A. Stream, wetland, riparian, and upland restoration or enhancement projects as authorized by the city.

B. Farming practices as defined in ORS 215.203 and farm uses, excluding buildings and structures, as defined in ORS 215.203.

C. Utility service using a single utility pole.

D. Boundary and topographic surveys leaving no cut scars greater than three inches in diameter on live parts of native plants listed in the Oregon City Native Plant List.

E. Soil tests, borings, test pits, monitor well installations, and other minor excavations necessary for geotechnical, geological or environmental investigation, provided that disturbed areas are restored to pre-existing conditions as approved by the community development director.

F. Trails meeting all of the following:

1. Construction shall take place between May 1 and October 30 with hand held equipment;
2. Widths shall not exceed forty-eight inches and trail grade shall not exceed twenty percent;
3. Construction shall leave no scars greater than three inches in diameter on live parts of native plants;
4. Located no closer than twenty-five feet to a wetland or the top of banks of a perennial stream, or no closer than ten feet of an intermittent stream;
5. No impervious surfaces; and
6. No native trees greater than one-inch in diameter may be removed or cut, unless replaced with an equal number of native trees of at least two-inch diameter and planted within ten feet of the trail.

G. Land divisions provided they meet the following standards, and indicate the following on the final plat:

1. Lots shall have their building sites (or buildable areas) entirely located at least five feet from the NROD boundary shown on the city's adopted NROD map. For the purpose of this subparagraph, "building site" means an area of at least three thousand five hundred square feet with minimum dimensions of forty feet wide by forty feet deep;
2. All public and private utilities (including water lines, sewer lines or drain fields, and stormwater disposal facilities) are located outside the NROD;
3. Impervious streets, driveways and parking areas shall be located at least ten feet from the NROD; and
4. The NROD portions of all lots are protected by:
   a. A conservation easement; or
   b. A lot or tract created and dedicated solely for unimproved open space or conservation purposes.

H. Site plan and design review applications where all new construction is located outside of the NROD boundary shown on the city's adopted NROD map, and the NROD area is protected by a conservation easement approved in form by the city.

I. Routine repair and maintenance of existing structures, roadways, driveways and utilities.

J. Replacement, additions, alterations and rehabilitation of existing structures, roadways, utilities, etc., where the ground level impervious surface area is not increased.

K. Measures approved by the city of Oregon City to remove or abate nuisances or hazardous conditions.

L. Tree Removal. The community development director may permit the removal of any tree determined to be a dead, hazardous, or diseased tree as defined in OCMC 17.04. Any tree that is removed in accordance with this subsection L shall be replaced with a new tree of at least one-half-inch caliper or at least six foot overall height. An exception to this requirement may be granted if the applicant demonstrates that a replacement tree has already been planted in anticipation of tree removal, or if the existing site conditions otherwise preclude tree replacement (due to existing dense canopy coverage or other ecological reasons).

The replacement tree(s) shall be located in the general vicinity of the removed tree(s), somewhere within NROD on the property. The replacement tree(s) shall be identified on the Oregon City Native Plant List or other locally adopted plant list (e.g. Metro or Portland). The property owner shall ensure that the replacement tree(s) survives at least two years beyond the date of its planting.

M. Planting of native vegetation and the removal of non-native, invasive vegetation (as identified on the Oregon City Native Plant List or other locally adopted plant list (e.g. Metro or Portland), or as recommended by an environmental professional with experience and academic credentials in one or more natural resource areas such as ecology, arboriculture, horticulture, wildlife biology, botany, hydrology or forestry), and removal of refuse and fill, provided that:

1. All work is done using hand-held equipment;
2. No existing native vegetation is disturbed or removed; and
3. All work occurs outside of wetlands and the top-of-bank of streams.

N. Activities in which no more than one hundred square feet of ground surface is disturbed outside of the bankfull stage of water bodies and where the disturbed area is restored to the pre-construction conditions, notwithstanding that disturbed areas that are predominantly covered with invasive species shall be required to remove the invasive species from the disturbance area and plant trees and native plants pursuant to this chapter.

O. New fences meeting all of the following:

1. No taller than three and a half feet and of split rail or similar open design;
2. Two feet width on both sides of fence shall be planted or seeded with native grasses, shrubs, herbs, or trees to cover any bare ground;
3. Six inches of clearance from ground level;
4. Fence posts shall be placed outside the top-of-bank of streams and outside of delineated wetlands.

P. Gardens, fences and lawns within the NROD that existed prior to the time the overlay district was applied to a subject property are allowed to be maintained but cannot expand further into the overlay district.

Response: Exempt activities necessary to prepare the GDP application such as boundary and topographic surveys, soil tests, borings, test pits, and other minor excavations necessary for geotechnical, geological or environmental investigation have or will be completed prior to the submittal of a Detailed Development Plan and/or NROD permit application.

17.49.090 - Uses allowed under prescribed conditions.

The following uses within the NROD are subject to the applicable standards listed in OCMC 17.49.100 through 17.49.190 pursuant to a Type II process:

A. Alteration to existing structures within the NROD when not exempted by OCMC 17.49.080, subject to OCMC 17.49.130.

B. A residence on a highly constrained vacant lot of record that has less than three thousand square feet of buildable area, with minimum dimensions of fifty feet by fifty feet, remaining outside the NROD portion of the property, subject to the maximum disturbance allowance prescribed in OCMC 17.49.120.A.

C. A land division that would create a new lot for an existing residence currently within the NROD, subject to OCMC 17.49.160.

D. Land divisions when not exempted by OCMC 17.49.080, subject to the applicable standards of OCMC 17.49.160.

E. Trails/pedestrian paths when not exempted by OCMC 17.49.080, subject to OCMC 17.49.170 (for trails) or OCMC 17.49.150 (for paved pedestrian paths).

F. New roadways, bridges/creek crossings, utilities or alterations to such facilities when not exempted by OCMC 17.49.080.

G. Roads, bridges/creek crossings subject to OCMC 17.49.150.

H. Utility lines subject to OCMC 17.49.140.

I. Stormwater detention or pre-treatment facilities subject to OCMC 17.49.155.

J. Institutional, industrial or commercial development on a vacant lot of record situated in an area designated for such use that has more than seventy-five percent of its area covered by the NROD, subject to OCMC 17.49.120.B.

K. City, county and state capital improvement projects, including sanitary sewer, water and stormwater facilities, water stations, and parks and recreation projects.

L. Non-hazardous tree removal that is not exempted pursuant to OCMC 17.49.080.K.

M. Fences that do not meet the standards for exemption pursuant to OCMC 17.49.080.O.4.

Response: This application involves a General Development Plan to guide future applications approving specific project improvements. Future DDP and NROD permits are anticipated to include some of these activities in the NROD (e.g., utility lines, trails, etc.). With those applications, necessary details demonstrating compliance with specific standards will be available and provided for review.

17.49.100 - General development standards.

The following standards apply to all uses allowed under prescribed conditions within the NROD with the exception of rights-of-way (subject to OCMC 17.49.150), trails (subject to OCMC 17.49.170), utility lines (subject to OCMC 17.49.140), land divisions (subject to OCMC 17.49.160), and mitigation projects (subject to OCMC 17.49.180 or 17.49.190):

Response: The following standards apply to the uses allowed within an NROD under prescribed conditions (listed above). As described above, this GDP application will not cause any of the above uses to be established on-site, including within the NROD areas.

A. Native trees shall be preserved unless they are located within ten feet of any proposed structures or within five feet of new driveways, or if deemed not wind-safe by a certified arborist. Trees listed on the Oregon City Nuisance Plant List or Prohibited Plant List are exempt from this standard and may be

removed. A protective covenant shall be required for any native trees that remain;

Response: Areas within Park Place Crossing that have been designated within the NROD are located such that they will be preserved within open space tracts. Existing tree locations have been provided as part of the Preliminary Plans (Exhibit A). These standards are understood and Park Place Crossing is expected to satisfy this standard. Structures and driveways will be located an appropriate distance from native trees unless deemed not wind-safe by a certified arborist.

B. The community development director may allow the landscaping requirements of the base zone, other than landscaping required for parking lots, to be met by preserving, restoring and permanently protecting habitat on development sites in the natural resource overlay district;

Response: These standards are not expected to apply to Park Place Crossing as the majority of mapped NROD areas are located within common open space tracts and within areas not subject to landscaping requirements. As appropriate, Park Place Crossing will comply with this standard.

C. All vegetation planted in the NROD shall be native and listed on the Oregon City Native Plant List or other locally adopted plant list (e.g. Metro or Portland), or as recommended by an environmental professional with experience and academic credentials in one or more natural resource areas such as ecology, arboriculture, horticulture, wildlife biology, botany, hydrology or forestry);

Response: If plantings within the project's NROD areas are deemed necessary, this standard will be met.

D. Grading is subject to installation of erosion control measures required by the city;

Response: Although this GDP application does not propose grading, this standard is understood and erosion control measures will be implemented through future DDP applications, as needed.

E. The minimum front, street, or garage setbacks of the base zone may be reduced to any distance between the base zone minimum and zero in order to minimize the disturbance area within the NROD portion of the lot;

Response: Although new home construction is not authorized with this GDP application, this standard is understood and future DDP and NROD applications may involve reduced front, street, or garage setbacks in order to minimize the disturbance of NROD portions of the lots; however, this action is not expected with this application for General Development Plan.

F. Any maximum required setback in any zone, such as for multi-family, commercial or institutional development, may be increased to any distance between the maximum and the distance necessary to minimize the disturbance area within the NROD portion of the lot;

Response: This GDP application does not involve construction of these items included by the standard. However, this standard is understood and future applications may demonstrate a reduction in the required setbacks for commercial projects (if applicable); however, these reductions are not required at this time.

G. Fences in compliance with OCMC 17.49.080.N;

Response: This GDP application does not include fence construction. However, this standard is understood. If fencing is deemed to be necessary within an NROD area, it is expected to comply with these standards.

H. Exterior lighting shall be placed or shielded so that they do not shine directly into resource areas;

Response: This GDP application does not include approval that would allow lighting to be installed within or in proximity to an NROD area. However, this standard is understood and future lighting is expected to be placed and shielded as necessary.

I. If development will occur within the one hundred-year floodplain, the standards of OCMC 17.42 shall be met; and

Response: This standard does not apply to Park Place Crossing. The NROD area within the project boundary does not feature 100-year floodplain.

J. Mitigation of impacts to the regulated buffer is required, subject to OCMC 17.49.180 or 17.49.190.

Response: This standard is understood and is expected to be met with future applications.

17.49.240 - Density transfer.

The NROD allocates urban densities to the non-NROD portions of properties located partially within the NROD, generally resulting in a substantial increase in net development potential.

For lots of record that are located within the NROD, density transfer is allowed, subject to the following provisions:

Response: As the GDP includes approximately 14.3 acres of mapped NROD land to be located within open spaces, a density transfer is planned to be utilized. NROD density transfers are regulated by OCMC 17.49.240. The standards included allow for a percentage of the NROD area to be considered towards the project's net developable area. This standard is provided separate to the density modifications permitted through the General Development Plan process (110% of the base zoning density).

A. Density may be transferred from the NROD to non-NROD portions of the same property or of contiguous properties within the same development site;

Response: This GDP application illustrates an NROD density transfer (as permitted herein) for the Park Place Crossing site, a series of contiguous properties with NROD-affected areas.

B. The residential transfer credit shall be as follows: For new residential partitions and subdivisions, one-third of the area of the NROD tract or conservation easement area may be added to the net developable area outside of the tract or conservation easement area within the boundary of the development site in order to calculate the allowable number of lots.

Response: Sheet P-18 of Exhibit A (the General Development Plans) demonstrates that density transfer allows for an additional ±4.8 acres (±14.3 acres x ⅓) of NROD designated land to be considered as part of the net developable area of Park Place Crossing.

C. Permitted Modifications to Residential Dimensional Standards. In order to allow for a transfer of density pursuant to subsection B above, the dimensional standards of the base zone may be modified in order minimize disturbance to the NROD. The permissible reductions are specified in Tables 17.49.240.A—17.49.240.C.

Response: As discussed above, this application for a GDP does not authorize any physical alterations to the project site. The NROD density transfer figures discussed are based on the estimated locations mapped by the City. As such, future refinement of the final figure may be needed during an application for DDP and NROD permit; however, using the prescribed methods outlined below result in a density both above the minimum required number and below the maximum allowed. Future applications for Detailed Development Permit and NROD permit will all for a specific calculation based on known site conditions.

The permitted modifications included within Tables 17.49.240.A through C have been applied as needed to some, but not all of the residential lots planned within Park Place Crossing. As Park Place Crossing involves a General Development Plan/Master Plan, standards are typically applied consistently throughout the Master Plan area rather than within isolated "splotches" of zoning. For example, density was calculated using a composite of the requirements for residential zones and uses included within the project boundaries ("Composite Maximum Residential Density" included on Sheet P-18 of the Preliminary Plans). Application of standards in such a manner promotes efficiency in land development within the project area through provision of a consistent neighborhood appearance, layout, and infrastructure rather than a disjointed arrangement of lot sizes, setbacks, and housing types corresponding to their base zoning.

From Table 17.49.240.A, lots with existing R-5 zoning have not received an allowed lot size reduction through an NROD density transfer. Such an adjustment, however, would permit through an NROD reduction and a GDP adjustment, a lot size minimum of 2,400 square feet. Lots within the existing R-10 zoning district have been proposed with a minimum lot size of 4,000 square feet, as determined through the allowed adjustment of up to 20% per OCMC 17.65.070.C.1 to the reduced standards shown within Table 17.49.240.A, below.

Reduced setbacks, such as those shown within Tables 17.49.240.B and C, have been planned to apply to the NROD-reduced lots as well. Instead of those specified within the Low Density Residential District dimensional standards of Table 17.08.040, those for lots between 4,000 and 5,999 square feet below would apply, bringing those lots into further conformity with surrounding lots within an R-5 zoning.

This criterion is met.

D. The applicant shall demonstrate that the minimum lot size of the underlying zone has been met. The area of the NROD in subsection B. above that is used to transfer density may be included in the calculation of the average minimum lot size.

Response: Lot sizes for Park Place Crossing were determined through the processes outlined within this Chapter and explained above. This criterion is met.

E. The applicant may choose to make the adjustments over as many lots as required.

Response: This standard is understood.

Table 17.49.240.A
Lot Size Reductions Allowed for NROD Density Transfers

ZONE	Minimum Lot Size (%)	Minimum Lot Width	Minimum Lot Depth
R-10	5,000 square feet	50’	65’
R-5	3,000 square feet	30’	50’

Table 17.49.240.B
Reduced Dimensional Standards for Detached Single-Family Residential Units

Size of Reduced Lot	Front Yard Setback	Rear Yard Setback	Side Yard Setback	Corner Side	Lot Coverage
8,000—9,999 square feet	15 feet	20 feet	7/9 feet	15 feet	40%
6,000—7,999 square feet	10 feet	15 feet	5/7 feet	15 feet	40%
4,000—5,999 square feet	10 feet	15 feet	5/5 feet	10 feet	40%
1,800—3,999 square feet	5 feet	15 feet	5/5 feet	10 feet	55%

Table 17.49.240.C
Reduced Dimensional Standards for Single-Family Attached or Two-Family Residential Units

Size of Reduced Lot	Front Yard Setback	Rear Yard Setback	Side Yard Setback	Corner Side	Lot Coverage
3,500—7,000 square feet	10 feet	15 feet	5/0 * feet	10 feet	40%
1,800—3,499 square feet	5 feet	15 feet	5/0 * feet	10 feet	55%

***Zero foot setback is only allowed on single-family attached units.**

F. For density transfers on properties zoned commercial, institutional, industrial or multi-family, the transfer credit ratio is ten thousand square feet per acre of land within the NROD;

Response: This GDP does not illustrate that a density transfer is planned for properties within Park Place Crossing zoned other than the residentially-designated lands as described herein. This standard does not apply.

G. The area of land contained in the NROD area may be excluded from the calculations for determining compliance with minimum density requirements of the land division code.

Response: The GDP illustrates that NROD areas were not included towards determining compliance with minimum density requirements.

H. The owner of the transferring property shall execute a covenant that records the transfer of density. The covenant shall be found to meet the requirements of this section and be recorded before building permits are issued.

Response: This standard is understood and such a covenant will be provided.

I. All other applicable development standards, including setbacks, building heights, and maximum lot coverage shall continue to apply when a density transfer occurs.

Response: This standard is understood.

17.49.250 - Verification of NROD boundary.

The NROD boundary may have to be verified occasionally to determine the true location of a resource and its functional values on a site. This may be through a site specific environmental survey or a simple site visit in those cases where existing information demonstrates that the NROD significance rating does not apply to a site-specific area. Applications for development on a site located in the NROD area may request a determination that the subject site is not in an NROD area and therefore is not subject to the standards of OCMC 17.49.100. Verifications shall be processed as either a Type I or Type II process.

Response: Based upon the GDP application, it is anticipated that a Type I NROD verification will be included with an upcoming Detailed Development Plan application. Information provided with this application include an NROD Memorandum (Exhibit G), which gives a general overview of the site and mapped NROD areas.

Geologic Hazards

Portions of the project site contain slopes regulated by this Chapter of the municipal code. Generally, these areas are located within drainage areas at the northwest and south-central portions of the site; however, some isolated pockets of steeper topography are located within other portions of the site. Information regarding these areas is included in Exhibits K, L, and M of the Park Place Crossing application.

17.44.010 - Intent and purpose.

The intent and purpose of the provisions of this chapter are:

A. To ensure that activities in geologic hazard areas are designed based on detailed knowledge of site conditions in order to reduce the risk of private and public losses;

B. To establish standards and requirements for the use of lands within geologic hazard areas;

C. To provide safeguards to prevent undue hazards to property, the environment, and public health, welfare, and safety in connection with use of lands within geologic hazard areas;

D. To mitigate risk associated with geologic hazard areas, not to act as a guarantee that the hazard risk will be eliminated, nor as a guarantee that there is a higher hazard risk at any location. Unless otherwise provided, the geologic hazards regulations are in addition to generally applicable standards provided elsewhere in the Oregon City Municipal Code.

Response: As discussed previously, approval of a GDP does not authorize physical alteration of the site. For the Park Place Crossing project to move forward, a DDP is required. That application is required to be consistent with this GDP and provide a greater level of detail regarding Geologic Hazards on the site. At that time a Geologic Hazards Review will be necessary and ready for City review.

17.44.025 - When required; regulated activities; permit and approval requirements.

No person shall engage in any of the following regulated activities within the adopted Oregon City Geologic Hazards Overlay Zone as defined in section 17.04.515 of the

Oregon City Municipal Code without first obtaining permits or approvals as required by this chapter:

A. Installation or construction of an accessory structure greater than 500 square feet in area;

B. Development of land, construction, reconstruction, structural alteration, relocation or enlargement of any building or structure for which permission is required pursuant to the Oregon City Municipal Code;

C. Tree removal on slopes greater than 25 percent where canopy area removal exceeds 25 percent of the lot.

D. Excavation which exceeds two feet in depth, or which involves twenty-five or more cubic yards of volume;

The requirements of this chapter are in addition to other provisions of the Oregon City Municipal Code. Where the provisions of this chapter conflict with other provisions of the Oregon City Municipal Code, the provisions that are the more restrictive of regulated development activity shall govern.

Response: The Park Place Crossing General Development Plan does not involve, and City approval of the GDP does not authorize the activities listed above within areas regulated by this Chapter. When regulated activities such as those listed above are proposed in the Geologic Hazard Overlay Zone (e.g., part of a DDP application), a Geologic Hazard Overlay Zone permit will be submitted for review and approval by the City.

17.44.030 - Procedures.

No building or site development permit or other authorization for development shall be issued until the plans and other documents required by this chapter have been reviewed and found by the review authority to comply with the requirements of this chapter.

A. Where the development is part of a land use permit application, review shall occur in the manner established in Chapter 17.50 for review of land use decisions.

B. Where the development is part of a limited land use permit application, review shall occur in the manner established in Chapter 17.50 for review of limited land use decisions.

C. Where the development is solely part of a grading permit or building permit, the city engineer may allow review to occur in the manner established in Title 15, Chapters 15.04 and 15.48 if the application meets Section 17.44.060 development standards.

D. For any other proposed development not otherwise subject to review as a land use or limited land use permit application, review shall occur in the manner established in Chapter 17.50 for limited land use decisions.

Response: As this application involves a General Development Plan, building permits, site development permits, or other authorization for development (e.g., physical site alterations) are not relevant at this time. Future applications for Geologic Hazard Review are planned to be provided with future applications for Detailed Development Plan as that type of application may involve the types of permits/development desired above. At such time that an application is made, the procedures outlined above, as applicable, will apply.

17.44.035 - Exemptions.

The following activities, and persons engaging in same, are EXEMPT from the provisions of this chapter.

A. An excavation which is less than two feet in depth, or which involves less than twenty-five cubic yards of volume;

B. A fill which does not exceed two feet in depth or twenty-five cubic yards of volume;

C. Structural alteration of any structure of less than five hundred square feet that does not involve grading as defined in this chapter;

D. Installation, construction, reconstruction, or replacement of utility lines in city right-of-way, or public easement, not including electric substations;

E. The removal or control of noxious vegetation;

F. Emergency actions which must be undertaken immediately to prevent an imminent threat to public health or safety, or prevent imminent danger to public or private property. The person undertaking emergency action shall notify the building official on all regulated activities associated with any building permit or city engineer/public works director on all others within one working day following the commencement of the emergency activity. If the city engineer/public works director or building official determine that the action or part of the action taken is beyond the scope of allowed emergency action, enforcement action may be taken.

Response: The application involves a General Development Plan/Master Plan application. The activities listed above are exempt from the provisions of this Chapter and may be proposed at a future point in time. This may include things such as noxious vegetation removal, but is not certain at this point in time.

17.44.050 - Development—Application requirements and review procedures and approvals.

Except as provided by subsection B. of this section, the following requirements apply to all development proposals subject to this chapter:

A. A geological assessment and geotechnical report that specifically includes, but is not limited to:

1. Comprehensive information and data regarding the nature and distribution of underlying geology, the physical and chemical properties of existing soils and groundwater; an opinion of site geologic stability, and conclusions regarding the effect of geologic conditions on the proposed development. In addition to any field reconnaissance or subsurface investigation performed for the site, the following resources, as a minimum, shall be reviewed to obtain this information and data:

   […]

2. Information and recommendations regarding existing local drainage, proposed permit activity impacts on local drainage, and mitigation to address adverse impacts;

3. Comprehensive information about site topography;

4. Opinion as to the adequacy of the proposed development from an engineering standpoint;

5. Opinion as to the extent that instability on adjacent properties may adversely affect the project;

6. Description of the field investigation and findings, including logs of subsurface conditions and laboratory testing results;

7. Conclusions regarding the effect of geologic conditions on the proposed development, tree removal, or grading activity;

8. Specific requirements and recommendations for plan modification, corrective grading, and special techniques and systems to facilitate a safe and stable site;

9. Recommendations and types of considerations as appropriate for the type of proposed development:
   a. General earthwork considerations, including recommendations for temporary and permanent cut and fill slopes and placement of structural fill;
   b. Location of residence on lot;
   c. Building setbacks from slopes;
   d. Erosion control techniques applicable to the site;
   e. Surface drainage control to mitigate existing and potential geologic hazards;
   f. Subdrainage and/or management of groundwater seepage;
   g. Foundations;
   h. Embedded/retaining walls;
   i. Management of surface water and irrigation water; and
   j. Impact of the development on the slope stability of the lot and the adjacent properties.
10. Scaled drawings that describe topography and proposed site work, including:
    […]
11. For properties greater than one acre, a preliminary hydrology report, prepared by a suitably qualified and experienced hydrology expert, addressing the effect upon the watershed in which the proposed development is located; the effect upon the immediate area's stormwater drainage pattern of flow, the impact of the proposed development upon downstream areas and upon wetlands and water resources; and the effect upon the groundwater supply.

Response: Although the project involves a General Development Plan/Master Plan application, and not a Detailed Development Plan or Geologic Hazard Area Overlay Zone Permit, the materials include a Preliminary Geotechnical Report (Exhibit K), a memo regarding slopes on the site (Exhibit L), and an additional memo regarding the Geologic Hazard Overlay Zone. Information included therein was created using the information and data sources listed above and includes recommendations regarding the existing and planned local drainage, possible future activities, and the safety of such activities.

B. Review procedures and approvals require the following:
1. Examination to ensure that:
   a. Required application requirements are completed;
   b. Geologic assessment and geotechnical report procedures and assumptions are generally accepted; and
   c. All conclusions and recommendations are supported and reasonable.
2. Conclusions and recommendations stated in an approved assessment or report shall then be directly incorporated as permit conditions or provide the basis for conditions of approval for the regulated activity.
3. All geologic assessments and geotechnical reports shall be reviewed by an engineer certified for expertise in geology or geologic engineering and geotechnical engineering, respectively, as determined by the city. The city will prepare a list of prequalified consultants for this purpose. The cost of review by independent review shall be paid by the applicant.

C. The city engineer may waive one or more requirements of subsections A and B of this section if the city engineer determines that site conditions, size or type or development of grading requirements do not warrant such detailed information. If one or more requirements are waived, the city engineer shall, in the staff report or decision, identify the waived provision(s), explain the reasons for the waiver, and state that the waiver may be challenged on appeal and may be denied by a subsequent review authority.

Response: Although it is understood that this GDP application does not involve the approval of site alterations/regulated activities, it is expected that a future application for Geologic Hazard Review will be reviewed according to the above requirements.

17.44.060 - Development standards.

Notwithstanding any contrary dimensional or density requirements of the underlying zone, the following standards shall apply to the review of any development proposal subject to this chapter. Requirements of this chapter are in addition to other provision of the Oregon City Municipal Code. Where provision of this chapter conflict with other provision of the Oregon City Municipal Code, the provisions that are more restrictive of regulated development activity shall govern.

A. All developments shall be designed to avoid unnecessary disturbance of natural topography, vegetation and soils. To the maximum extent practicable as determined by the review authority, tree and ground cover removal and fill and grading for residential development on individual lots shall be confined to building footprints and driveways, to areas required for utility easements and for slope easements for road construction, and to areas of geotechnical remediation.

Response: As this application involves a GDP, disturbances to natural topography, vegetation, and soils will not result because approval of a GDP application does not authorize physical site alterations. That said, the Park Place Crossing GDP has been designed to avoid unnecessary disturbance of the natural topography, vegetation, and soils to the greatest extent practicable. Site alterations are anticipated to be necessary to implement the GDP which has been required as part of the annexation application. Implementation of the roads, utilities, blocks, and development types envisioned in the Park Place Concept Plan require these site alterations. As it is appropriate, future applications for DDP and Geologic Hazard Review will provide details regarding these necessary site alterations. Please see Exhibits K, L, and M for further details.

B. All grading, drainage improvements, or other land disturbances shall only occur from May 1 to October 31. Erosion control measures shall be installed and functional prior to any disturbances. The city engineer may allow grading, drainage improvements or other land disturbances to begin before May 1 (but no earlier than March 16) and end after October 31 (but no later than November 30), based upon weather conditions and in consultation with the project geotechnical engineer. The modification of dates shall be the minimum necessary, based upon the evidence provided by the applicant, to accomplish the necessary project goals. Temporary protective fencing shall be established around all trees and vegetation designed for protection prior to the commencement of grading or other soil disturbance.

Response: These procedures are anticipated to be met when appropriate.

C. Designs shall minimize the number and size of cuts and fills.

Response: As shown on the GDP application plans, grading will be needed for roads, gravity utilities, etc. However, the design minimizes the number of cuts and fills and provides documentation that such activities can be done in a safe manner.

D. Cut and fill slopes, such as those for a street, driveway accesses, or yard area, greater than seven feet in height (as measured vertically) shall be terraced. Faces on a terraced section shall not exceed five feet. Terrace widths shall be a minimum of three feet and shall be vegetated. Total cut and fill slopes shall not exceed a vertical height of fifteen feet. Except in connection with geotechnical remediation plans approved in accordance with the chapter, cuts shall not remove the toe of any slope that contains a known landslide or is greater than twenty-five percent slope. The top of cut or fill slopes not utilizing structural retaining walls shall be located a minimum of one-half the height of the cut slope from the nearest property line.

Response: This GDP application does not authorize physical site alterations but does include a preliminary grading plan that illustrates areas where earthwork is anticipated to occur. Future applications for a DDP and Geologic Hazard Review will include a detailed preliminary grading plan that illustrates necessary cuts and fills as well as required terracing, as applicable.

E. Any structural fill shall be designed by a suitably qualified and experienced civil or geotechnical engineer licensed in Oregon in accordance with standard engineering practice. The applicant's engineer shall certify that the fill has been constructed as designed in accordance with the provisions of this chapter.

Response: This standard is understood. It is anticipated that during the appropriate process, structural fill designed by a qualified engineer will be provided.

F. Retaining walls shall be constructed in accordance with the Oregon Structural Specialty Code adopted by the State of Oregon.

Response: This standard is understood.

G. Roads shall be the minimum width necessary to provide safe vehicle and emergency access, minimize cut and fill and provide positive drainage control. The review authority may grant a variance from the city's required road standards upon findings that the variance would provide safe vehicle and emergency access and is necessary to comply with the purpose and policy of this chapter.

Response: The GDP application Park Place Crossing preliminary plans are being designed with the width necessary to provide safe vehicle and emergency access, provide appropriate drainage control, and minimize cuts and fills to the surrounding areas. A variance to this standard has not been sought.

H. Density shall be determined as follows:

1. For those areas with slopes less than twenty-five percent between grade breaks, the allowed density shall be that permitted by the underlying zoning district;
2. For those areas with slopes of twenty-five to thirty-five percent between grade breaks, the density shall not exceed two dwelling units per acre except as otherwise provided in subsection I of this section;

3. **For those areas with slopes over thirty-five percent between grade breaks, development shall be prohibited except as otherwise provided in subsection I.4. of this section.**

Response: Exhibits K, L, and M demonstrate that the planned improvements can be feasibly and safely accomplished without adversely affecting slope stability. The small, isolated areas within the residential portions of the site require grading in order to provide public streets, underground utilities, home sites, and access to the residences. Density calculations for Park Place Crossing are included on Sheet P-18 of the Preliminary Plans (Exhibit A). Areas with slopes over 35 percent have not been considered for home placement and have been utilized where necessary only for roads, utilities, etc. that are permitted by OCMC 17.44.060.I.4 below. This standard is met.

I. For properties with slopes of twenty-five to thirty-five percent between grade breaks:

1. **For those portions of the property with slopes of twenty-five to thirty-five percent, the maximum residential density shall be limited to two dwelling units per acre; provided, however, that where the entire site is less than one-half acre in size, a single dwelling shall be allowed on a lot or parcel existing as of January 1, 1994 and meeting the minimum lot size requirements of the underlying zone;**
2. **An individual lot or parcel with slopes between twenty-five and thirty-five percent shall have no more than fifty percent or four thousand square feet of the surface area, whichever is smaller, graded or stripped of vegetation or covered with structures or impermeable surfaces.**
3. **No cut into a slope of twenty-five to thirty-five percent for the placement of a housing unit shall exceed a maximum vertical height of fifteen feet for the individual lot or parcel.**
4. **For those portions of the property with slopes over thirty-five percent between grade breaks:**
   a. **Notwithstanding any other city land use regulation, development other than roads, utilities, public facilities and geotechnical remediation shall be prohibited; provided, however, that the review authority may allow development upon such portions of land upon demonstration by an applicant that failure to permit development would deprive the property owner of all economically beneficial use of the property. This determination shall be made considering the entire parcel in question and contiguous parcels in common ownership on or after January 1, 1994, not just the portion where development is otherwise prohibited by this chapter. Where this showing can be made on residentially zoned land, development shall be allowed and limited to one single-family residence. Any development approved under this chapter shall be subject to compliance with all other applicable city requirements as well as any applicable state, federal or other requirements;**
   b. **To the maximum extent practicable as determined by the review authority, the applicant shall avoid locating roads, utilities, and public facilities on or across slopes exceeding thirty-five percent.**

Response: This standard is understood. Building envelopes have not yet been determined; however, further information will be provided with future applications for DDP and Geologic Hazard Review permits. Grading within areas with slopes over 35 percent have not been planned except for those intended for roads, utilities, public facilities, and geotechnical remediation. Further information will be provided with future applications for Geologic Hazard Review and DDP. Exhibits K, L, and M provide sufficient information to determine the safety of the overall site plans from a geotechnical engineer. The location of Holly Lane is prescribed by the Transportation Systems Plan, Park Place Concept Plan, roadway construction and curvature standards, and other factors such as the “chokepoint” at the southern edge of Phase 1. To the maximum extent practicable, roads, utilities, and public facilities were located as to avoid areas with slopes exceeding 35 percent.

J. **The geotechnical engineer of record shall review final grading, drainage, and foundation plans and specifications and confirm in writing that they are in conformance with the recommendations provided in their report.**

K. **At the city's discretion, peer review shall be required for the geotechnical evaluation/investigation report submitted for the development and/or lot plans. The peer reviewer shall be selected by the city. The applicant's geotechnical engineer shall respond to written comments provided by the city's peer reviewer prior to issuance of building permit.**

L. **The review authority shall determine whether the proposed methods of rendering a known or potential hazard site safe for construction, including proposed geotechnical remediation methods, are feasible and adequate to prevent landslides or damage to property and safety. The review authority shall consult with the city's geotechnical engineer in making this determination. Costs for such consultation shall be paid by the applicant. The review authority may allow development in a known or potential hazard area as provided in this chapter if specific findings are made that the specific provisions in the design of the proposed development will prevent landslides or damage. The review authority may impose any conditions, including limits on type or intensity of land use, which it determines are necessary to assure that landslides or property damage will not occur.**

Response: These standards are understood. Preliminary information to allow for the approval of a General Development Plan has been provided with further information to come as part of a Detailed Development Plan/Geologic Hazard Overlay Zone permit application.

17.44.070 - Access to property.

A. **Shared private driveways may be required if the city engineer or principal planner determines that their use will result in safer location of the driveway and lesser amounts of land coverage than would result if separate private driveways are used.**

Response: This provision is understood. Details such as driveway locations have been considered preliminarily and will be further refined with future applications for Detailed Development Plans and Geologic Hazard Overlay Zone permits.

B. **Innovations in driveway design and road construction shall be permitted in order to keep grading and cuts or fills to a minimum and to achieve the purpose and policy of this chapter.**

Response: This requirement is understood. Details such as grading, cuts, and fills will be considered in relation to driveway placement and road construction with future applications for Detailed Development Plans and Geologic Hazard permits.

C. Points of access to arterials and collectors shall be minimized.

Response: Points of access to roads of higher classification have been minimized, with only one access to Holcomb Boulevard planned for Park Place Crossing until the future construction and extension of Holly Lane can take place. At such time, the closure of the Phase 1 connection to Holcomb Boulevard is possible.

D. The city engineer or principal planner shall verify that adequate emergency services can be provided to the site.

Response: Through consultation with City and Clackamas Fire District #1 staff, the project was designed with adequate emergency services in mind. Temporary emergency access from Shartner Drive is planned for Phase 1 with further emergency access to the site provided from S Livesay Road as part of Phase 2.

17.44.080 - Utilities.

All new service utilities, both on-site and off-site, shall be placed underground and under roadbeds where practicable. Every effort shall be made to minimize the impact of utility construction. Underground utilities require the geologic hazards permitting and review prescribed herein.

Response: Utilities have been shown within Exhibit A – Preliminary Plans to be planned for installation underground and under roadbeds as practicable. With General Development Plan applications, only general locations of utilities are provided as the final design may not be known. As such, future applications for Detailed Development Plans will be accompanied by a required Geologic Hazard Permit application that addresses the placement of utilities.

17.44.090 - Stormwater drainage.

The applicant shall submit a permanent and complete stormwater control plan. The program shall include, but not be limited to the following items as appropriate: curbs, gutters, inlets, catch basins, detention facilities and stabilized outfalls. Detention facilities shall be designed to city standards as set out in the city's drainage master plan and design standards. The review authority may impose conditions to ensure that waters are drained from the development so as to limit degradation of water quality consistent with Oregon City's Title III section of the Oregon City Municipal Code Chapter 17.49 and the Oregon City Public Works Stormwater Management Design Manual and Standards Plan or other adopted standards subsequently adopted by the city commission. Drainage design shall be approved by the city engineer before construction, including grading or other soil disturbance, has begun.

Response: A Preliminary Stormwater Report has been provided as Exhibit F that demonstrates that the GDP application does not create a drainage issue that degrades water quality or excess erosion than occurs presently.

17.44.100 - Construction standards.

[…]

17.44.110 - Approval of development.

The city engineer shall review the application and verify, based on the applicant's materials and the land use record, whether the proposed development constitutes a

hazard to life, property, natural resources or public facilities. If, in the city engineer's opinion, a particular development poses such a hazard, the city engineer shall recommend to the review authority permit conditions designed to reduce or eliminate the hazard. These conditions may include, but are not limited to, prohibitions on construction activities between November 1st and March 31st.

[…]

Response: The construction standards will be addressed with future applications for Geologic Hazard Overlay Zone Review and will be adhered to as appropriate during future construction. Similarly, because the application involves a General Development Plan and is subject to future review of Detailed Development Plans and Geologic Hazard permits prior to commencement of work on the site that could pose a hazard to life, property, natural resources, or public facilities. These issues will be addressed at that time, but materials are provided to demonstrate that these areas are generally safe, as determined by a geotechnical engineer.

Thank you for your assistance. Please let us know if you have any questions.

ENGINEERING & FORESTRY

July 16, 2021

Re: Neighborhood Meeting Summary
Park Place Crossing – Park Place Neighborhood Association Meeting
City of Oregon City File No. PA 21-00015

Meeting Date: May 17, 2021
Time: 6:30 p.m.
Location: Virtual Meeting was held via Zoom Webinar

The Applicant participated in a scheduled Park Place Neighborhood Association neighborhood meeting in accordance with applicable City regulations to discuss an application for a General Development Plan for Park Place Crossing. This meeting was held via a Zoom Webinar. The meeting was attended by Harlan Borow and Darren Gusdorf of ICON Construction and Development, LLC; Todd Mobley of Lancaster Mobley; Chris Goodell, Cody Street, and Glen Southerland from AKS Engineering & Forestry, LLC, as well as approximately 24 other interested neighbors/other attendees. The meeting began with a brief presentation which included an overview of the project and details about the planned project. The planned land use application and a general process of the land use application process was described.

Following the introduction of the project, neighbors asked questions and/or provided general comments about the project. Additionally, prior to the meeting, there were some questions asked by neighbors. Below is a summary of the questions asked and responses provided:

Item	Question Summary	Response Summary
1	Several questions involved the location of the S Holcomb Blvd./Holly Lane intersection and why it was relocated from Jada Way per the Park Place Concept Plan.	Following coordination with the City and a memo issued by Lancaster Mobley on July 24, 2020, the conceptual location of the S Holcomb Blvd./Holly Lane intersection was relocated from opposite Jada Way to opposite S. Barlow Drive because of safety and alignment reasons.
2	Several questions and comments related to the timing of the Holly Lane connection to S Holcomb Blvd.	The project site does not include the properties immediately adjacent to where the intersection would be located. It is likely that City involvement would be needed in order to complete the connection to S Holcomb Blvd.
3	Several neighborhood residents were concerned about the zoning of the property and the number of homes that would be located adjacent to existing homes near Trail View/Journey Drive.	Homes are being placed per OCMC requirements, though there was some discussion about the possibility of adding vegetated screening of some sort to screen new homes from those existing.
4	A number of comments were received from residents of the adjacent subdivision accessing S Holcomb Blvd via Winston Drive. They recounted their experiences of trying to leave the neighborhood	The project would initially access S Holcomb Blvd via "Street A"/Holly Lane. The initial phases would provide emergency access to and from the site via a gravel fire access from Shartner Drive to Holly Lane. Later phases would complete Holly Lane and connections to existing streets, allowing access in

	in vehicles following an evacuation notice for wildfires last summer.	both directions and possibly alleviating congestion at Winston Drive. Emergency access after Phase 2 would be provided by S Livesay Road. Eventual completion of other portions of the Livesay Road Main Street and other properties would allow for full access to S Livesay Road and eventual connection to Redland Road and the existing Holly Lane leading south.
5	The possibility of construction traffic was mentioned as a concern.	Construction traffic will be dealt with by the City and addressed when Detailed Development Plans and construction plans are submitted and approved.
6	Several community members were concerned by the number of dwelling units the project would eventually provide.	The number of units is based on the zoning of the site and the constraints created by the natural resources and geologic hazard areas. The project meets the density requirements put in place by the City through OCMC and the Park Place Concept Plan.
7	Several community members were concerned about off-site traffic impacts.	Todd Mobley, PE, of Lancaster Mobley spoke to the off-site traffic impacts, the mitigation required by the annexation application and the reviews that would take place at submittal of the GDP and future DDP applications. Off-site intersections and transportation projects would receive funding based on proportionate share.

The applicant portion of the meeting concluded at approximately 8:45 p.m.

Sincerely,

AKS ENGINEERING & FORESTRY, LLC

Chris Goodell, AICP, LEED AP
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
503-563-6151 | ChrisG@aks-eng.com

Item #1.

Glen Southerland

From: Glen Southerland
Sent: Tuesday, May 4, 2021 11:30 AM
To: gpstone72@yahoo.com; steve@vanhaverbeke.org
Cc: PPNA Bob La Salle; Chris Goodell; Cody Street; Janelle Guiao
Subject: Park Place Neighborhood Meeting Inquiry
Attachments: 7404 2021504 Park Place Village Plans.pdf

Categories: Filed by Newforma

Good Morning All,

We are preparing an application for a residential subdivision and would like to request an opportunity to present our project to the Park Place Neighborhood Association. Do you believe you will have any time available at your May 17, 2021 Steering Committee meeting?

The application is for a Master Plan for a planned ±408 lot subdivision of single-family homes. The applications will also include Detailed Development Plans for two phases (±84 lots) of the project. The project is on approximately 91.4 acres located at 15110 S Holcomb Blvd. and 16472, 16582, 16644, 16530, and 14361 S Livesay Road. The properties are zoned R-10 – Low Density Residential (±9.5 acres), R-5 – Medium Density Residential (±77.4 acres), and Neighborhood Commercial (±4.5 acres).

I've attached plans for your reference. Please let me know if you have time available to discuss this project.

Best Regards,

Glen Southerland, AICP
AKS ENGINEERING & FORESTRY, LLC
12965 SW Herman Road, Suite 100 | Tualatin, OR 97062
P: 503.563.6151 Ext. 166 | www.aks-eng.com | SoutherlandG@aks-eng.com
Offices in: Bend, OR | Keizer, OR | Tualatin, OR | Vancouver, WA

Glen Southerland

From: Glen Southerland
Sent: Monday, May 10, 2021 4:58 PM
To: Linda Smith; Chris Goodell; Cody Street; Janelle Guiao
Cc: Stone, Greg; Steve VanHaverbeke; Bob LaSalle
Subject: RE: Park Place Neighborhood Association Meeting May 17th

Categories: Filed by Newforma

Thank you, Linda!

We look forward to speaking with the Neighborhood Association.

Best Regards,
Glen Southerland, AICP
AKS ENGINEERING & FORESTRY, LLC
P: 503.563.6151 Ext. 166 | www.aks-eng.com | southerlandg@aks-eng.com

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From: Linda Smith <ocgal5700@gmail.com>
Sent: Monday, May 10, 2021 4:55 PM
To: Glen Southerland <southerlandg@aks-eng.com>; Chris Goodell <chrisg@aks-eng.com>; Cody Street <streetc@aks-eng.com>; Janelle Guiao <guiaoj@aks-eng.com>
Cc: Stone, Greg <gpstone72@yahoo.com>; Steve VanHaverbeke <steve@vanhaverbeke.org>; Bob LaSalle <jeanbob06@comcast.net>
Subject: Park Place Neighborhood Association Meeting May 17th

Hello Mr. Southerland,

We have added you to the PPNA agenda for our upcoming steering committee meeting on Monday May 17th at 6:30PM. Zoom link will be sent in a followup email.

Best,
Linda Smith, PPNA Secretary

Park Place Neighborhood Association Steering Committee Meeting

Attendee List **May 17, 2021 6:30 p.m.**

Steve Van Haverbeke	Park Place NA Vice Chair
Ray Renken	Park Place NA Treasurer
Linda Smith	Park Place NA Secretary
Bob LaSalle	CIC Alternate Representative
Chris Goodell	AKS Engineering & Forestry, LLC
Cody Street	AKS Engineering & Forestry, LLC
Glen Southerland	AKS Engineering & Forestry, LLC
Todd Mobley	Lancaster Mobley
Harlan Borow	ICON Construction & Development, LLC
Darren Gusdorf	ICON Construction & Development, LLC
Ryan Richards	
Nick Rierkman	
Elira Solaita	
Barbara Renken	
Troy Lavoie	
Jennifer Reitshtein	
Lecia	
Sara Sutton	
Steve Sagi	
Kirk Tolstrup	
Tee	
Janice Vandomelan	
Brian Sutton	
John Anderson	
Heidi	
Jennifer Harvey	
Marian Hedberg-Stan	
Gus Miller	
Geneava/Gene Butterfield	
Paulette Merrill	
Jean LaSalle	
Tom Geil	
Armando Barbora	
Laura P.	
Lisa Brown	
Jackie Hammonds	

GLUA-21-00045: Park Place Crossing General Development Plan:

MAS-21-00006 – General Development Plan (GDP)
VAR-22-00001 – Variance

Type III Quasi-judicial review

Kelly Reid, Planner

Planning Commission

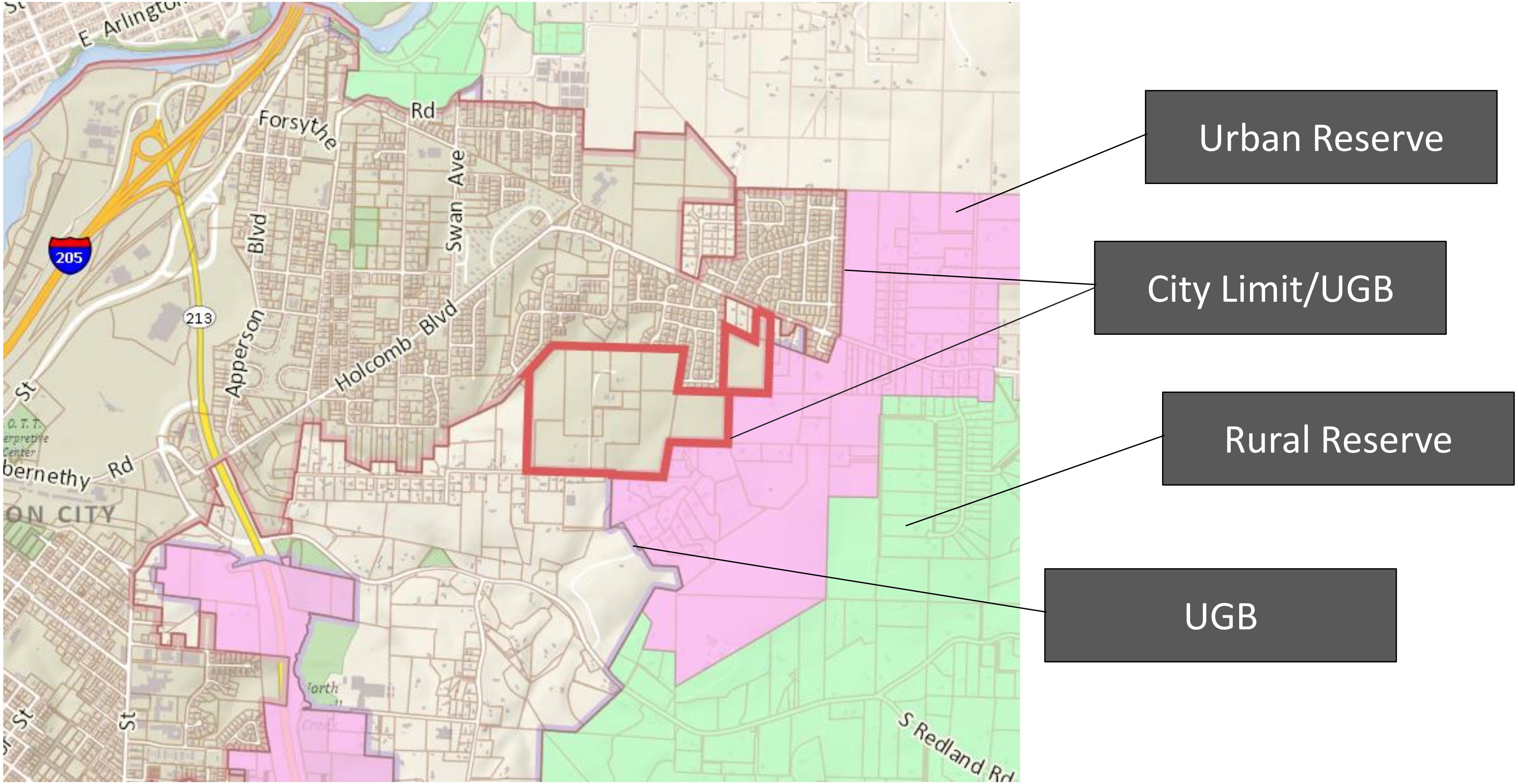
April 25, 2022

Tonight's Hearing

Continuance needed to incorporate new information into the staff report

1. Brief summary from staff
2. Public Testimony
3. Keep record open and continue hearing

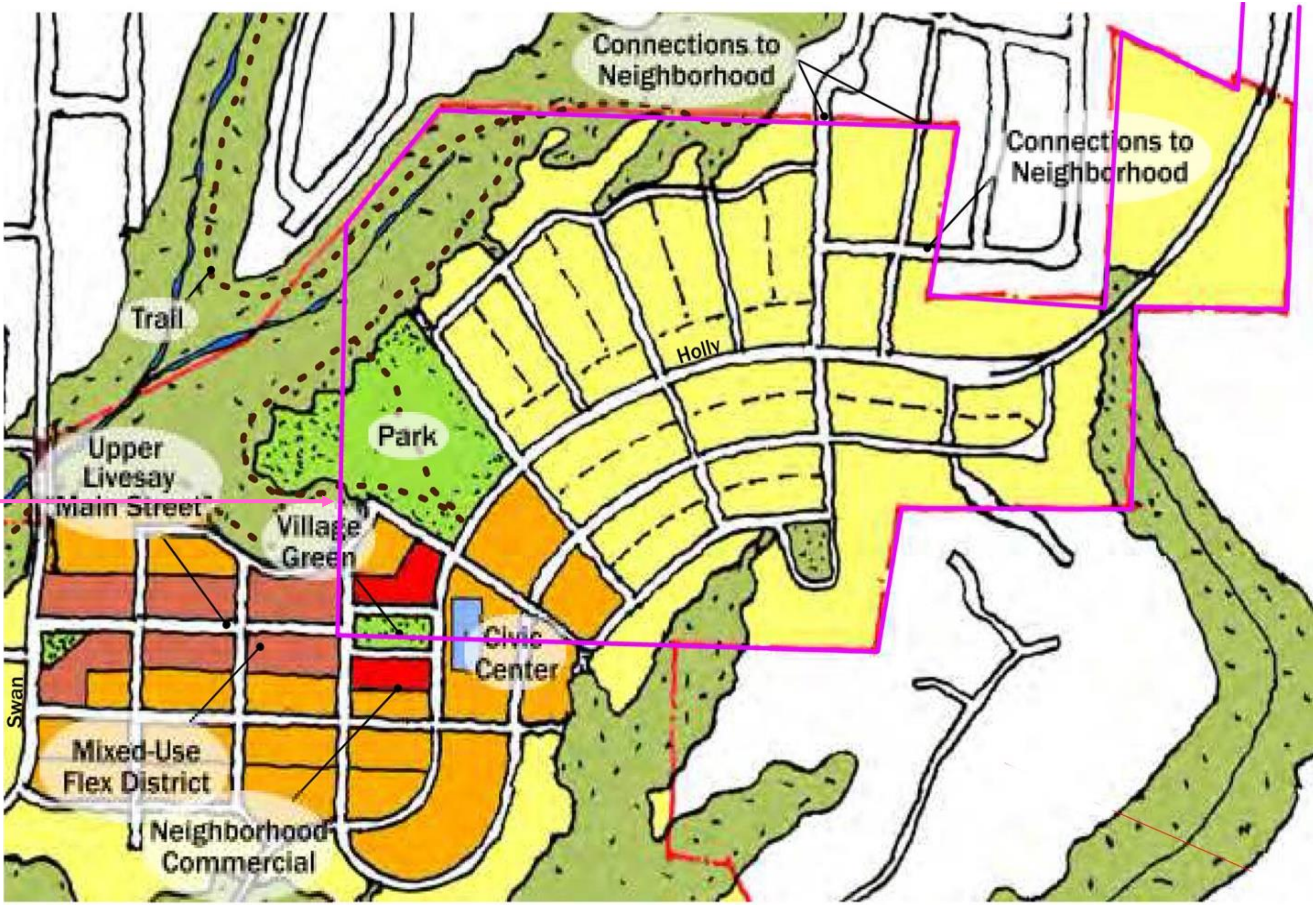
Subject Site



History

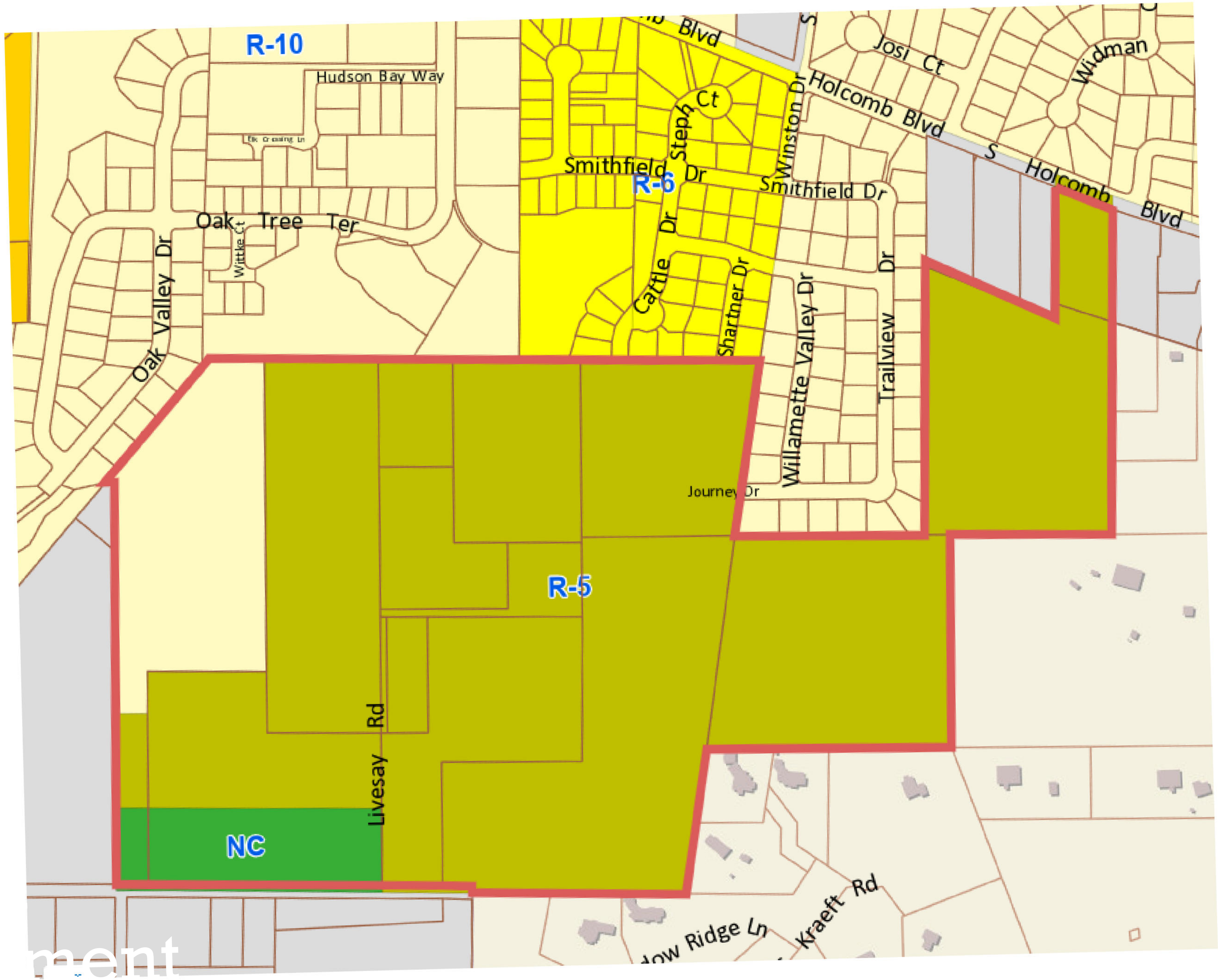
- Park Place Concept Plan (2008) following addition of land into UGB
- AN-17-04: Approved annexation of 92 acres of land within the Urban Growth Boundary
- ZC-17-05: Approved zone change from Clackamas County Future Urbanizable-10 (FU-10) and RRF5 (Rural Farm and Forest 5-Acre) to:
    - R-10 Low Density Residential District
    - R-5 Medium Density Residential District
    - NC Neighborhood Commercial District

Park Place Concept Plan



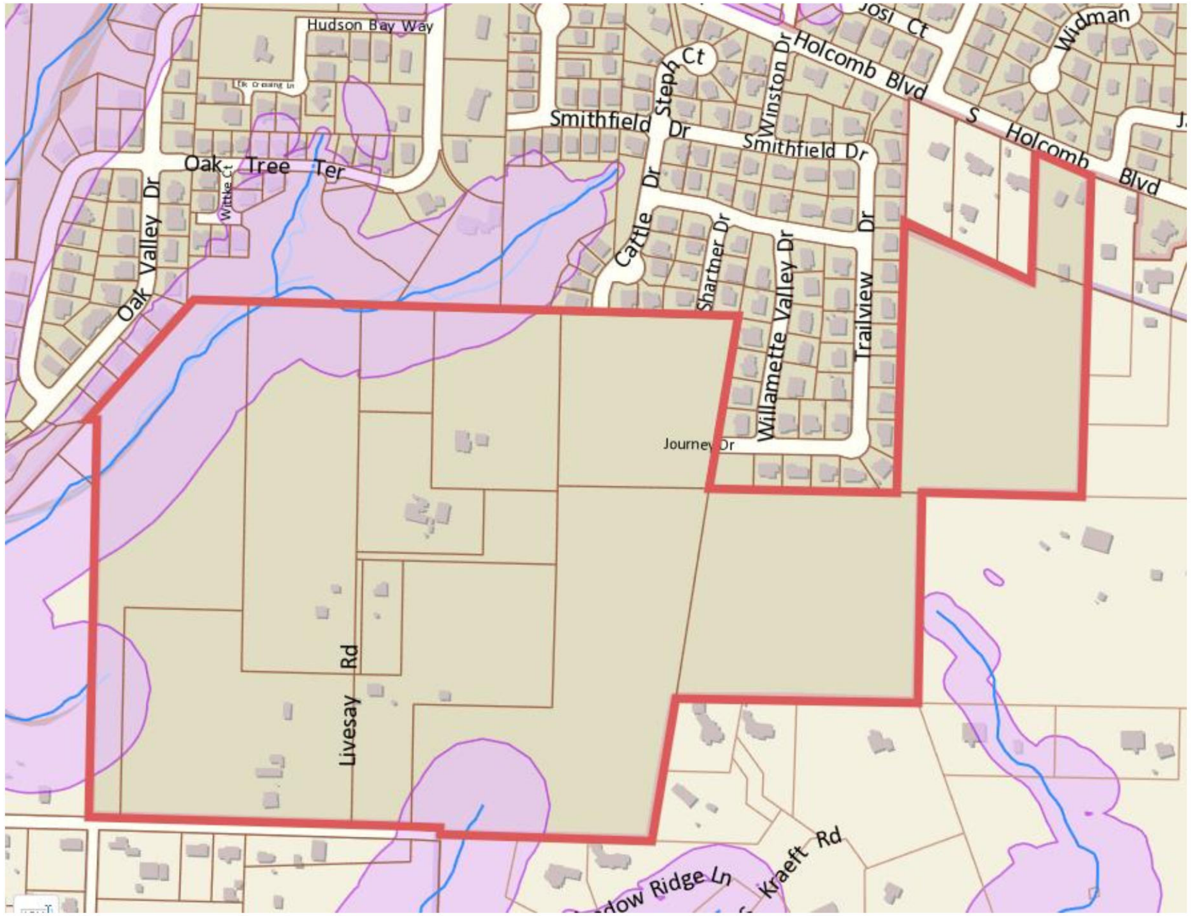
Subject property

Zoning

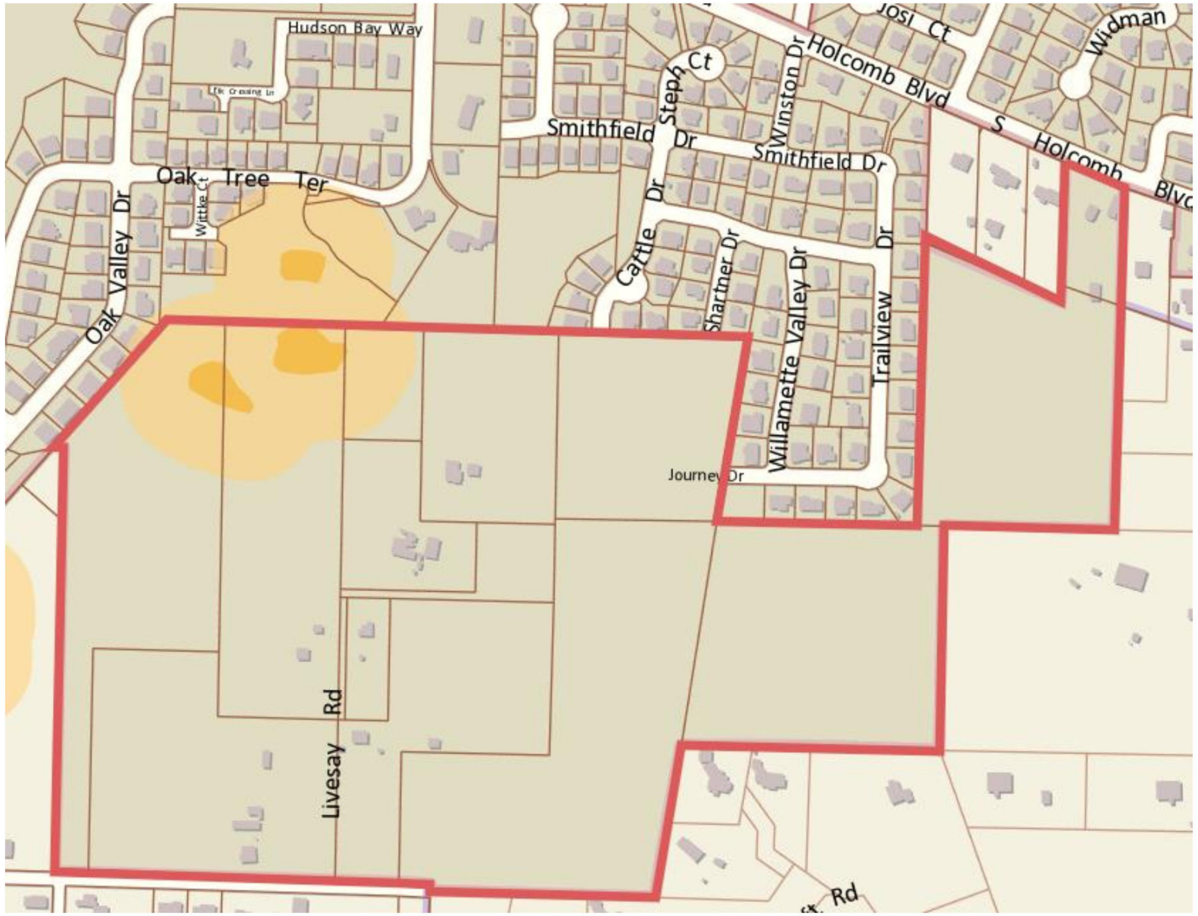


R-10
Hudson Bay Way
Oak Tree Ter
Oak Valley Dr
Wittke Ct
R-6
Smithfield Dr
Steph Ct
Cattle Dr
Shartner Dr
Winston Dr
Holcomb Blvd
S Holcomb Blvd
Josi Ct
Widman
Willamette Valley Dr
Trailview Dr
Journey Dr
R-5
Livesay Rd
NC
Kraeft Rd

Overlay Zones

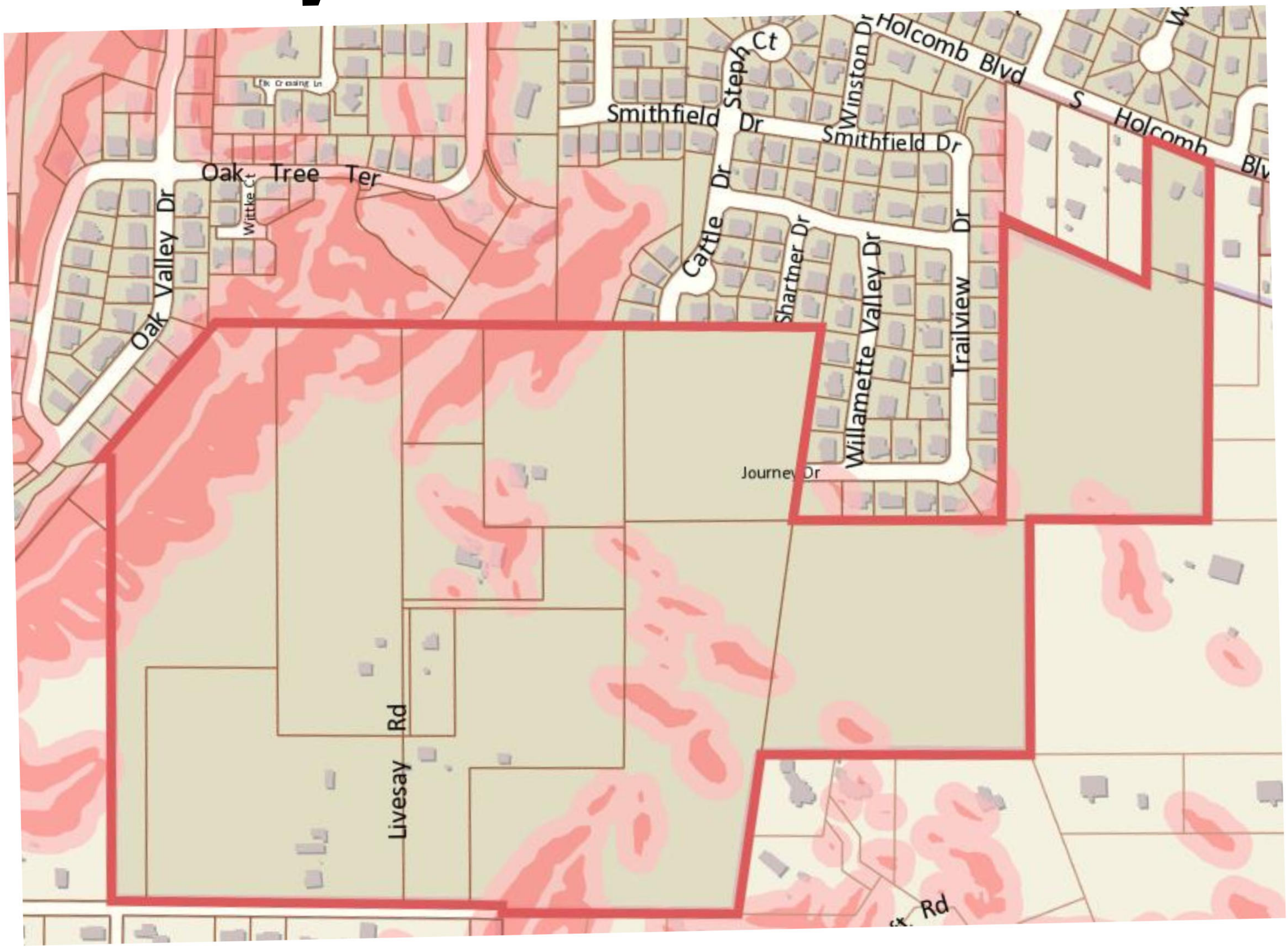


Natural Resource Overlay (NROD)



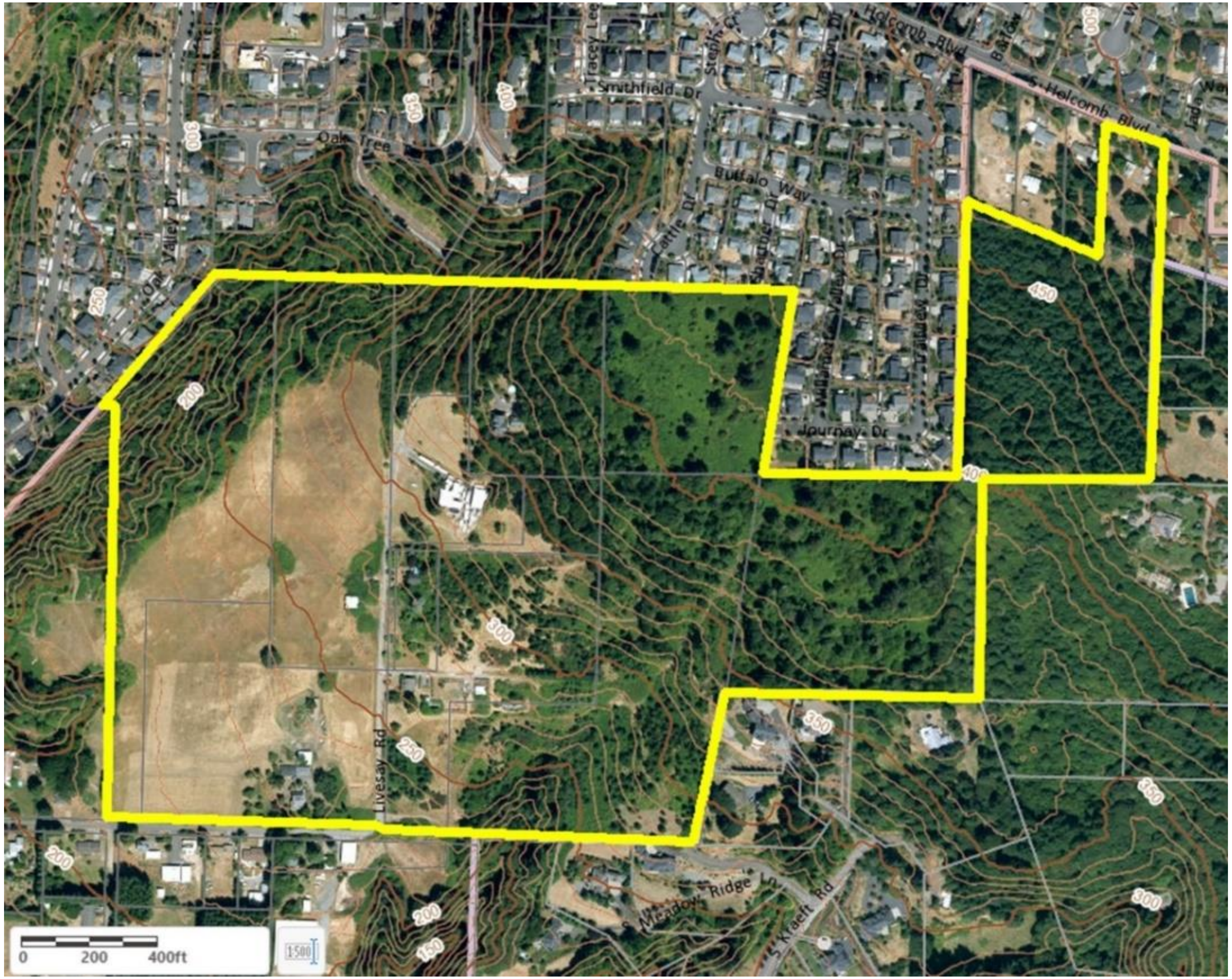
Landslides (Geologic Hazard Overlay)

Overlay Zones



Steep Slopes (Geologic Hazard Overlay)

Existing Conditions



Project Summary

- **General Development Plan (GDP)**: The overall long-term approach to development through 2030 for up to 476 residential lots, including supporting parks, trails, and neighborhood commercial and civic spaces. Included in the request for GDP approval is:
  - A modification to street width standards for a limited segment of Holly Lane
  - Adjustments to the following development standards:
    - OCMC 17.08.040 and 17.10.040 Dimensional Standards, including up to 20% reduction of lot sizes, widths, depths, and setbacks
    - OCMC 17.21.090.A for garage placement and design
    - OCMC 17.08.050 and 17.10.050 Density Standards to exceed maximum density by approximately 4%

- **Variance:** Request to reduce the minimum lot size for attached single family lots to 1800 square feet.

General Development Plan

- 476 total housing units, including 126 attached dwellings and 350 detached dwellings
- Construction of a segment of Holly Lane, a planned collector street
- A future public park site of 4.4 acres
- Approximately 1.3 acres of commercial/civic space provided in two parcels
- An off-street trail system within protected natural areas

General Development Plan Process

1. General Development Plan review (Type III)

2. Detailed Development Plan (DDP) review for each development phase (Type II)

   - DDPs must be consistent with approved General Development Plan

3. Construction Plans and Permits

Next Hearing

- Full staff report and recommendation
- Applicant’s Presentation
- Additional testimony and rebuttal

Planning Commission Options

1. Open the hearing, take public testimony, and continue the hearing to a date certain of May 9, 2022
2. Open the hearing, take public testimony, and continue to hearing to another date certain