CITY OF
West Linn

Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656.4211 • Fax 503.656.4106 • westlinnoregon.gov

DEVELOPMENT REVIEW APPLICATION

For Office Use Only

STAFF CONTACT Jennifer Arnold	PROJECT NO(S). CUP-16-02 / DR-16-03	
NON-REFUNDABLE FEE(S) [illegible] 20,200	REFUNDABLE DEPOSIT(S) 4500	TOTAL 24,700

Type of Review (Please check all that apply):

☐ Annexation (ANX)
☐ Appeal and Review (AP) *
x Conditional Use (CUP)
x Design Review (DR)
☐ Easement Vacation
☐ Extraterritorial Ext. of Utilities
☐ Final Plat or Plan (FP)
☐ Flood Management Area
☐ Hillside Protection & Erosion Control
☐ Historic Review
☐ Legislative Plan or Change
☐ Lot Line Adjustment (LLA) */**
☐ Minor Partition (MIP) (Preliminary Plat or Plan)
☐ Non-Conforming Lots, Uses & Structures
☐ Planned Unit Development (PUD)
☐ Pre-Application Conference (PA) */**
☐ Street Vacation
☐ Subdivision (SUB)
☐ Temporary Uses *
☐ Time Extension *
☐ Variance (VAR)
☐ Water Resource Area Protection/Single Lot (WAP)
☐ Water Resource Area Protection/Wetland (WAP)
☐ Willamette & Tualatin River Greenway (WRG)
☐ Zone Change

Home Occupation, Pre-Application, Sidewalk Use, Sign Review Permit, and Temporary Sign Permit applications require different or additional application forms, available on the City website or at City Hall.

Site Location/Address: ADJACENT TO 20800 HIDDEN SPRINGS ROAD

Assessor's Map No.: 21E23CD
Tax Lot(s): 12301
Total Land Area: 2.6 acres

Brief Description of Proposal: NEW TUALATIN VALLEY FIRE & RESCUE STATION 55

Applicant Name: SIOBHAN KIRK
(please print)
Phone: 503-259-1219
Address: 11945 SW 70TH AVENUE
Email: Siobhan.kirk@tvfr.com
City State Zip: TIGARD, OREGON 97223

Owner Name (required): SIOBHAN KIRK
(please print)
Phone: 503-259-1219
Address: 11945 SW 70TH AVENUE
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City State Zip: TIGARD, OREGON 97223

Consultant Name: FRANK ANGELO, ANGELO PLANNING GROUP
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1. All application fees are non-refundable (excluding deposit). **Any overruns to deposit will result in additional billing.**
2. The owner/applicant or their representative should be present at all public hearings.
3. A denial or approval may be reversed on appeal. No permit will be in effect until the appeal period has expired.
4. **Three (3) complete hard-copy sets (single sided) of application materials must be submitted with this application. One (1) complete set of digital application materials must also be submitted on CD in PDF format. If large sets of plans are required in application please submit only two sets.**

* No CD required / ** Only one hard-copy set needed

RECEIVED
SEP 13 2016
PLANNING & BUILDING
CITY OF WEST LINN
INT. TIME

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Community Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

Applicant's signature 8-30-16 Date
Owner's signature *(required)* 8-30-16 Date

Station 55 Application Form

Tualatin Valley Fire & Rescue
Station 55

Conditional Use and Class II Design Review Applications

Prepared by Angelo Planning Group

Submitted to the City of West Linn,

September 2016

Development Application Design Team for
Tualatin Valley Fire & Rescue: Station 55

Applicant:

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Development Application Summary Information for Tualatin Valley Fire & Rescue Station 55

Legal Description:	21E23CD 12301
Current Zoning:	R-10
Site Size:	2.6 acres
Community Plan:	Hidden Springs (HSRS)
Applications Submitted for:	Conditional Use Class II Design Review

TABLE OF CONTENTS
Development Application for Tualatin Valley Fire & Rescue: Station 55

Application Forms and Tax Map

Section 1: General Information

Project Description

Tualatin Valley Fire & Rescue (TVF&R) is seeking Conditional Use and Class II Design Review approval from the City of West Linn to construct a new fire station (Station 55) on tax lot 21E23CD 12301, located adjacent to 20800 Hidden Springs Road. The site is currently undeveloped, with grass pasture fronting Hidden Springs Road and some vegetated areas along the southern property boundary. The site bounds a single family home, which sits on a separate tax lot and is not part of this application. The applicant proposes a single story, hip roofed fire station to be staffed 24-hours a day by a crew of four, with room to expand to up to six firefighters. The maximum occupation (six firefighters) is used in the transportation and parking analysis. A community meeting room is also proposed as part of the station design. The station, driveways and parking will be located to the east of the existing home on the adjacent tax lot.

The construction of the proposed Station 55 is funded through General fund and Local Option Levy approved by District voters in 2014 to upgrade and improve the safety and operations of TVF&R's fire stations. TVF&R identified the need for a station in this location to ensure quick response times in the future as development continues in the West Linn area. Due to the topography and road network of West Linn, locating the station at its proposed location at the top of the hill offered the best coverage and fastest response times. The National Fire Protection Association (NFPA) establishes a national standard which specifies requirements for effective and efficient organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public (NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments).[1] The response performance objective for the first arriving unit at an emergency medical incident is a travel time of 4 minutes. Figure 1 shows this travel time modeling based upon the distribution of existing stations compared to the travel time modeling with Station 55 added to the system. The addition of Station 55 will significantly reduce emergency response travel times for a large area of West Linn.

A formal Neighborhood Meeting was held during the Hidden Springs Neighborhood Association meeting on June 21, 2016. The meeting was held at Rosemont Middle School and was well-attended. TVF&R representatives reviewed the proposed project, the need for the new station and described the architectural features. The audience asked a number of questions. The neighborhood meeting notes as well as the information presented at the meeting are provided in Attachment A.

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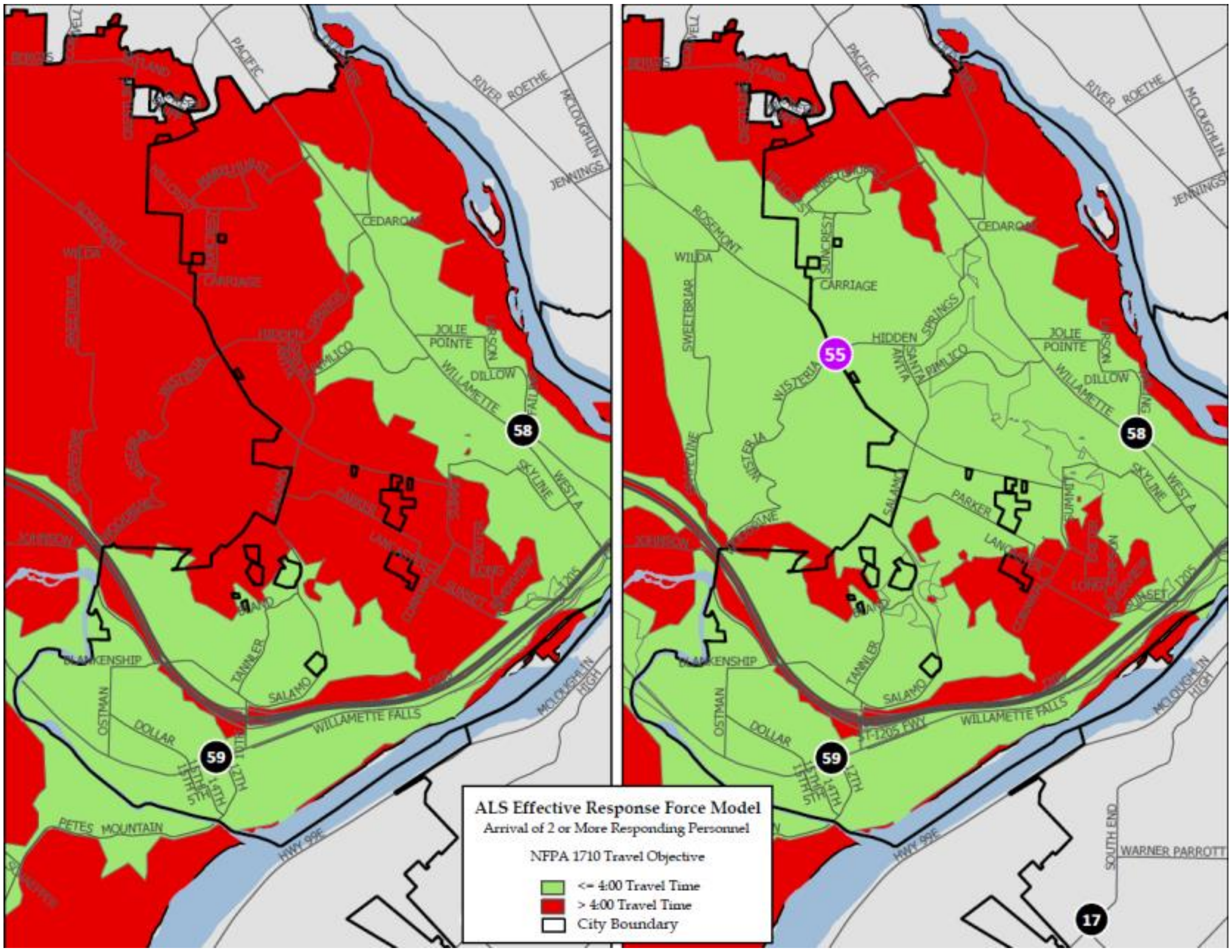
[1] http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards?mode=code&code=1710

Figure 1. Advanced Life Support (ALS) Effective Response Force Model



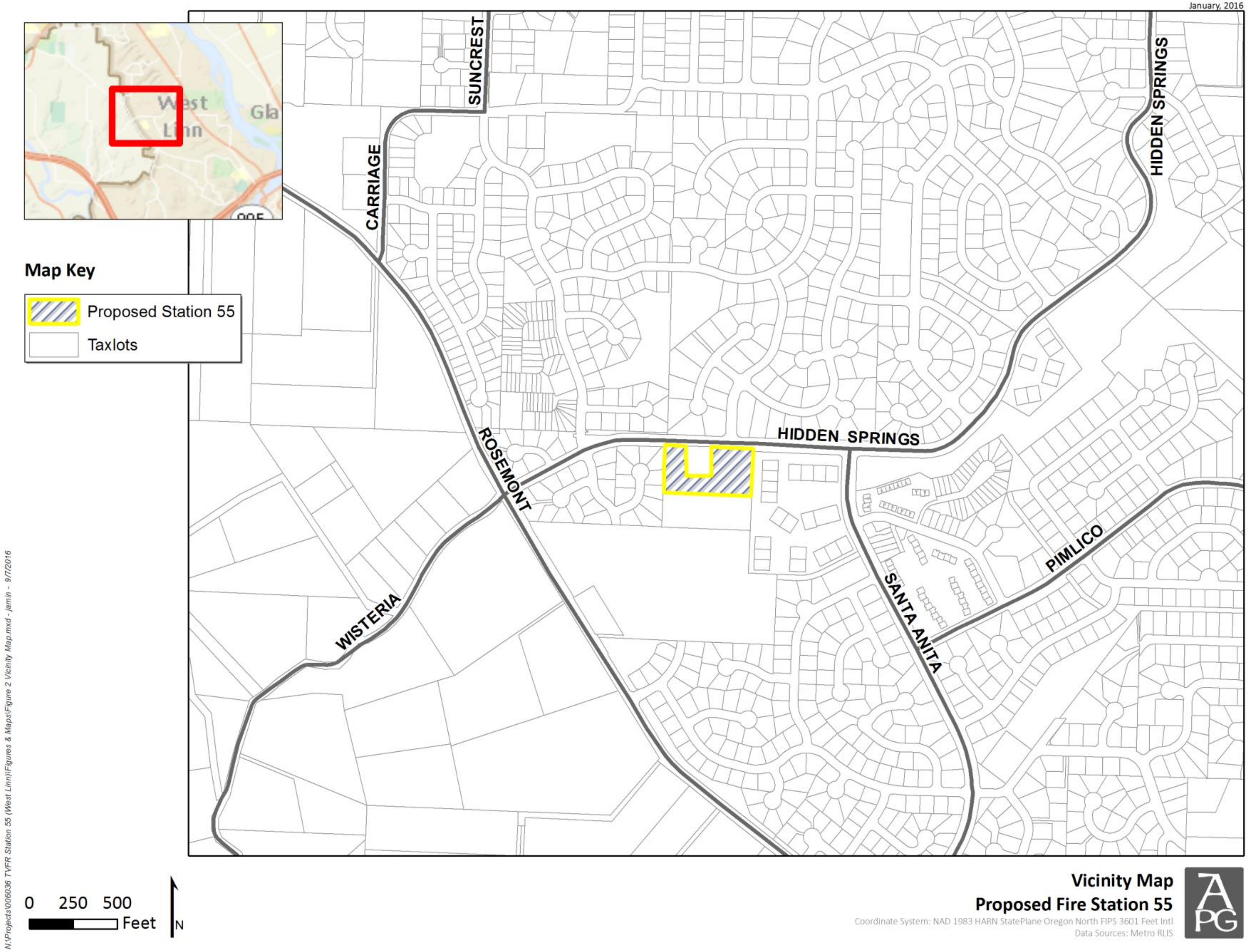
Station 55 Site and Context

The proposed site for Station 55 is a single, 2.6-acre tax lot, zoned R-10 (single family residential detached, 10,000 square foot minimum lot size) as shown in Figure 2. The site is surrounded to the north, east and south by R-10 zoning and to the west by R-7 zoning (single family residential detached, 7,000 square foot minimum lot size). As shown on Figure 3, Aerial Map, and Figure 4, Zoning Map, the surrounding area is largely developed with existing single family homes, with the exception of Trillium Creek elementary school which shares the subject property's southern boundary. To the east and west of the subject site are also single family homes. South of the property is Trillium Creek. The wetlands associated with Trillium Creek are located on the adjacent school property to the south. Additionally, there is an 857 square foot area located within the Riparian Corridor and a 5,575 square feet area located within the Water Resource Area (WRA – Degraded Condition) in the southeast corner of the Station 55 property. The Natural Resource Assessment (Attachment C, Figures 6 and 7) identifies the location of the resources and the temporary impact that will result from the proposed stormwater outfall that will be mitigated through restoration.

Project Timeframe

Construction of Station 55 is expected to begin in spring 2017 after all the necessary land use and building permits have been acquired. Construction is expected to last about a year with completion expected spring 2018.

Figure 2. Vicinity Map



Vicinity Map
Proposed Fire Station 55
Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Sources: Metro RLIS

N:\Projects\006036 TVFR Station 55 (West Linn)\Figures & Maps\Figure 2 Vicinity Map.mxd - jamin - 9/7/2016

Figure 3. Aerial Map

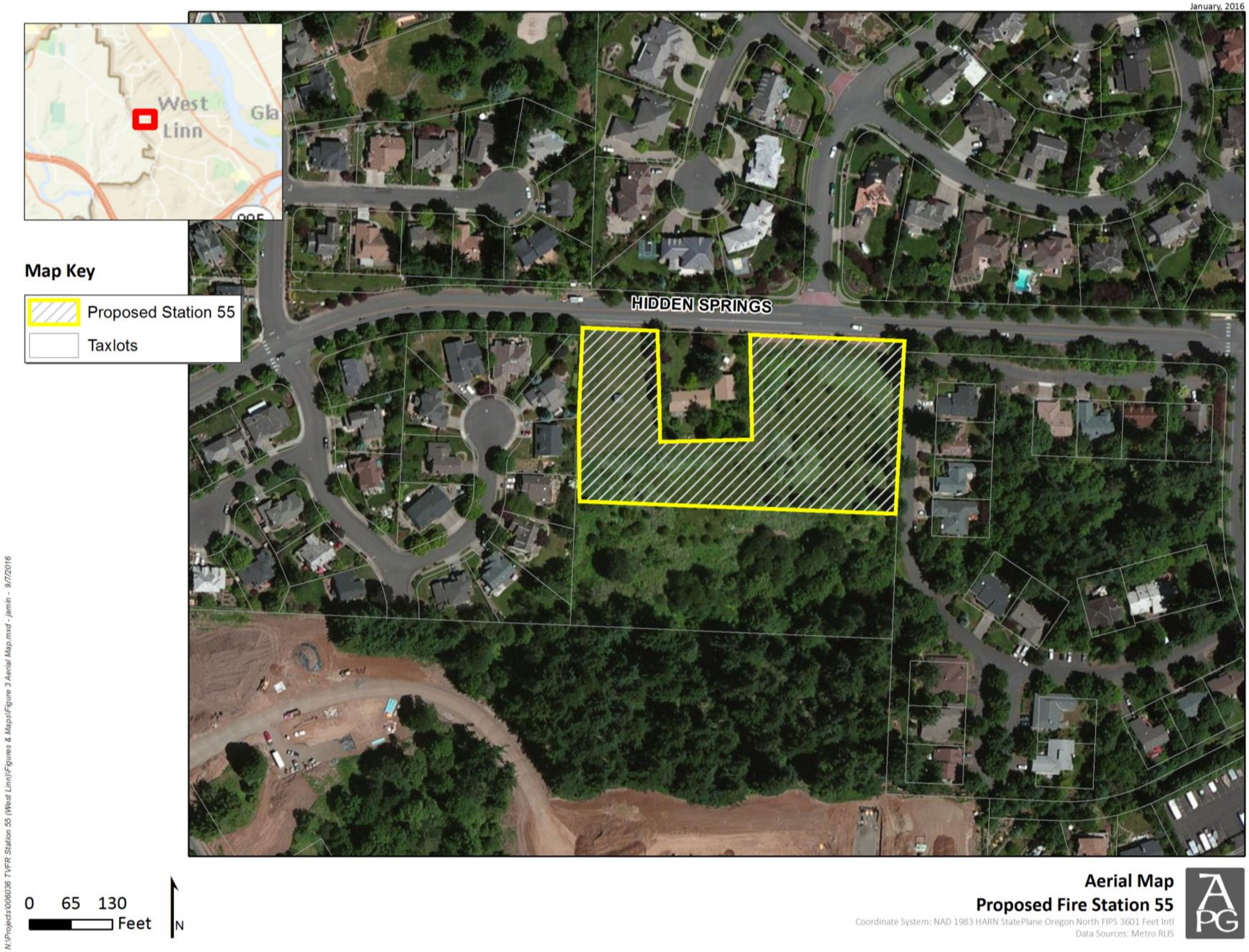
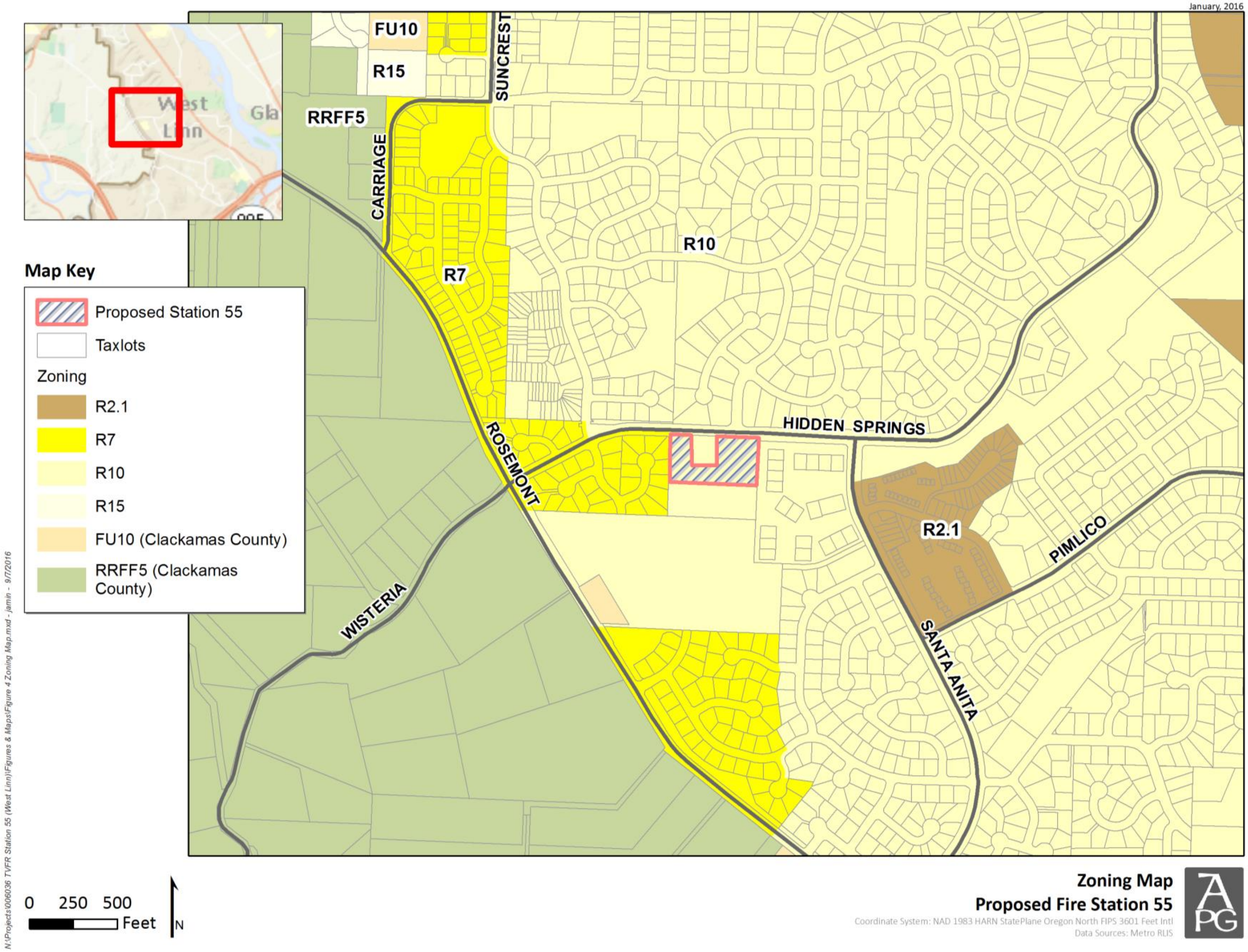


Figure 4. Zoning Map



Section 2: Conformance with the Applicable Review Criteria

This section of the application contains responses that illustrate how this development application conforms to the applicable standards and regulations of the West Linn Community Development Code. Only code text that contains applicable approval criteria or otherwise requires a response related to the requested land use actions have been included.

Hidden Springs Community Plan

Response: There is no adopted Neighborhood Plan for the Hidden Springs Neighborhood.

West Linn Community Development Code

Chapter 11: R-10

11.020 Procedures and Approval Process

C. A conditional use (CDC 11.060) is a use the approval of which is discretionary with the Planning Commission. The approval process and criteria for approval are set forth in Chapter 60 CDC, Conditional Uses. If a use is not listed as a conditional use, it may be held to be a similar unlisted use under the provisions of Chapter 80 CDC.

Response: The proposed use is a new fire station, which is considered a “public safety facility” use pursuant to CDC Chapter 2.00 Definitions. The applicant understands that a public safety facility is a Conditional Use in the R-10 zone (single family residential detached/10,000 square foot minimum lot size) and, as such, is subject to a discretionary review by the Planning Commission and to the approval process and criteria in Chapter 60, which are addressed in this application.

11.060 Conditional Uses

The following are conditional uses which may be allowed in this zoning district subject to the provisions of Chapter 60 CDC, Conditional Uses.

3. Public Safety Facilities

Response: Pursuant to CDC Chapter 2.00 Definitions, public safety facilities are defined as uses that provide “protection pursuant to fire, life and safety code sections with the incidental storage of maintenance of necessary vehicles.” The typical uses listed in the definition include fire stations. Therefore, the proposed fire station is allowed as a Conditional Use in the R-10 zone.

11.070 Dimensional Requirements, Uses Permitted Outright and Uses Permitted under Prescribed Conditions

Except as may be otherwise provided by the provisions of this code, the following are the requirements for uses within this zone:

1. *The minimum lot size shall be 10,000 square feet for a single-family detached unit.*
2. *The minimum front lot line length or the minimum lot width at the front lot line shall be 35 feet.*
3. *The average minimum lot width shall be 50 feet.*
4. *Repealed by Ord. 1622.*

5. Except as specified in CDC 25.070(C)(1) through (4) for the Willamette Historic District, the minimum yard dimensions or minimum building setback area from the lot line shall be:

> *a. For the front yard, 20 feet; except for steeply sloped lots where the provisions of CDC 41.010 shall apply.*
>
> *b. For an interior side yard, seven and one-half feet.*
>
> *c. For a side yard abutting a street, 15 feet.*
>
> *d. For a rear yard, 20 feet.*

6. The maximum building height shall be 35 feet, except for steeply sloped lots in which case the provisions of Chapter 41 CDC shall apply.

7. The maximum lot coverage shall be 35 percent.

8. The minimum width of an accessway to a lot which does not abut a street or a flag lot shall be 15 feet.

9. The floor area ratio shall be 0.45. Type I and II lands shall not be counted toward lot area when determining allowable floor area ratio, except that a minimum floor area ratio of 0.30 shall be allowed regardless of the classification of lands within the property. That 30 percent shall be based upon the entire property including Type I and II lands. Existing residences in excess of this standard may be replaced to their prior dimensions when damaged without the requirement that the homeowner obtain a non-conforming structures permit under Chapter 66 CDC.

10. The sidewall provisions of Chapter 43 CDC shall apply. (Ord. 1175, 1986; Ord. 1298, 1991; Ord. 1377, 1995; Ord. 1538, 2006; Ord. 1614 § 2, 2013; Ord. 1622 § 24, 2014)

Response: The site size is 113,256 square feet and meets the minimum lot size for R-10 zoning. The proposed front, back and side lot lines meet the dimensional requirements addressed in Table 1.

Table 1. Dimensional Requirements

Dimension	*R-10 Requirement*	*Proposed Fire Station 55*
Minimum Front Lot Line or Width	35’	355’5”
Average Minimum Lot Width	50’	427’5”
Minimum Yard Dimensions or Setbacks		
Front Yard	20’	20’
Interior Side Yard	7.5’	7.5’
Side Yard Abutting a Street	15’	15’
Rear Yard	20’	20’
Maximum Building Height	35’	32’
Maximum Lot Coverage	35%	12%

11.080 Dimensional Requirements, Conditional Uses

Except as may otherwise be established by this code, the appropriate lot or parcel size for a conditional use shall be determined by the approval authority at the time of consideration of the application based upon the criteria set forth in CDC 60.070(A) and (B). (Ord. 1636 § 9, 2014)

Response: Based on Table 1, the proposed lot size is appropriate for the proposed use.

11.090 Other Applicable Development Standards

A. The following standards apply to all development including permitted uses:

1. Chapter 34 CDC, Accessory Structures, Accessory Dwelling Units, and Accessory Uses.

2. Chapter 35 CDC, Temporary Structures and Uses.

3. Chapter 38 CDC, Additional Yard Area Required; Exceptions to Yard Requirements; Storage in Yards; Projections into Yards.

4. Chapter 40 CDC, Building Height Limitations, Exceptions.

5. Chapter 41 CDC, Structures on Steep Lots, Exceptions.

6. Chapter 42 CDC, Clear Vision Areas.

7. Chapter 44 CDC, Fences.

8. Chapter 46 CDC, Off-Street Parking, Loading and Reservoir Areas.

9. Chapter 48 CDC, Access, Egress and Circulation.

10. Chapter 52 CDC, Signs.

11. Chapter 54 CDC, Landscaping.

B. The provisions of Chapter 55 CDC, Design Review, apply to all uses except detached single-family dwellings, residential homes and residential facilities. (Ord. 1590 § 1, 2009)

Response: The applicant understands that requirements found in the Code Chapters listed in Section 11.090 may be applicable to the development proposal. Each chapter has been reviewed and the following sections have been determined to be applicable to this proposal:

- Chapter 34 Accessory Structures, Accessory Dwelling Units, and Accessory Uses: Not applicable; no accessory structures or uses are being proposed
- Chapter 35, Temporary Structure and Uses: Not applicable; no temporary structures or uses are being proposed
- Chapter 38, Additional Yard Area Required: Not applicable; no additional yard area is required.
- Chapter 40, Building Height Limitations, Repealed by Ord. 1504; Not applicable
- Chapter 41, Building Height, Structures on Steep Lots: Addressed on pages 14 of this application
- Chapter 42, Clear Vision Areas: Addressed on page 15 of this application
- Chapter 44, Fences: Addressed on page 16 of this application
- Chapter 46, Off-Street Parking: Addressed on page 18 of this application

- Chapter 48, Access: Addressed on page 27 of this application
- Chapter 52, Signs: Addressed on page 33 of this application
- Chapter 54, Landscaping: Addressed on page 37 of this application

Chapter 28 Willamette and Tualatin River Protection

28.010 Purpose

The purposes of the Willamette and Tualatin River Protection Area are the following:

A. Protect, conserve, enhance, and maintain the natural, scenic, historical, economic, and recreational qualities of lands along the Willamette and Tualatin Rivers.

B. Implement the policies of the West Linn Comprehensive Plan and the State of Oregon's Willamette River Greenway program.

C. Establish standards and requirements for the existing and future use of lands within the Willamette and Tualatin River Protection Areas.

D. Provide for the review of any intensification of use, change of use, or development within the Willamette and Tualatin River Protection Areas.

E. Encourage local stewardship of the Willamette and Tualatin River Protection Areas.

F. Protect, preserve and expand legal public use and access to and along the shoreline and river, while recognizing and preserving private property rights.

G. Create incentives to direct development to areas where it is most appropriate.

H. Protect and enhance riparian habitat for native flora, fish, and wildlife within the Willamette and Tualatin Rivers and along their banks. (Ord. 1576, 2008)

Response: The applicant understands that the goals of the Willamette and Tualatin River Protection Area are to protect, conserve, enhance and maintain the areas along the Willamette and Tualatin Rivers. As indicated in the Natural Resource Assessment (Attachment C), all development and grading associated with Station 55 can be done outside of those areas (Water Resource Area (WRA), Riparian Corridor and Habitat Conversation Area (HCA)), with the exception of the temporary impact noted below. Therefore no WRA or Willamette and Tualatin River Protection Area permits are required.

Staff notes that Trillium Creek and associated wetlands are located on the adjacent school property to the south. The wetland is mapped on the City of West Linn's adopted WRA Map and agrees with the wetland delineation prepared in 2009. The 65 foot WRA setback shall be measured from this wetland boundary. Additionally, there is an 857 square foot area comprising a Riparian Corridor and 5,575 square feet in a Water Resource Area (WRA – Degraded Condition) in the southeast corner of the Station 55 property. The Natural Resource Assessment (Attachment C, Figures 6 and 7) identifies the location of the resources and the temporary impact that will result from the stormwater outfall and will be mitigated through restoration.

28.030 Applicability

A. The Willamette and Tualatin River Protection Area is an overlay zone. The zone boundaries are identified on the City's zoning map, and include:

1. All land within the City of West Linn's Willamette River Greenway Area.

2. All land within 200 feet of the ordinary low water mark of the Tualatin River, and all land within the 100-year floodplain of the Tualatin River.

3. In addition to the Willamette Greenway and Tualatin River Protection Area boundaries, this chapter also relies on the HCA Map to delineate where development should or should not occur. Specifically, the intent is to keep out of, or minimize disturbance of, the habitat conservation areas (HCAs). Therefore, if all, or any part, of a lot or parcel is in the Willamette Greenway and Tualatin River Protection Area boundaries, and there are HCAs on the lot or parcel, a Willamette and Tualatin River Protection Area permit shall be required unless the development proposal is exempt per CDC 28.040.

B. At the confluence of a stream or creek with either the Tualatin or Willamette River, the standards of this chapter shall apply only to those portions of the lot or parcel fronting the river. Meanwhile, development in those portions of the property facing or adjacent to the stream or creek shall meet the transition, setbacks and other provisions of Chapter 32 CDC, Water Resource Area Protection.

C. All uses permitted under the provisions of the underlying base zone and within the Willamette and Tualatin River Protection Area zone are allowed in the manner prescribed by the base zone subject to applying for and obtaining a permit issued under the provisions of this chapter unless specifically exempted per CDC 28.040.

D. The construction of a structure in the HCA or the expansion of a structure into the HCA when the new intrusion is closer to the protected water feature than the pre-existing structure. (Ord. 1576, 2008; Ord. 1604 § 21, 2011; Ord. 1636 § 26, 2014)

Response: The requirements of the Willamette and Tualatin River Protection Area rely on the Habitat Conservation Area (HCA) Map to delineate where development should or should not occur. As noted in the Pre-Application Conference Meeting Summary Notes (Attachment B), Trillium Creek and the associated wetlands are located on the adjacent school property to the south. There is a small portion of mapped HCA in the southeast corner of the property, as well as on the adjacent property to the south near the project's proposed stormwater discharge point. However, this project is not proposing any encroachment into the HCA and therefore meets the requirements of 28.040 and is exempt from the Willamette and Tualatin River Protection Area permit requirements.

28.040 Exemptions/Uses Permitted Outright

S. In cases where the required development standards of this chapter are applied and met with no encroachment into HCAs, and also meeting subsections T and U of this section, where applicable, then no permit under the provisions of this chapter will be required. For example, if the proposed development or action will be located in the "Habitat and Impact Areas Not Designated as HCAs" and keeps out of the habitat conservation areas, a Willamette or Tualatin River Protection Area permit shall not be required. Floodplain management area or other permits may still be required.

T. The construction, remodeling or additions of home and accessory structures that take place completely within the "Habitat and Impact Areas Not Designated as HCAs" shall be exempt from a Willamette or Tualatin River Protection Area permit. Where the "Habitat and Impact Areas Not Designated as HCAs" goes to the edge of a clearly defined top of bank, the applicant's home and accessory structures shall be set back at least 15 feet from top of bank. At-grade patios and deck areas within 30 inches of grade may extend to within five feet from top of bank. No overhang or cantilevering of structures is permitted over HCA or over setback area. If these terms are met then no permit will be required under this chapter.

U. Maintenance, alteration, expansion, repair and replacement of existing structures are exempt, provided impermeable surfaces do not exceed 5,000 square feet and that it complies with the provisions of Chapters 27 and 28 CDC. The following standards shall also apply:

> *1. Rebuilding of existing residential and non-residential structures within the same foundation lines as the original structure(s) including, but not limited to, those damaged or destroyed by fire or other natural hazards; or*
>
> *2. The alteration, expansion, repair and replacement of a house or structure per the standards of CDC 28.110(E) not to exceed 5,000 square feet of impermeable surface per that section; or*
>
> *3. The alteration, expansion, repair and replacement of a house or structure vertically where the applicant is adding additional floors or expanding above the footprint of the existing structure regardless of whether the structure's footprint is in an HCA or not.*

Response: As shown in the Natural Resource Assessment (Attachment C, Figures 6 and 7), proposed development and associated grading can be accommodated outside the mapped HCA area on the project site. There is a small portion of HCA located in the southeast corner of the site and also on the adjacent property to the south near the proposed stormwater discharge point. The project is not proposing any encroachment into the HCA; therefore, the project meets the exemption requirements of 28.040 and a Willamette and Tualatin River Protection Area permit is not required, pursuant to 28.030.3.

Chapter 32 Water Resource Area Protection

32.010 Purposes

The purposes of this chapter are to:

A. Comply with Title 13 and Title 3 of Metro's Urban Growth Management Functional Plan while balancing resource protection with property rights and development needs.

B. Protect or improve water quality by filtering sediment and pollutants and absorbing excess nutrients for the protection of public health, safety and the environment and to comply with both state and federal laws and regulations, including the Clean Water Act and the Endangered Species Act.

C. Moderate storm water impacts by slowing, storing, filtering and absorbing storm water and to maintain storm water storage and conveyance to prevent or minimize flooding and erosion for the protection of public health and safety.

D. Prevent erosion and minimize sedimentation of water bodies by protecting root masses along streams that resist erosion and stabilize the stream bank and by protecting vegetation on steep slopes to maintain their stability.

E. Protect and improve the following functions and values of WRAs that enhance the value of fish and wildlife habitat:

1. Natural stream corridors that provide habitat and habitat connectivity for terrestrial wildlife;

2. Microclimate habitats that support species adapted to those conditions;

3. Shade to maintain healthy stream temperatures;

4. Vegetation to absorb and filter pollution and sediment that would otherwise contaminate the water body;

5. Sources of organic material that support the food chain;

6. Recruitment of large wood that enhances the habitat of fish bearing streams;

7. Moderation of stream flow by storing and delaying storm water runoff; and

8. Vegetated areas surrounding wetlands that, together with the wetland, provide vital habitat for birds, amphibians, and other species.

F. Provide mitigation standards and guidance to address water quality values and ecological functions and values lost through development within WRAs.

G. Encourage the use of habitat friendly development practices.

H. Minimize construction of structures and improvements where they are at risk of flooding, to enable natural stream migration and channel dynamics, and protect water resources from the potential harmful impacts of development.

I. Provide for uses and activities in WRAs that have negligible impact on such areas; and to provide for other uses that must be located in such areas in a way that will avoid or, when avoidance is not possible, minimize potential impacts. (Ord. 1623 § 1, 2014)

Response: The applicant understands that the Water Resource Area Protection aims to protect water bodies while balancing property rights and development needs and provides the following responses in compliance with the WRA requirements.

32.020 Applicability

A. This chapter applies to all development, activity or uses within WRAs identified on the WRA Map. It also applies to all verified, unmapped WRAs. The WRA Map shall be amended to include the previously unmapped WRAs.

B. The burden is on the property owner to demonstrate that the requirements of this chapter are met, or are not applicable to the land, development activity, or other proposed use or alteration of land. The Planning Director may make a determination of applicability based on the WRA Map, field visits, and any other relevant maps, site plans and information, as to:

1. *The existence of a WRA;*
2. *The exact location of the WRA; and/or*
3. *Whether the proposed development, activity or use is within the WRA boundary.*

In cases where the location of the WRA is unclear or disputed, the Planning Director may require a survey, delineation, or sworn statement prepared by a natural resource professional/wetland biologist or specialist that no WRA exists on the site. Any required survey, delineation, or statement shall be prepared at the applicant's sole expense. (Ord. 1623 § 1, 2014)

Response: Trillium Creek and the associated wetlands are located on the adjacent school property to the south of the subject site. City Staff has confirmed that there is a mapped wetland on the City of West Linn's adopted WRA Map and that the wetland delineation prepared in 2009 for the site agrees with the WRA Map (see Attachment B, Pre-Application Conference Summary Notes). As shown on Attachment C, the 65 foot WRA setback has been measured from this wetland boundary. Roughly 5,575 square feet of the WRA is located along the southern boundary of the Station 55 property. This area is in degraded condition as shown on the Natural Resource Assessment (Attachment C). The WRA along the southern boundary of the site is also on the adjacent property to the south near the proposed stormwater discharge point. As anticipated, the project will necessitate temporary encroachment into the WRA for an underground storm pipe and permanent encroachment into the WRA for a rip-rap pad at the storm discharge point. The impacts will be temporary with approximately 61 square feet of permanent impact. Pursuant to *Table 32-1: Summary of Where Development and Activities May Occur in Areas Subject to This Chapter*, these anticipated storm water treatment and detention impacts are allowed/permitted given that the exiting topography of the site affords no other reasonable alternatives for managing stormwater.

32.030 Prohibited Uses

Alteration, development, or use of real property designated as, and within, a WRA is strictly prohibited except as specifically allowed or exempted in this chapter.

Response: As shown in the Natural Resource Assessment (Attachment C, Figure 7), it is anticipated that the project will require temporary encroachment into the WRA (approximately 1,360 square feet) for an underground storm pipe and permanent encroachment into the WRA (approximately 61 square feet) for a rip-rap pad at the storm discharge point. Pursuant to *Table 32-1: Summary of Where Development and Activities May Occur in Areas Subject to This Chapter*, these anticipated storm water treatment and detention impacts are allowed/permitted given that the exiting topography of the site affords no other reasonable alternatives for managing stormwater. Because the proposed improvement related to the private discharge (outfall) is permitted pursuant to 32.040, no WRA permit is required.

Chapter 41 Building Height Limitations

41.005 Determining Height of Building

> *A. For all zoning districts, building height shall be the vertical distance above a reference datum measured to the highest point of a flat roof or to the deck line of a mansard roof or to the highest gable, ridgeline or peak of a pitched or hipped roof, not including projections above roofs such as cupolas, towers, etc. The reference datum shall be selected by either of the following, whichever yields a greater height of building.*
>
> *1. For relatively flat sites where there is less than a 10-foot difference in grade between the front and rear of the building, the height of the building shall be measured from grade five feet out from the exterior wall at the front of the building; or*
>
> *2. For steeper lots where there is more than a 10-foot difference in grade between the front and rear of the building, the height of the building is measured from grade at a point five feet out from the exterior wall on the lowest side (front or rear) of the building. One then measures vertically to the peak or ridgeline of the roof to determine the height.*
>
> *3. Buildings on cross slopes or side slopes are measured at either the front or rear of the building using methods described in subsections (A)(1) and (2) of this definition only.*

Even if the cross slope creates a tall elevation on the side, the method of determining height is not modified.

Response: The proposed site has less than a 10-foot difference in grade; therefore the height is measured from grade five feet out from the exterior wall. As shown in the Building Elevation (Exhibit A3.01, A3.02), the proposed fire station is measured as 32 feet in height.

41.010 Front Yard Setback Exception

> *If the average slope of a building site is 25 percent or greater, as measured along the planes of the proposed structure, the minimum front yard setback for the garage shall be three feet. All structures other than the garage shall meet the setback requirement of the underlying zone, or as otherwise specified in this code.*

Response: The proposed fire station application is not requesting a front yard setback exception, therefore this criterion is not applicable.

41.020 Height Exceptions

> *If the highest grade of a building site which fronts on the downslope side of the street is greater than 10 feet above the lowest grade as measured along the planes of the proposed structure, the total building height may not exceed 45 feet as measured from the lowest grade at a point five feet downhill from the rear of the building, provided the building height does not project more than 24 feet above the average grade of the street. In the R-15, R-20, and R-40 zones the 45-foot height may be increased to 50 feet…*

Response: The proposed fire station application is not requesting a height exception, therefore this criterion is not applicable.

41.030 Projections not used for Human Habitation

Projections such as chimneys, spires, domes, elevator shaft housings, towers, aerials, flag poles, and other similar objects not used for human occupancy are not subject to the building height limitations of this code. (Ord. 1604 § 44, 2011)

Response: There are no chimneys, spires, domes, elevator shaft housings, towers, or aerials proposed for the site. A flag pole will occupy the site and is not subject to building height limitation. A communications antenna will be provided on the roof of Station 55.

41.040 Places of Worship or Government Buildings

The height of a place of worship or governmental building may be built to a maximum height of 50 feet provided:

Response: Pursuant to Chapter 60.001, a fire station is considered a governmental building. The fire station will be 29 feet tall, less than the 50 foot maximum for government buildings.

Chapter 42 Clear Vision Areas

42.020 Clear Vision Areas Required, Uses Prohibited

A. A clear vision area shall be maintained on the corners of all property adjacent to an intersection as provided by CDC 42.040 and 42.050.

B. A clear vision area shall contain no planting, fence, wall, structure or temporary or permanent obstruction (except for an occasional utility pole or tree) exceeding three feet in height, measured from the top of the curb, or, where no curb exists, from the street centerline grade, except that trees exceeding this height may be located in this area, provided all branches below eight feet are removed. (Ord. 1192, 1987)

Response: The tax lot on which the proposed fire station is located is not adjacent to an intersection and, therefore, meets the requirements for maintaining clear vision areas on the corners of all property adjacent to an intersection. As shown on the Landscape Plan (Exhibit L1.0, L2.0) and the Site Plan (Exhibit A1.01), the location and site design for the proposed fire station does not contain any existing or planned obstructing landscaping or structures. The proposed site meets the requirements of 42.040 and 42.050 as indicated in the findings addressing those code sections.

42.030 Exceptions

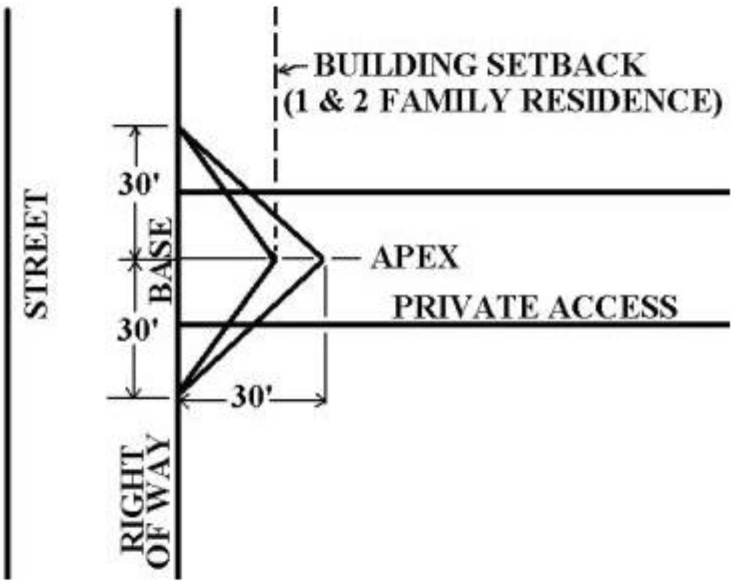
The following described area in Willamette shall be exempt from the provisions of this chapter. The units of land zoned General Commercial which abut Willamette Falls Drive, located between 10th and 16th Streets. Beginning at the intersection of Willamette Falls Drive and 11th Street on 7th Avenue to 16th Street; on 16th Street to 9th Avenue; on 9th Avenue to 14th Street to the Tualatin River; following the Tualatin River and Willamette River to 12th Street; on 12th Street to 4th Avenue; on 4th Avenue to 11th Street; on 11th Street to Willamette Falls Drive. This described area does not include the northerly side of Willamette Falls Drive. (Ord. 1636 § 29, 2014)

Response: The proposed fire station site, located in Hidden Springs, is not exempt from the provisions of this chapter; findings addressing the requirements of Chapter 42 follow.

42.050 Computation; Accessway Less than 24 Feet in Width

The clear vision area for street and accessway intersections (accessways having less than 24 feet in width) shall be that triangular area whose base extends 30 feet along the street right-of-way in both directions from the centerline of the accessway at the front setback line of a single-family and two-family residence, and 30 feet back from the property line on all other types of uses.

Clear vision area for corner lots and driveways less than 24 feet in width:



Response: The location and site design for the proposed fire station does not contain any existing or obstructing landscaping or structures in the clear vision area. Landscape Plan (Exhibit L1.0, L2.0) illustrates that landscaping proposed in the clear vision area is less than three feet in height, such as river rock and ground cover vegetation, consistent with CDC 42.020.

Chapter 44 Fences

44.020 Sight-Obscuring Fence; Setback and Height Limitations

A. A sight- or non-sight-obscuring fence may be located on the property line or in a yard setback area subject to the following:

1. The fence is located within:

a. A required front yard area, and it does not exceed three feet, except pillars and driveway entry features subject to the requirements of Chapter 42 CDC, Clear Vision Areas, and approval by the Planning Director;

b. A required side yard which abuts a street and it is within that portion of the side yard which is also part of the front yard setback area and it does not exceed three feet;

c. A required side yard which abuts a street and it is within that portion of the side yard which is not also a portion of the front yard setback area and it does not exceed six feet provided the provisions of Chapter 42 CDC are met;

d. A required rear yard which abuts a street and it does not exceed six feet; or

e. A required side yard area which does not abut a street or a rear yard and it does not exceed six feet.

B. Fence or wall on a retaining wall. When a fence is built on a retaining wall or an artificial berm, the following standards shall apply:

1. When the retaining wall or artificial berm is 30 inches or less in height from finished grade, the maximum fence or wall height on top of the retaining wall shall be six feet.

2. When the retaining wall or earth berm is greater than 30 inches in height, the combined height of the retaining wall and fence or wall from finished grade shall not exceed eight and one-half feet.

3. Fences or walls located on top of retaining walls or earth berms in excess of 30 inches above finished grade may exceed the total allowed combined height of eight and one-half feet; provided, that the fence or wall is located a minimum of two feet from the retaining wall and the fence or wall height shall not exceed six feet.

Response: The proposed fire station includes a retaining wall that varies from 3'6" to 22' in height. A combined fence / screen will be provided along the top of the retaining wall for safety purposes. This will be a combination of a 3' concrete vehicle barrier (serves as solid screening for headlights) and a 3' fence. The fence screen will not be taller than 8'6" in height above the top of the retaining wall and will comply with 44.020 B.2 above.

44.030 Screening of Outdoor Storage

A. All service, repair, and storage activities carried on in connection with any commercial, business or industrial activity and not conducted within an enclosed building, shall be screened from view of all adjacent properties and adjacent streets by a sight obscuring fence.

B. The sight obscuring fence shall be in accordance with provisions of Chapter 44, Clear Vision Areas, and shall be subject to the provisions of Chapter 55, Development Review.

Response: The proposed fire station will accommodate minor service and repair of the emergency service vehicles on-site. Any major service and repair activities will occur off-site. The truck wash area and minor repair area is located in the back of the apparatus bays, and is located roughly in the center of the developed area, behind the station building. The proposed retaining walls and fencing along the southern and eastern edge of the property will effectively screen this activity from adjacent properties. Additional screening or fencing is therefore not necessary. The only storage planned that is not within the main building will be for garbage and recycling facilities (140 square feet in CMU enclosure), which will be located in the back of the building and screened.

44.040 Landscaping

Landscaping which is located on the fence line and which impairs sight vision shall not be located within the clear vision area as provided in Chapter 42 CDC.

Response: As shown on the Landscape Plan (Exhibit L1.0, L2.0), the proposed fire station does not contain landscaping that impairs clear vision areas.

44.050 Standards for Construction

A. The structural side of the fence shall face the owner's property; and

B. The sides of the fence abutting adjoining properties and the street shall be maintained. (Ord. 1291, 1990)

Response: A combined fence / screen will be provided along the top of the retaining wall for safety purposes. This will be a combination of a 3 foot concrete vehicle barrier (serves as solid screening for headlights) and a 3 foot fence. Both sides of the fence will have the same design.

Chapter 46 Off-Street Parking, Loading and Reservoir Areas

46.020 Applicability and General Provisions

A. At the time a structure is erected or enlarged, or the use of a structure or unit of land is changed within any zone, parking spaces, loading areas and reservoir areas shall be provided in accordance with the requirements of this chapter unless other requirements are otherwise established as a part of the development approval process.

B. The provision and maintenance of off-street parking and loading spaces are the continuing obligation of the property owner.

C. No building or other permit shall be issued until plans are approved that show the property that is and will remain available for exclusive use as off-street parking and loading space as required by this chapter.

D. Required parking spaces and loading areas shall be improved to the standards contained in this chapter and shall be available for use at the time of the final building inspection except as provided in CDC 46.150. (Ord. 1463, 2000; Ord. 1622 § 25, 2014; Ord. 1636 § 30, 2014)

Response: The applicant understands that when a structure is erected off-street parking spaces are to be provided and maintained by the property owner in accordance with this chapter and that no permits will be issued until the required parking is shown to be adequate on the submitted plans. As shown on Exhibit A1.01 and described in findings under 46.030 Submittal Requirements, the proposed development will conform to the City's parking requirements. The parking spaces provided will be standard 9' x 18' spaces. No compact parking is provided.

46.030 Submittal Requirements

For any application requiring design review approval, which includes parking areas, the applicant shall submit, within the design review package, a plan drawn to scale showing all the elements necessary to indicate that the requirements of Chapter 55 CDC are met and it shall include but not be limited to:

A. The delineation of individual parking and loading spaces and their dimensions;

Response: The location of the 34 vehicle parking spaces provided as a part of this project are shown on the Site Plan (Exhibit A1.01). The dimensions of the parking spaces will comply with the City standard.

B. The identification of compact parking spaces;

Response: No compact parking spaces are proposed.

C. The location of the circulation area necessary to serve spaces;

Response: The location of the circulation areas provided as a part of this project are shown on the Site Plan (Exhibit A1.01).

D. The access point(s) to streets, alleys, and properties to be served;

Response: The location of the two primary access points (the fire apparatus bay will be exit only) and the service access are shown on the Site Plan (Exhibit A1.01).

E. The location of curb cuts;

Response: The location of the curb cuts associated with the two primary access points (the fire apparatus bay will be exit only) and the service access (utilizing an existing curb cut) are shown on the Site Plan (Exhibit A1.01).

F. The location and dimensions of all landscaping, including the type and size of plant material to be used, as well as any other landscape material incorporated into the overall plan;

Response: The Landscape Plan (Exhibit L1.0, L2.0) provides the information related to the landscape material and treatments.

G. The proposed grading and drainage plans and the slope (percentage) of parking lot;

Response: The Tree Removal, Grading and Erosion Control Plan (Exhibit C2) provides the information related to grading, drainage and topography.

H. Specifications as to signs and bumper guards;

Response: Bumper guards are provided.

I. Identification of disabled parking spaces;

Response: The location of the two disabled vehicle parking spaces provided as a part of this project are shown on the Site Plan (Exhibit A1.01).

J. Location of pedestrian walkways and crossings; and

Response: The location of pedestrian walkways, crossings and access to the building provided as a part of this project are shown on the Site Plan (Exhibit A1.01).

K. Location of bicycle racks. (Ord. 1463, 2000)

Response: The location of the two bicycle parking spaces provided as a part of this project are shown on the Site Plan (Exhibit A1.01).

46.040 Approval Standards

Approval shall be based on the standards set forth in this chapter and Chapters 48, Access and Circulation; 52, Signs; and 54, Landscaping.

Response: The applicant understands that approval will be based on the standards within this chapter and Chapter 48, 52 and 54. Narrative responses to Chapter 48, 52 and 54 are provided in the following sections.

46.050 Joint Use of a Parking Area

A. Joint use of required parking spaces may occur when two or more uses on the same or separate sites are able to share the same parking spaces because their parking demands occur at different times. Joint use of required parking spaces is allowed if the following documentation is submitted in writing to the Planning Director as part of a building or zoning permit application or land use review…

B. If a joint use arrangement is subsequently terminated, the requirements of this chapter will apply to each use separately.

Response: The applicant is not proposing a joint use of parking area. Therefore, this section is not applicable.

46.060 Storage in Parking and Loading Areas Prohibited

Required parking spaces shall be available for the parking of passenger automobiles of residents, customers, patrons and employees only, and the required parking spaces shall not be used for storage of vehicles or materials or for the parking of trucks connected with the business or use with the exception of small (under one-ton) delivery trucks or cars

Response: The applicant is not proposing using required parking spaces for storage of vehicles or materials or parking of vehicles connected with the fire station, therefore this section is not applicable.

46.070 Maximum Distance Allowed between Parking Area and Use

B. Off-street parking spaces for uses not listed in "A" above shall be located not farther than 200 feet from an entryway to the building or use they are required to serve, measured in a straight line from the building with the following exceptions:

1. Shared parking areas for commercial uses which require more than 40 parking spaces may provide for the spaces in excess of the required 40 spaces up to a distance of 300 feet from the entryway to the commercial building or use.

2. Industrial and manufacturing uses which require in excess of 40 spaces may locate the required spaces in excess of the 40 spaces up to a distance of 300 feet from the entryway to the building.

3. Employee parking areas for car pools and van pools shall be located closer to the entryway to the building than general employee parking.

4. Stacked or valet parking is allowed if an attendant is present to move vehicles. If stacked parking is used for required parking spaces, the applicant shall ensure that an attendant will always be present when the lot is in operation. The requirements for minimum or maximum spaces and all parking area development standards continue to apply for stacked parking.

5. All disabled parking shall be placed closest to building entrances than all other parking. Appropriate ADA curb cuts and ramps to go from the parking lot to the ADA accessible entrance shall be provided unless exempted by ADA code.

Response: As shown in Site Plan *(*Exhibit A1.01*)*, all provided parking is located less than 200 feet from the entrance to the building. Two disabled parking have been designed to meet the ADA code requirements and are located closest to the building entrances. The employee parking area will be located in the southern parking area. No carpool or vanpool parking is proposed.

46.080 Computation of Required Parking Spaces and Loading Area

A. Where several uses occupy a single structure or parcel of land or a combination of uses are included in one business, or a combination of uses in the same or separate buildings share a common parking area as in the case of a shopping center, the total off-street parking spaces and loading area shall be the sum of the requirements of the several uses, computed separately. For example, parking for an auto sales and repair business would be calculated using the "retail-bulky" calculation for the sales area and the "service and repair" calculation for the repair area. In another example, parking for a shopping center with a grocery store, a restaurant, and a medical office would be calculated using the "general retail store" calculation for the grocery store, the "restaurant" calculation for the restaurant, and the "medical/dental clinics" calculation for the medical office. The total number of required parking spaces may be reduced by up to 10 percent to account for cross-patronage (when a customer visits several commercial establishments during one visit to the commercial center) of adjacent businesses or services in a commercial center with five or more separate commercial establishments.

B. To calculate building square footage as a basis for determining how many parking spaces are needed, the area measured shall be gross floor area under the roof measured from the faces of the structure, including all habitable floors and excluding only space devoted to covered off-street parking or loading.

C. Where employees are specified, the employees counted are the persons who work on the premises including proprietors, executives, professional people, production, sales, and distribution employees, during the largest shift.

D. Fractional space requirements shall be counted as a whole space.

E. Parking spaces in the public street shall not be eligible as fulfilling any part of the parking requirement except open space/park areas with adjacent street frontage.

F. When an office or commercial development is proposed which has yet to identify its tenants, the parking requirement shall be based upon the "office" or "general retail" categories, respectively.

G. As permitted uses are replaced with new permitted uses within an existing commercial or business center, modification of the number of parking spaces relative to the new mix of uses is not required unless other modifications of the site which require design review approval pursuant to Chapter 55 are proposed.

Response: The proposed fire station will initially open with shifts of four employees but can ultimately accommodate up to six employees. The station will also include a community room of 590 square feet. The station will be “open” 24-hours a day, with a shift change at 7:00 am. Given the initial staff level is projected to be four per shift, four employees will arrive and four employees will leave at the shift change. In the long term, when six employees are stationed at Station 55, six employees will arrive and six will leave.

46.090 Minimum Parking Space Requirements

B. Public and Semi-public Buildings/Uses:

4. Religious institutions and community meeting rooms. One space for every 4 fixed seats or every 8 feet of bench length or every 28 square feet where no permanent seats or benches are maintained (in main auditorium, sanctuary, or place of worship).

F. Maximum parking. Parking (except for single-family and two-family residential uses) shall not exceed the minimum required number of spaces by more than 10 percent.

Response: The community meeting room within the fire station is 590 square feet. Pursuant to the City requirement of providing one space for every 28 square feet of community meeting room, 21 off-street parking spaces are required to account for the community room. During the pre-application meeting, the City determined that the overall Station 55 required parking will rely on the standard used by the West Linn Planning Commission for the Failing Street and Willamette Falls Drive TVF&R stations: one space for every 28 square feet of community meeting room plus one space per each employee during peak shift. As noted previously, long term at peak shift, there will be six employees arriving and six employees leaving, for 12 spaces needed for fire station personnel. Pursuant to CDC Section 46.080.A, below, the two different uses must be computed separately, then added for the total off-street parking spaces required:

> *“…where several uses occupy a single structure or parcel of land or a combination of uses are included in one business, or a combination of uses in the same or separate buildings share a common parking area as in the case of a shopping center, the total off-street parking spaces and loading area shall be the sum of the requirements of the several uses, computed separately.”*

By adding the requirements for the community room (21) together with the required spaces for the fire station employees (12) there is a minimum of 33 parking spaces required. The application proposes 34 spaces, which is within 10 percent of the minimum spaces required and therefore does not exceed the maximum parking allowed.

46.100 Parking Requirements for Unlisted Uses

A. Upon application and payment of fees, the decision-making authority, as provided by Section 99.060(B), may rule that a use not specifically listed in Section 46.080 is a use similar to a listed use and that the same parking standards shall apply. The ruling on parking requirements shall be based on the requirements of Chapter 99 and findings that:

1. The use is similar to and of the same general type as a listed use;

2. The use has similar intensity, density and off-site impacts as the listed use; and,

3. The use has similar impacts on the community facilities as the listed use.

B. This section does not authorize the inclusion of a use in a zone where it is not listed, or a use which is specifically listed in another zone or which is of the same general type, and is similar to a use specifically listed in another zone.

Response: A fire station is not a use that is specifically listed in Section 46.080, however City Staff has recommended that the application be consistent with approved fire stations in West Linn: one space per peak shift employee plus requirements related to a community room. The applicant understands that this section does not authorize the inclusion of a use in a zone where it is not listed or a use which is specifically listed in another zone or which is of the same general type, and is similar to a use specifically listed in another zone.

46.110 Reservoir Areas Required for Drive-In Uses

All uses providing drive-in services as defined by this code shall provide, on the same site, a reservoir space a minimum of 15 feet long for each car…

Response: A fire station is not listed as a drive-in service and therefore this criterion is not applicable.

46.120 Driveways Required on Site

Any school or other meeting place which is designed to accommodate more than 25 people at one time shall provide a 15-foot-wide driveway designed for continuous forward flow of passenger vehicles for the purposes of loading and unloading passengers. Depending on functional requirements, the width may be increased with Planning Director approval.

Response: The community room will accommodate approximately 20 people and therefore this criterion is not applicable.

46.130 Off-Street Loading Spaces

Building or structures to be built or substantially altered, which receive and distribute materials or merchandise by truck, shall provide and maintain off-street loading and maneuvering space. The dimensional standard for loading space is a minimum of 14 feet wide by 20 feet long or proportionate to accommodate the size of delivery trucks that typically serve the proposed use as follows…

Response: The proposed fire station will not receive or distribute material or merchandise by truck and therefore this criterion is not applicable.

46.140 Exemptions to Parking Requirements

To facilitate the design requirements of Chapter 58 CDC, properties in the Willamette Falls Drive Commercial District, located between 10th and 16th Streets, shall be exempt from the requirements for off-street parking as identified in this chapter. Any off-street parking spaces provided shall be designed and installed per the dimensional standards of this code.

Response: The proposed fire station is not within the Willamette Falls Drive Commercial Design District and therefore this criterion is not applicable.

46.150 Design and Standards

1. "One standard parking space" means a minimum for a parking stall of eight feet in width and 16 feet in length. These stalls shall be identified as "compact." To accommodate larger cars, 50 percent of the required parking spaces shall have a minimum dimension of nine feet in width and 18 feet in length (nine feet by 18 feet). When multi-family parking stalls back onto a main driveway, the stalls shall be nine feet by 20 feet. Parking for development in water resource areas may have 100 percent compact spaces.

Response: The vehicle parking spaces are 9' x 18' and meet the minimum dimension noted above.

2. Disabled parking and maneuvering spaces shall be consistent with current federal dimensional standards and subsection B of this section and placed nearest to accessible building entryways and ramps.

Response: Disabled parking and maneuvering spaces have been designed to be consistent with federal dimensional requirements and are located nearest to an accessible building entryway.

3. Repealed by Ord. 1622.

4. Service drives shall be designed and constructed to facilitate the flow of traffic, provide maximum safety of traffic access and egress, and maximum safety of pedestrians and vehicular traffic on the site.

Response: The drive aisle to the parking lot has been designed to operate safely and to facilitate traffic flow.

5. Each parking and/or loading space shall have clear access, whereby the relocation of other vehicles to utilize the parking space is not required.

Response: Clear access to parking / loading spaces has been provided.

6. Except for single- and two-family residences, any area intended to be used to meet the off-street parking requirements as contained in this chapter shall have all parking spaces clearly marked using a permanent paint. All interior drives and access aisles shall be clearly marked and signed to show direction of flow and maintain vehicular and pedestrian safety. Permeable parking surface spaces may have an alternative delineation for parking spaces.

Response: Provided parking spaces will be delineated by painting the stalls.

7. Except for residential parking, and parking for public parks and trailheads, at least 50 percent of all areas used for the parking and/or storage and/or maneuvering of any vehicle, boat and/or trailer shall be improved with asphalt or concrete surfaces according to the same standards required for the construction and acceptance of City streets. The remainder of the areas used for parking may use a permeable paving surface designed to reduce surface runoff. Parking for public parks or trailheads may use a permeable paving surface designed to reduce surface runoff for all parking areas. Where a *parking lot contains both paved and unpaved areas, the paved areas shall be located closest to the use which they serve.*

Response: The parking lot will be paved with concrete.

8. Off-street parking spaces for single- and two-family residences shall be improved with an asphalt or concrete surface, or a permeable parking surface designed to reduce surface runoff, to specifications as approved by the Building Official. Other parking facilities for two- and single-family homes that are to accommodate additional vehicles, boats, recreational vehicles, and trailers, etc., need not be paved. All parking for multi-family residential development shall be paved with concrete or asphalt. Driveways shall measure at least 20 feet from the back of sidewalk to garage or the end of the parking pad to accommodate cars and sport utility vehicles without the vehicles blocking the public sidewalk.

Response: The fire station is not a residential use.

9. Access drives from the street to off-street parking or loading areas shall be designed and constructed to facilitate the flow of traffic and provide maximum safety for pedestrian and vehicular traffic on the site. The number of access drives shall be limited to the minimum that will allow the property to accommodate and service the anticipated traffic. Access drives shall be clearly and permanently marked and defined through use of rails, fences, walls, or other barriers or markers on frontage not occupied by service drives.

Response: The access drives have been designed to meet this standard. The number of access drives has been limited to the number necessary to efficiently operate the fire station.

10. Access drives shall have a minimum vision clearance as provided in Chapter 42 CDC, Clear Vision Areas.

Response: As noted earlier, clear vision requirements have been met at the driveways.

11. Parking spaces along the boundaries of a parking lot or adjacent to interior landscaped areas or sidewalks shall be provided with a wheel stop at least four inches high located two feet back from the front of the parking stall. Such parking spaces may be provided without wheel stops if the sidewalks or landscaped areas adjacent the parking stalls are two feet wider than the minimum width.

Response: Wheel stops have been provided and meet the standard noted above.

12. Off-street parking and loading areas shall be drained in accordance with plans and specifications approved by the City Engineer. Storm drainage at commercial sites may also have to be collected to treat oils and other residue.

Response: Inlets will be located and spaced to adequately convey surface water runoff from the site. Trapped catch basins will be utilized to pre-treat runoff from parking and drive aisle areas. An oil water separator will be used to treat runoff from apparatus wash-down areas. Runoff from impervious surfaces will be treated and detained in the proposed stormwater treatment facility in accordance with City requirements. Refer to Composite Utility Plan (Exhibit C3) and Preliminary Stormwater Report (Attachment D) for more information.

13. Artificial lighting on all off-street parking facilities shall be designed to deflect all light downward away from surrounding residences and so as not to create a hazard to the public use of any road or street.

Response: See Site Lighting Plan, Exhibit E1.01, E1.01PH

14. Directional arrows and traffic control devices which are placed on parking lots shall be identified.

Response: No directional arrows will be provided.

15. The maximum driveway grade for single-family housing shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage must maintain a maximum grade of 12 percent as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.

Response: This is not a single family use; this criterion is not applicable.

16. Visitor or guest parking must be identified by painted "GUEST" or "VISITOR."

Response: No identification of visitor or guest parking is proposed; this criterion is not applicable.

17. The parking area shall have less than a five percent grade. No drainage across adjacent sidewalks or walkways is allowed.

Response: The proposed parking area has grades that are less than five percent (See Grading Plan, Exhibit C2). No drainage across adjacent sidewalks or walkways is proposed. This criterion is met.

18. Commercial, office, industrial, and public parking lots may not occupy more than 50 percent of the main lot frontage of a development site. The remaining frontage shall comprise buildings or landscaping. If over 50 percent of the lineal frontage comprises parking lot, the landscape strip between the right-of-way and parking lot shall be increased to 15 feet wide and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. The defensible space of the parking lot should not be compromised.

Response: Parking does not occupy more than 50 percent of the main lot frontage along Hidden Springs Road.

19. Areas of the parking lot improved with asphalt or concrete surfaces shall be designed into areas of 12 or less spaces through the use of defined landscaped area. Groups of 12 or less spaces are defined as:

a. Twelve spaces in a row, provided there are no abutting parking spaces, as in the case when the spaces are abutting the perimeter of the lot; or

b. Twelve spaces in a group with six spaces abutting together; or

c. Two groups of 12 spaces abutting each other, but separated by a 15-foot-wide landscape area including a six-foot-wide walkway.

d. Parking areas improved with a permeable parking surface may be designed using the configurations shown in subsections (A)(19)(a), (b) and (c) of this section except that groups of up to 18 spaces are allowed.

e. The requirements of this chapter relating to total parking lot landscaping, landscaping buffers, perimeter landscaping, and landscaping the parking lot islands and interior may be waived or reduced pursuant to CDC 32.110(F) in a WRA application without a variance being required.

Response: The Landscape Plan (Exhibit L1.0, L2.0) addresses the above requirements. Defined landscaped areas are provided in the parking areas.

20. Pedestrian walkways shall be provided in parking areas having 20 or more spaces. Walkways or sidewalks shall be constructed between major buildings/activity areas (an example in multi-family housing: between recreation center, swimming pool, manager's office, park or open space areas, parking lots, etc.) within a development, between adjacent developments and the new development, as feasible, and between major buildings/activity areas within the development and adjacent streets and all adjacent transit stops. Internal parking lot circulation and design should maintain ease of access for pedestrians from streets and transit stops. Walkways shall be constructed using a material that visually contrasts with the parking lot and driveway surface. Walkways shall be further identifiable to *pedestrians and motorists by grade separation, walls, curbs, surface texture (surface texture shall not interfere with safe use of wheelchairs, baby carriages, shopping carts, etc.), and/or landscaping. Walkways shall be six feet wide. The arrangement and layout of the paths shall depend on functional requirements.*

21. The parking and circulation patterns are easily comprehended and defined. The patterns shall be clear to minimize traffic hazards and congestion and to facilitate emergency vehicles.

22. The parking spaces shall be close to the related use.

23. Permeable parking spaces shall be designed and built to City standards.

Response: The general parking area has 21 spaces and provides sidewalk and easy access to the main building and immediate access to the community room.

B. Accessible parking standards for persons with disabilities. If any parking is provided for the public or visitors, or both, the needs of the people with disabilities shall be based upon the following standards or current applicable federal standards, whichever are more stringent:

1. Minimum number of accessible parking space requirements (see following table):

2. Location of parking spaces. Parking spaces for the individual with a disability that serve a particular building shall be located on the shortest possible accessible circulation route to an accessible entrance to a building. In separate parking structures or lots that do not serve a particular building, parking spaces for the persons with disabilities shall be located on the shortest possible circulation route to an accessible pedestrian entrance of the parking facility.

3. Accessible parking space and aisle shall meet ADA vertical and horizontal slope standards.

4. Where any differences exist between this section and current federal standards, those standards shall prevail over this code section.

5. One in every eight accessible spaces, but not less than one, shall be served by an access aisle 96 inches wide.

6. Van-accessible parking spaces shall have an additional sign marked “Van Accessible” mounted below the accessible parking sign. A van-accessible parking space reserved for wheelchair users shall have a sign that includes the words “Wheelchair Use Only.” Van-accessible parking shall have an adjacent eight-foot-wide aisle. All other accessible stalls shall have a six-foot-wide aisle. Two vehicles may share the same aisle if it is between them. The vertical clearance of the van space shall be 96 inches.

Response: The proposed parking area contains two ADA accessible parking spaces, located to the east of the proposed entry court and, as required, near the main entrance of the building along a marked pedestrian path. As shown on the Site Plan (Exhibit A1.01), the ADA accessible parking space has been designed to appropriate standards.

C. Landscaping in parking areas. Reference Chapter 54 CDC, Landscaping.

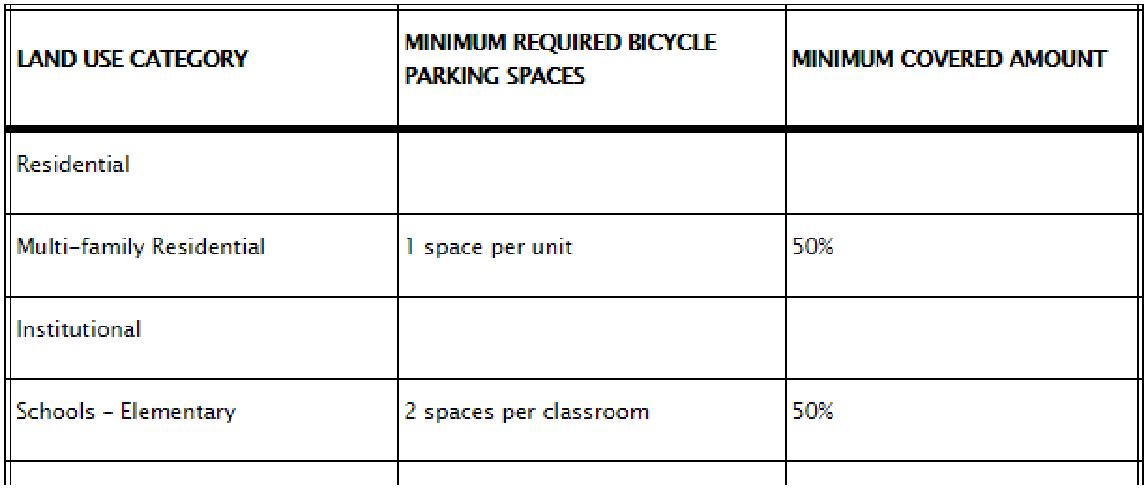
Response: The parking area landscaping is addressed in this application above. As discussed in pervious findings and shown on the Landscape Plan (Exhibit L1.0, L2.0), the proposal meets the City’s parking landscaping requirements.

D. Bicycle facilities and parking.

1. Provisions shall be made for pedestrian and bicycle ways if such facilities are shown on an adopted plan.

2. Bicycle parking facilities shall either be lockable enclosures in which the bicycle is stored, or secure stationary racks which accommodate bicyclist’s locks securing the frame and both wheels. The bicycle *parking shall be no more than 50 feet from the entrance to the building, well-lit, observable, and properly signed.*

3. Bicycle parking must be provided in the following amounts:



LAND USE CATEGORY	MINIMUM REQUIRED BICYCLE PARKING SPACES	MINIMUM COVERED AMOUNT
Residential		
Multi-family Residential	1 space per unit	50%
Institutional		
Schools - Elementary	2 spaces per classroom	50%

Response: There is no exact land use category that corresponds to a public safety facility/fire station, but institutional is closest to the proposed use. The institutional land use category does not require bicycle parking as shown above. Therefore bicycle parking is not required for fire stations. However, TVF&R will be providing 2 bicycle parking spaces as a part of Station 55. The location of the two bicycle parking spaces is shown on the Site Plan (Exhibit A1.01).

E. Office or industrial developments shall be allowed a 10 percent reduction in the number of required parking spaces when the property owner agrees to a demand management program that includes three or more of the following measures…

Response: The proposed project does not include an office or industrial development, therefore this section is not applicable.

Chapter 48 Access, Egress and Circulation

48.020 Applicability and General Provisions

A. The provisions of this chapter do not apply where the provisions of the Transportation System Plan or land division chapter are applicable and set forth differing standards.

B. All lots shall have access from a public street or from a platted private street approved under the land division chapter.

C. No building or other permit shall be issued until scaled plans are presented to the City and approved by the City as provided by this chapter, and show how the access, egress, and circulation requirements are to be fulfilled. Access to State or County roads may require review, approval, and permits from the appropriate authority.

D. Should the owner or occupant of a lot, parcel or building enlarge or change the use to which the lot, parcel or building is put, resulting in increasing any of the requirements of this chapter, it shall be unlawful and a violation of this code to begin or maintain such altered use until the provisions of this *chapter have been met, and, if required, until the appropriate approval authority under Chapter 99 CDC has approved the change.*

E. Owners of two or more uses, structures, lots, parcels, or units of land may agree to utilize jointly the same access and egress when the combined access and egress of both uses, structures, or parcels of land satisfies the requirements as designated in this code; provided, that satisfactory legal evidence is presented to the City Attorney in the form of deeds, easements, leases, or contracts to establish joint use. Copies of said instrument shall be placed on permanent file with the City Recorder.

F. Property owners shall not be compelled to access their homes via platted stems of flag lots if other driveways and easements are available and approved by the City Engineer. (Ord. 1584, 2008; Ord. 1636 § 32, 2014)

Response: The proposed fire station has public access from Hidden Springs Road. Joint access with another parcel, use or structure is not being proposed.

48.025 Access Control

A. Purpose. The following access control standards apply to public, industrial, commercial and residential developments including land divisions. Access shall be managed to maintain an adequate level of service and to maintain the functional classification of roadways as required by the West Linn Transportation System Plan. Major roadways, including arterials and collectors, serve as the primary system for moving people and goods within and through the City. Access management is a primary concern on these roads. Local streets and alleys provide access to individual properties. If vehicular access and circulation are not properly designed, these roadways will be unable to accommodate the needs of development and serve their transportation function. The regulations in this section further the orderly layout and use of land, protect community character, and conserve natural resources by promoting well-designed road and access systems and discouraging the unplanned subdivision of land.

B. Access control standards.

1. Traffic impact analysis requirements. The City or other agency with access jurisdiction may require a traffic study prepared by a qualified professional to determine access, circulation and other transportation requirements. (See also CDC 55.125, Traffic Impact Analysis.)

Response: TVF&R has submitted a Traffic Impact Analysis, included in Attachment E, prepared by Lancaster Engineering.

2. The City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit, to ensure the safe and efficient operation of the street and highway system. Access to and from off-street parking areas shall not permit backing onto a public street.

Response: The proposed accesses are the minimum necessary to maintain safe and efficient operation of the station and the adjacent street. To ensure rapid emergency response, it is imperative that emergency vehicle egress have its own access without mixing with passenger vehicles.

3. Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (planned access shall be consistent with adopted public works standards and TSP). These methods are "options" to the developer/subdivider.

> *a) Option 1. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane,* direct access to a public street is not permitted.

Response: Access is not from an existing or proposed alley or mid-block lane.

> *b) Option 2. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway"). A public access easement covering the driveway shall be recorded in this case to assure access to the closest public street for all users of the private street/drive.*

Response: Access is not from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway").

> *c) Option 3. Access is from a public street adjacent to the development lot or parcel. If practicable, the owner/developer may be required to close or consolidate an existing access point as a condition of approving a new access. Street accesses shall comply with the access spacing standards in subsection (B)(6) of this section.*

***Response**:* Access points to the project site from Hidden Springs Road are shown on the Site Plan (Exhibit A1.01). These accesses include:

- One full driveway access at the eastern edge of the property providing access to the parking areas and ingress for emergency vehicles to access the apparatus bay.
- One exit-only access from the apparatus bay for emergency vehicles only. This access is lined up opposite Bay Meadows Drive.
- One access at the western edge of the property to the gravel road access to the stormwater facility. This road will only be used for maintenance access to the stormwater facility.

4. Subdivisions fronting onto an arterial street. New residential land divisions fronting onto an arterial street shall be required to provide alleys or secondary (local or collector) streets for access to individual lots. When alleys or secondary streets cannot be constructed due to topographic or other physical constraints, access may be provided by consolidating driveways for clusters of two or more lots (e.g., includes flag lots and mid-block lanes).

Response: The proposed fire station is not within a subdivision. Therefore this subsection is not applicable.

5. Double-frontage lots. When a lot or parcel has frontage onto two or more streets, access shall be provided first from the street with the lowest classification. For example, access shall be provided from a local street before a collector or arterial street. When a lot or parcel has frontage opposite that of the adjacent lots or parcels, access shall be provided from the street with the lowest classification.

Response: The proposed fire station is not a double-frontage lot. Therefore this subsection is not applicable.

6. Access spacing.

> *a. The access spacing standards found in Chapter 8 of the adopted Transportation System Plan (TSP) shall be applicable to all newly established public street intersections and non-traversable medians.*
>
> *b. Private drives and other access ways are subject to the requirements of CDC 48.060.*

7. Number of access points. For single-family (detached and attached), two-family, and duplex housing types, one street access point is permitted per lot or parcel, when alley access cannot otherwise be provided; except that two access points may be permitted corner lots (i.e., no more than one access per street), subject to the access spacing standards in subsection (B)(6) of this section. The number of street access points for multiple family, commercial, industrial, and public/institutional developments shall be minimized to protect the function, safety and operation of the street(s) and *sidewalk(s) for all users. Shared access may be required, in conformance with subsection (B)(8) of this section, in order to maintain the required access spacing, and minimize the number of access points.*

8. Shared driveways. The number of driveway and private street intersections with public streets shall be minimized by the use of shared driveways with adjoining lots where feasible. The City shall require shared driveways as a condition of land division or site design review, as applicable, for traffic safety and access management purposes in accordance with the following standards:

> *a. Shared driveways and frontage streets may be required to consolidate access onto a collector or arterial street. When shared driveways or frontage streets are required, they shall be stubbed to adjacent developable parcels to indicate future extension. "Stub" means that a driveway or street temporarily ends at the property line, but may be extended in the future as the adjacent lot or parcel develops. "Developable" means that a lot or parcel is either vacant or it is likely to receive additional development (i.e., due to infill or redevelopment potential).*
>
> *b. Access easements (i.e., for the benefit of affected properties) shall be recorded for all shared driveways, including pathways, at the time of final plat approval or as a condition of site development approval.*
>
> *c. Exception. Shared driveways are not required when existing development patterns or physical constraints (e.g., topography, lot or parcel configuration, and similar conditions) prevent extending the street/driveway in the future.*

C. Street connectivity and formation of blocks required. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

> *1. Block length and perimeter. The maximum block length shall not exceed 800 feet or 1,800 feet along an arterial.*
>
> *2. Street standards. Public and private streets shall also conform to Chapter 92 CDC, Required Improvements, and to any other applicable sections of the West Linn Community Development Code and approved TSP.*
>
> *3. Exception. Exceptions to the above standards may be granted when blocks are divided by one or more pathway(s), in conformance with the provisions of CDC 85.200(C), Pedestrian and Bicycle Trails, or cases where extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations preclude implementation, not just inconveniences or design challenges. (Ord. 1635 § 25, 2014; Ord. 1636 § 33, 2014)*

Response: Proposed access to the fire station and its associated public parking is from Hidden Springs Road, a public street adjacent to the subject parcel. The number of street access points for this public safety facility, which can be considered a public/institutional development, is the minimum necessary to allow access/egress to the emergency equipment bays and to provide access to employee and visitor parking. Access to the site has been designed to maintain safety and mobility on Hidden Springs Road for all users, consistent with its planned function as a Minor Arterial, in conformance with the City's access requirements. The Traffic Impact Analysis prepared by Lancaster Engineering (Attachment E) demonstrates how the proposed project complies with City transportation performance standards and access requirements.

There is one full driveway (site entrance and exit) for public use. This driveway also provides the ingress to the site for the fire apparatuses. An additional exit for the fire apparatuses in front of the apparatus bay and is lined-up opposite Bay Meadows Drive. This maintains safety as the fire apparatuses will not be hindered by other vehicles as it exits the facility.

There are no proposed shared driveways with other uses, as the fire station needs its own driveway to ensure prompt and safe access to and from the fire station. As noted in the Traffic Impact Analysis (Attachment E), the proposed fire station will not have a significant impact on vehicular and pedestrian circulation, and the existing network of streets will remain the same. Therefore, the street standard and block length and perimeter standards are not applicable. The Traffic Impact Analysis demonstrates that the trips generated by a fire station use are minimal, and not expected to create any significant amount of traffic. During the morning peak hour, and assuming peak staffing levels (6 employees arriving, six leaving), twelve trips are generated by employees during morning shift change, which occurs at 7:00 am. As the capacity analysis summary tables in the Traffic Impact Analysis shows, none of the intersections impacted by the proposed use are degraded below the adopted city level of service (LOS) standard. Therefore, the anticipated traffic from the proposed fire station meets an adequate LOS to maintain the functional classification of the roadway.

48.030 Minimum Vehicular Requirements for Residential Uses

Response: This section is not applicable as the site is not being proposed for residential uses.

48.040 Minimum Vehicle Requirements for Non-Residential Uses

Access, egress, and circulation system for all non-residential uses shall not be less than the following:

A. Service drives for non-residential uses shall be fully improved with hard surface pavement:

1. With a minimum of 24-foot width when accommodating two-way traffic; or

Response: The main, two-way accessway is 24 feet wide.

2. With a minimum of 15-foot width when accommodating one-way traffic. Horizontal clearance shall be two and one-half feet wide on either side of the driveway.

Response: The exit from the apparatus bay is one-way and is 30 feet to accommodate fire emergency apparatus.

3. Meet the requirements of CDC 48.030(E)(3) through (6).

Response: The requirements of CDC 48.030(E)(3) through (6) will be met.

4. Pickup window driveways may be 12 feet wide unless the Fire Chief determines additional width is required.

Response: No pickup window driveways are being provided. Therefore this criteria is not applicable.

B. All non-residential uses shall be served by one or more service drives as determined necessary to provide convenient and safe access to the property and designed according to CDC 48.030(A). In no case shall the design of the service drive or drives require or facilitate the backward movement or other maneuvering of a vehicle within a street, other than an alley.

Response: The fire station is served by two service drives to provide convenient and safe access to the property. One service drive will be used as an exit only for the fire apparatus, and the other service drive will serve as an entrance for the public, employees and the fire apparatus as well as an exit for the public.

C. All on-site maneuvering and/or access drives shall be maintained pursuant to CDC 46.130.

Response: The onsite access drives will be maintained pursuant to CDC 46.130

D. Gated accessways to non-residential uses are prohibited unless required for public safety or security. (Ord. 1408, 1998, Ord. 1463, 2000)

Response: There will be a fence around the pond with a gate to get inside the fence, but no gate on the access road at Hidden Springs. The other accessways to the site will not be gated.

48.050 One-Way Vehicular Access Points

Where a proposed parking facility plan indicates only one-way traffic flow on the site, it shall be accommodated by a specific driveway serving the facility, and the entrance drive shall be situated closest to oncoming traffic, and the exit drive shall be situated farthest from oncoming traffic.

Response: As demonstrated on the Site Plan (Exhibit A1.01), the only one-way traffic flow on site is from the apparatus bay out to Hidden Springs Road and will only be used by the fire apparatus.

48.060 Width and Location of Curb Cuts and Access Separation Requirements

A. Minimum curb cut width shall be 16 feet.

B. Maximum curb cut width shall be 36 feet, except along Highway 43 in which case the maximum curb cut shall be 40 feet. For emergency service providers, including fire stations, the maximum shall be 50 feet.

C. No curb cuts shall be allowed any closer to an intersecting street right-of-way line than the following:

1. On an arterial when intersected by another arterial, 150 feet.

2. On an arterial when intersected by a collector, 100 feet.

3. On an arterial when intersected by a local street, 100 feet.

4. On a collector when intersecting an arterial street, 100 feet.

5. On a collector when intersected by another collector or local street, 35 feet.

6. On a local street when intersecting any other street, 35 feet.

D. There shall be a minimum distance between any two adjacent curb cuts on the same side of a public street, except for one-way entrances and exits, as follows:

1. On an arterial street, 150 feet.

2. On a collector street, 75 feet.

3. Between any two curb cuts on the same lot or parcel on a local street, 30 feet.

E. A rolled curb may be installed in lieu of curb cuts and access separation requirements.

F. Curb cuts shall be kept to the minimum, particularly on Highway 43. Consolidation of driveways is preferred. The standard on Highway 43 is one curb cut per business if consolidation of driveways is not possible.

G. Adequate line of sight pursuant to engineering standards should be afforded at each driveway or accessway. (Ord. 1270, 1990; Ord. 1584, 2008; Ord. 1636 § 35, 2014)

Response: The curb cut proposed for the fire station access is on a designated minor arterial and has been designed to be 30 feet wide, which meets the criteria above. Curb cuts for emergency service providers are allowed up to 50 feet. The distance between two adjacent curb cuts on Hidden Springs Road is 43 feet. Access spacing is addressed in detail in the Traffic Impact Analysis prepared by Lancaster Engineering (Attachment E).

48.070 Planning Director's Authority to Restrict Access Appeal Provisions

A. In order to provide for increased traffic movement on congested streets and eliminate turning movement problems, the Planning Director and the City Engineer, or his designee, may restrict the location of driveways on said street and require the location of driveways on adjacent streets upon the finding that the proposed access would:

1. Provide inadequate access for emergency vehicles; or

2. Cause or increase hazardous conditions to exist which would constitute a clear and present danger to the public health safety and general welfare.

B. A decision by the Planning Director may be appealed to the Planning Commission as provided by CDC 99.240(B).

Response: As supported by the Traffic Impact Analysis prepared by Lancaster Engineering (Attachment E), there are no mobility or safety concerns on Hidden Springs Road related to the siting of a fire station on the subject parcel. The applicant understands that the Planning Director and the City Engineer may restrict the location of driveways to provide for increased traffic movement, but the proposed driveway placement, as shown on the Site Plan (Exhibit A1.01) will not negatively impact congestion or turning movements on Hidden Springs Road.

48.080 Bicycle and Pedestrian Circulation

A. Within all multi-family developments (except two-family/duplex dwellings), each residential dwelling shall be connected to vehicular parking stalls, common open space, and recreation facilities by a pedestrian pathway system having a minimum width of six feet and constructed of an all-weather material. The pathway material shall be of a different color or composition from the driveway. (Bicycle routes adjacent to the travel lanes do not have to be of different color or composition.)

B. Bicycle and pedestrian ways within a subdivision shall be constructed according to the provisions in CDC 85.200(A)(3).

C. Bicycle and pedestrian ways at commercial or industrial sites shall be provided according to the provisions of Chapter 55 CDC, Design Review.

Response: The proposed fire station is not a multi-family development, subdivision or a commercial or industrial site. Therefore, the above criteria are not applicable.

Chapter 52 Signs

52.010 Purpose

The purpose of this chapter is to maintain or improve the aesthetic quality of the City's residential and business environment; to prevent the proliferation of signs and sign clutter; to minimize adverse visual *safety factors to travelers on public roadways and private areas open to public vehicular travel; to provide for safe construction, location, erection and maintenance of signs; and to improve the effectiveness of signs in identifying and advertising businesses, all by classifying and regulating signs. (Ord. 1276, 1990)*

52.101 Procedures and Approval Process

A. A sign exempt from City approval does not require application with the City but shall conform to all other applicable provisions of this chapter.

B. A sign subject to City approval is a sign for which approval will be granted by the Planning Director provided all conditions are satisfied; and

1. The Planning Director shall make the decision in the manner provided by CDC 99.060.

2. The decision may be appealed to the City Council as prescribed by CDC 99.240(A).

C. The following code provisions may be applicable in certain situations:

1. Chapter 42 CDC, Clear Vision Area.

2. Chapter 75 CDC, Variance. (Ord. 1474, 2001)

Response: A monument sign is proposed and is subject to city approval. The location of the sign is shown on the Site Plan (Exhibit A1.01). The sign will identify Station 55. The sign dimensions will be 4' x 7' and will be lit during the evening.

52.102 Time Limit on Sign Approval

A. Approval of a sign by the Planning Director shall be void after 90 days if:

1. The sign has not been installed within that 90-day period; or

2. The sign is a departure from the approval plan.

B. The Planning Director shall, upon written request by the applicant, grant an extension of the approval period not to exceed 30 days; provided, that:

1. No changes are made on the original sign as approved by the Director.

2. The applicant can show intent of initiating placement of the sign on the site within the 30-day extension period.

3. There have been no changes in the applicable policies and ordinance provisions on which the approval was based.

52.103 Permit

A. No sign shall be erected, structurally altered, relocated, or replaced, except for maintenance of signs that conform with this chapter, without first obtaining a permit from the Community Development Department, paying the requisite fee, and otherwise complying with all applicable provisions of this chapter, unless a provision of this chapter specifically exempts a sign from the permit requirement.

B. A copy of each sign permit, including the permit number, shall be kept by the Planning Director, business owner, person contracting for the erection of the sign, and by the sign company. (Ord. 1621 § 25, 2014)

Response: TVF&R will obtain any needed sign permit for the Station 55 identification sign.

52.104 Application

A. Permanent sign permits.

1. An application for a permanent sign permit shall be initiated by the property owner or the owner's authorized agent.

2. An application for a sign permit shall be made on a form prescribed by the Planning Director and shall be filed with the Community Development Department. The application shall include one copy of a sketch drawn to scale indicating the following:

a. Name, address, and telephone number of the applicant.

b. Location by street number and legal description of the building, structure or lot to which or upon which the sign is to be installed or affixed.

c. A drawing approximately to scale showing design of the sign including dimensions, height, sign area, materials, method of attachment, source of illumination, and showing the relationship to any building or structure to which it is or is proposed to be installed or affixed or to which it relates. For purposes of this section, "design" does not include text or copy, but an applicant may provide information concerning color, size and style of lettering.

d. A site plan drawn to scale indicating the location of the sign relative to property lines, structures, other signs on premises, streets and sidewalks; and the location of any structures and freestanding signs on abutting properties.

3. The applicant shall pay the required fee. When a sign is erected or placed prior to approval of a required sign permit, the sign permit application fee shall be doubled. Payment of the double fee shall not relieve an applicant from fully complying with the requirements of this chapter or from any penalties prescribed herein.

4. After the applicant has installed his or her sign, he or she shall inform the Community Development Department of the sign's completed installation.

B. Temporary sign permits. An application for a temporary sign shall include the appropriate fee, as set by City Council resolution. The fee is nonrefundable. (Ord. 1276, 1990; Ord. 1378, 1995; Ord. 1539, 2006; Ord. 1547, 2007; Ord. 1590 § 1, 2009; Ord. 1621 § 25, 2014; Ord. 1622 § 13, 2014)

Response: TVF&R will apply for the required sign permit following land use review and approval.

52.210 Approval Standards

All signs shall meet the following standards:

A. The scale of the sign and its components shall be appropriate for its location and consistent with the applicable design standards.

B. The size, location, or manner of illumination shall not create a traffic hazard and shall not hide from view any traffic or street sign or signal.

C. The sign shall be located in compliance with Chapter 42 CDC, Clear Vision Area.

D. Signs and sign structures located over vehicular driveways and pedestrian walkways shall allow at least 15 feet of clearance over driveways and eight feet of clearance over walkways.

E. The light from any illuminated sign shall be shaded, fully shielded such that no light is emitted above the horizontal plane, and directed or reduced so that glare is minimized.

F. Signs shall be located to preserve existing trees, topography and natural drainage, to the extent possible consistent with the installation of the sign.

G. All permanent signs shall be located within a landscaped area or installed on a wood, stone, or other base structure that meets the following standards:

1. Signs shall be installed on a base with a maximum height of two feet, a minimum width at least one-half as wide as the sign face, and a depth equal to or greater than the depth of the sign.

2. In the event a sign is erected on a multiple-pole or piling structure, the base required by subsection (G)(1) of this section shall be apportioned among each of the upright members.

3. Any wood used in a base shall be treated against water damage and insect assault.

H. Manual changeable copy signs shall be designed to minimize the opportunity for unauthorized personnel to change the sign copy.

I. Electronic changeable copy signs are permitted in business centers only, either as separate signs or as part of a larger sign. The approval authority may impose conditions of approval regarding the frequency of copy change, the hours of operation, and the methods by which the message is changed in order to assure compliance with the standards of this section and this chapter. Electronic changeable copy signs are subject to the following requirements:

1. The sign face for the electronic changeable copy sign or portion of a sign may not exceed 24 square feet; provided, however, that electronic changeable copy signs with greater than 24 square feet may be approved through the conditional use process.

2. The design and placement of the sign shall not adversely affect vehicular and pedestrian safety.

3. The sign shall comply with all other requirements of this chapter.

J. Where both sides of a sign may be viewed from a right-of-way, the signs shall be double-faced.

K. Signs in the Willamette Falls Drive Commercial Design District…

Response: The location of the proposed monument sign is shown in Exhibit A1.01. The sign meets the requirements outlined above. TVF&R will apply for the required sign permit following land use review and approval.

Chapter 54 Landscaping

54.010 Purpose

The purpose of this chapter is to provide for the design, selection, installation, and maintenance of landscaping. The landscaping is intended to provide an attractive natural balance to built areas, to reduce runoff, to provide shade, to screen or buffer uses, and to frame or complement views. The chapter also encourages the selection of plant materials that will provide long-term growth, a balance of year-round coverage and greenery, and a variety of species for a more healthy, disease-resistant plant inventory.

54.020 Approval Criteria

A. Every development proposal requires inventorying existing site conditions which include trees and landscaping. In designing the new project, every reasonable attempt should be made to preserve and protect existing trees and to incorporate them into the new landscape plan. Similarly, significant landscaping (e.g., bushes, shrubs) should be integrated. The rationale is that saving a 30-foot-tall mature tree helps maintain the continuity of the site, they are qualitatively superior to two or three two-inch caliper street trees, they provide immediate micro-climate benefits (e.g., shade), they soften views of the street, and they can increase the attractiveness, marketability, and value of the development.

B. To encourage tree preservation, the parking requirement may be reduced by one space for every significant tree that is preserved in the parking lot area for a maximum reduction of 10 percent of the required parking. The City Parks Supervisor or Arborist shall determine the significance of the tree and/or landscaping to determine eligibility for these reductions.

C. Developers must also comply with the municipal code chapter on tree protection.

D. Heritage trees. Heritage trees are trees which, because of their age, type, notability, or historical association, are of special importance. Heritage trees are trees designated by the City Council following review of a nomination. A heritage tree may not be removed without a public hearing at least 30 days prior to the proposed date of removal. Development proposals involving land with heritage tree(s) shall be required to protect and save the tree(s). Further discussion of heritage trees is found in the municipal code.

Response: There are no heritage trees designated on-site, therefore this criterion is not applicable.

E. Landscaping – By type, location and amount.

1. Residential uses (non-single-family)…

2. Non-residential uses. A minimum of 20 percent of the gross site area shall be landscaped. Parking lot landscaping may be counted in the percentage.

Response: The site has a total square footage of 112,247 square feet. Twenty percent of the site would be 22,485 square feet. Currently, the landscaping on-site is equal to approximately 71,355 square feet or 63% percent and meets the amount of required landscaping standard. The Landscape Plan (Exhibit L1.0, L2.0) shows these percentages.

3. All uses (residential uses (non-single-family) and non-residential uses):

a. The landscaping shall be located in defined landscaped areas which are uniformly distributed throughout the parking or loading area. There shall be one shade tree planted for every eight parking spaces. These trees shall be evenly distributed throughout the parking lot to provide shade. Parking *lots with over 20 spaces shall have a minimum 10 percent of the interior of the parking lot devoted to landscaping. Pedestrian walkways in the landscaped areas are not to be counted in the percentage. The perimeter landscaping, explained in subsection (E)(3)(d) of this section, shall not be included in the 10 percent figure. Parking lots with 10 to 20 spaces shall have a minimum five percent of the interior of the parking lot devoted to landscaping. The perimeter landscaping, as explained above, shall not be included in the five percent. Parking lots with fewer than 10 spaces shall have the standard perimeter landscaping and at least two shade trees. Non-residential parking areas paved with a permeable parking surface may reduce the required minimum interior landscaping by one-third for the area with the permeable parking surface only.*

Response: The parking area contains 34 parking spaces and measures 16,131 square feet, requiring approximately 10 percent or 1,613 square feet of internal landscaping. As shown on the Landscape Plan (Exhibit L1.0, L2.0), 4,919 square feet of internal parking lot landscaping is provided.

b. The landscaped areas shall not have a width of less than five feet.

Response: Landscaped areas in the parking area has a width of 9 feet or more, as shown in Exhibit C3 – Composite Utility and Street Plan.

c. The soils, site, proposed soil amendments, and proposed irrigation system shall be appropriate for the healthy and long-term maintenance of the proposed plant species.

Response: The plant species proposed for the site’s landscaping areas are appropriate for the soil, soil amendments and irrigation system on-site.

d. A parking, loading, or service area which abuts a street shall be set back from the right-of-way line by perimeter landscaping in the form of a landscaped strip at least 10 feet in width. When a parking, loading, or service area or driveway is contiguous to an adjoining lot or parcel, there shall be an intervening five-foot-wide landscape strip. The landscaped area shall contain:

1) Street trees spaced as appropriate to the species, not to exceed 50 feet apart on the average;

2) Shrubs, not to reach a height greater than three feet, six inches, spaced no more than five feet apart on the average; or

3) Vegetative ground cover such as grass, wildflowers, or other landscape material to cover 100 percent of the exposed ground within two growing seasons. No bark mulch shall be allowed except under the canopy of low level shrubs.

Response: The parking area is set back from Hidden Springs Road by approximately 10 feet. There is landscaping within that buffer which consists of mixed shrubs, trees and ground cover to help screen the parking area from view. The parking area to the east of the building has a five-foot-wide landscape strip. The Landscape Plan has been designed to comply with the above standards.

e. If over 50 percent of the lineal frontage of the main street or arterial adjacent to the development site comprises parking lot, the landscape strip between the right-of-way and parking lot shall be increased to 15 feet in width and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. This extra requirement only applies to one street frontage.

Response: The main street frontage for the site is along Hidden Springs Road and measures 355’ 5” lineal feet. The portion of parking along Hidden Springs Road measures 60 feet or roughly 17% of the total frontage. Therefore, this criterion is not applicable.

f. A parking, loading, or service area which abuts a property line shall be separated from the property line by a landscaped area at least five feet in width and which shall act as a screen and noise buffer, and the adequacy of the screen and buffer shall be determined by the criteria set forth in CDC 55.100(C) and (D), except where shared parking is approved under CDC 46.050.

g. All areas in a parking lot not used for parking, maneuvering, or circulation shall be landscaped.

h. The landscaping in parking areas shall not obstruct lines of sight for safe traffic operation.

Response: The applicant understands that landscaping in parking areas is not to obstruct sight lines for safe traffic operation. As shown in the Landscape Plan (Exhibit L1.0, L2.0) all areas in a parking lot not used for parking are landscaped and the landscaping does not obstruct lines of sight for safe traffic operation.

i. Outdoor storage areas, service areas (loading docks, refuse deposits, and delivery areas), and above-ground utility facilities shall be buffered and screened to obscure their view from adjoining properties and to reduce noise levels to acceptable levels at the property line. The adequacy of the buffer and screening shall be determined by the criteria set forth in CDC 55.100(C)(1).

Response: Per the Metro standards for a public development such as a fire station, a minimum solid waste storage and recycling storage area of 10 square feet plus 4 square feet per 1,000 square feet should be provided. The fire station is 8,430 square feet, requiring a storage area of 70 square feet. The proposed storage area is approximately 171 square feet. The storage meets the standards to buffer and screen their view from adjoining properties.

j. Crime prevention shall be considered and plant materials shall not be located in a manner which prohibits surveillance of public and semi-public areas (shared or common areas).

Response: As shown on the submitted Landscape Plan (Exhibit L1.0, L2.0) no plant materials have been located in a manner which would prohibit surveillance of the site’s public or semi-public areas.

k. Irrigation facilities shall be located so that landscaped areas can be properly maintained and so that the facilities do not interfere with vehicular or pedestrian circulation.

Response: As noted on the Landscape Plan (Exhibit L1.0, L2.0) the irrigation facilities will be design-build but will not interfere with vehicular or pedestrian circulation. Additionally, plants selected for the landscape areas are drought resistant.

l. For commercial, office, multi-family, and other sites, the developer shall select trees that possess the following characteristics:

1) Provide generous “spreading” canopy for shade.

2) Roots do not break up adjacent paving.

3) Tree canopy spread starts at least six feet up from grade in, or adjacent to, parking lots, roads, or sidewalks unless the tree is columnar in nature.

4) No sticky leaves or sap-dripping trees (no honey-dew excretion).

5) No seed pods or fruit-bearing trees (flowering trees are acceptable).

6) Disease-resistant.

7) Compatible with planter size.

8) Drought-tolerant unless irrigation is provided.

9) Attractive foliage or form all seasons.

Response: The type and size of trees provided throughout the project are shown on the Landscape Plan (Exhibit L1.0, L2.0) *m. Plant materials (shrubs, ground cover, etc.) shall be selected for their appropriateness to the site, drought tolerance, year-round greenery and coverage, staggered flowering periods, and avoidance of nuisance plants (Scotch broom, etc.).*

Response: All plant materials are appropriate to the site and drought tolerant. The plants will provide year round greenery and coverage as well as staggered flowering periods. No nuisance plants will be provided on-site.

F. Landscaping (trees) in new subdivision…

Response: The proposed fire station is not a new subdivision; criteria in this subsection are not applicable.

54.030 Planting Strips for Modified and New Streets

All proposed changes in width in a public street right-of-way or any proposed street improvement shall, where feasible, include allowances for planting strips. Plans and specifications for planting such areas shall be integrated into the general plan of street improvements. This chapter requires any multi-family, commercial, or public facility which causes change in public right-of-way or street improvement to comply with the street tree planting plan and standards.

Response: The applicant is proposing street improvements. TVF&R will dedicate public right-of-way and put in a sidewalk along the street frontage of the subject parcel.

54.040 Installation

A. All landscaping shall be installed according to accepted planting procedures.

B. The soil and plant materials shall be of good quality.

C. Landscaping shall be installed in accordance with the provisions of this code.

D. Certificates of occupancy shall not be issued unless the landscaping requirements have been met or other arrangements have been made and approved by the City such as the posting of a bond.

Response: All landscaping will be installed according to accepted planting procedures and in conformance with this code. Additionally all plant materials and soil will be of good quality. The applicant understands that any certificates of occupancy will not be issued unless these landscaping requirements have been met.

54.050 Protection of Street Trees

Street trees may not be topped or trimmed unless approval is granted by the Parks Supervisor or, in emergency cases, when a tree imminently threatens power lines.

Response: The applicant is not proposing to top or trim any street trees. Therefore this section is not applicable.

54.060 Maintenance

A. The owner, tenant and their agent, if any, shall be jointly and severally responsible for the maintenance of all landscaping which shall be maintained in good condition so as to present a healthy, neat, and orderly appearance and shall be kept free from refuse and debris.

B. All plant growth in interior landscaped areas shall be controlled by pruning, trimming, or otherwise so that:

1. *It will not interfere with the maintenance or repair of any public utility;*
2. *It will not restrict pedestrian or vehicular access; and*
3. *It will not constitute a traffic hazard because of reduced visibility.*

Response: The applicant understands that they will be responsible for the maintenance of all landscaping and the interior landscaping will be maintained so that it will not interfere with utilities, restrict pedestrian or vehicular access or reduce visibility related to traffic.

54.070 Specification Summary

Table 2. Required and Proposed Landscaping Areas

Area/Location	*Landscaping Required*	*Landscaping Proposed*
1. Between parking lot and ROW	10 feet	18 feet
2. Between parking lot and other lot.	5 feet	20 feet
5. Percentage of non-residential site to be landscaped	20%	63%
6. Percentage of parking area (over 20 spaces) to be landscaped (excluding perimeter)	10%	30%

Chapter 55: Design Review

55.020 Classes of Design Review

B. Class II Design Review. Class II design review applies to all uses/activities except those uses/activities listed under Class I design review, and the exemptions of DCD 55.025. Class II design review applies to the proposed improvements listed in this section when the proposed improvement (e.g., new sidewalk) is part of a major commercial, office, industrial, public, or multi-family construction project (e.g., a new shopping center). (Ord. 1547, 2007; Ord. 1604 § 50, 2011; Ord. 1622 § 20, 201)

Response: The proposed fire station is not a use or activity listed under the Class 1 design review, and therefore it is subject to a Class II design review.

55.070 Submittal Requirements

A. The design review application shall be initiated by the property owner or the owner's agent, or condemnor.

Response: The application is being submitted by the property owner, Tualatin Valley Fire & Rescue.

B. A pre-application conference, per CDC 99.030(B), shall be a prerequisite to the filing of an application.

Response: A pre-application conference was held on May 19, 2016 and the summary notes have been included with this application as Attachment B.

C. Documentation of any required meeting with the respective City-recognized neighborhood association per CDC 99.038.

Response: A neighborhood meeting was held on June 21, 2016 and the required documentation is submitted as Attachment A of this application

D. The applicant shall submit a complete application form and:

1. The development plan for a Class I design review shall contain the following elements:

a. A site analysis (CDC 55.110) only if the site is undeveloped;

b. A site plan (CDC 55.120);

c. Architectural drawings, including building envelopes and all elevations (CDC 55.140) only if architectural work is proposed; and

d. Pursuant to CDC 55.085, additional submittal material may be required.

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the City. When the application submittal is determined to be complete, additional copies may be required as determined by the Community Development Department.

Response: This is a Class II Design Review application.

2. Development plan for a Class II design review shall contain the following elements:

a. A site analysis (CDC 55.110);

b. A site plan (CDC 55.120);

c. A grading plan (CDC 55.130);

d. Architectural drawings, indicating floor plan and elevation (CDC 55.140);

e. A landscape plan (CDC 55.150);

f. A utility plan appropriate to respond to the approval criteria of CDC 55.100(I)(1) through (5) relating to streets, drainage, municipal water, sanitary sewers, solid waste and recycling storage;

g. A light coverage plan with photometric data, including the location and type of outdoor lighting, with specific consideration given to compliance with CDC 55.100(J) pertaining to crime prevention and, if applicable, CDC 46.150(A)(13) pertaining to parking lot lighting;

h. If staff determines before or during the pre-application conference that the land use is expected to generate noise that may exceed DEQ standards, the application shall include a noise study conducted by a licensed acoustical engineer that demonstrates that the application and associated noise sources will meet DEQ standards. Typical noise sources of concern include but are not limited to, vehicle drive-throughs, parking lots, HVAC units and public address systems;

i. Documents as required per the Tree Technical Manual.

Response: The required plans have been submitted as Exhibits C1 through A.501 of this development application

3. A narrative, based on the standards contained in this code, which supports any requested exceptions as provided under CDC 55.170.

Response: The applicant is not requesting an exception under CDC Section 55.170, therefore this criterion is not applicable.

4. Submit full written responses to approval criteria of CDC 55.100 for Class II design review, or CDC 55.090 for Class I design review, plus all applicable referenced approval criteria.

Response: Written responses have been provided for Section 55.100 beginning.

E. The applicant shall submit samples of all exterior building materials and colors in the case of new buildings or building remodeling.

Response: Illustrations of the materials to be used have been submitted with this application and provide samples of all exterior building materials and colors.

F. The applicant shall pay the required deposit and fee. (Ord. 1401, 1997; Ord. 1408, 1998; Ord. 1442, 1999; Ord. 1613 § 11, 2013; Ord. 1621 § 25, 2014; Ord. 1622 § 14, 2014)

Response: The application fee was paid by the applicant at the time of submittal.

55.085 Additional Information Required and Waiver of Requirements

A. The Planning Director may require information as part of the application subject to the provisions of CDC 99.035(A).

B. The Planning Director may waive any requirements for the application subject to the provisions of CDC 99.035(B) and (C).

Response: The applicant understands that the Planning Director may require or waive requirements for information per the provisions of Section 99.035. No application requirements have been waived.

55.100 Approval Standards – Class II Design Review

The approval authority shall make findings with respect to the following criteria when approving, approving with conditions or denying a Class II design review application.

A. The provisions of the following chapters shall be met:

1. Chapter 34 CDC, Accessory Structures, Accessory Dwelling Units, and Accessory Uses.

2. Chapter 38 CDC, Additional Yard Area Required; Exceptions to Yard Requirements; Storage in yards, Projections into Yards.

3. Chapter 40 CDC, Building Height Limitations, Exceptions,

4. Chapter 42 CDC, Clear Vision Areas.

5. Chapter 44 CDC, Fences.

6. Chapter 46 CDC, Off-Street Parking, Loading and Reservoir Areas.

7. Chapter 48 CDC, Access, Egress and Circulation.

8. Chapter 52 CDC, Signs.

9. Chapter 54 CDC, Landscaping.

Response: The applicable Sections of the above Chapters have been met through the responses found in this development application in the following sections.

B. Relationship to the natural and physical environment

1. The buildings and other site elements shall be designed and located so that all heritage trees, as defined in the municipal code, shall be saved. Diseased heritage trees, as determined by the City Arborist, may be removed at his/her direction.

Response: There are no heritage trees identified on this site. Therefore, this criterion is not applicable.

2. All heritage trees, as defined in the municipal code, all trees and clusters of trees ("cluster" is defined as three or more trees with overlapping driplines; however, native oaks need not have an overlapping dripline) that are considered significant by the City Arborist, either individually or in consultation with certified arborists or similarly qualified professionals, based on accepted arboricultural standards including consideration of their size, type, location, health, long term survivability, and/or numbers, shall be protected pursuant to the criteria of subsections (B)(2)(a) through (f) of this section. In cases where there is a difference of opinion on the significance of a tree or tree cluster, the City Arborist's findings shall prevail. It is important to acknowledge that all trees are not significant and, further, that this code section will not necessarily protect all trees deemed significant.

a. Non-residential and residential projects on Type I and II lands shall protect all heritage trees and all significant trees and tree clusters by either the dedication of these areas or establishing tree conservation easements. Development of Type I and II lands shall require the careful layout of streets, driveways, building pads, lots, and utilities to avoid heritage trees and significant trees and tree clusters, and other natural resources pursuant to this code. The method for *delineating the protected trees or tree clusters ("dripline + 10 feet") is explained in subsection (B)(2)(b) of this section. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply.*

b. Non-residential and residential projects on non-Type I and II lands shall set aside up to 20 percent of the area to protect trees and tree clusters that are determined to be significant, plus any heritage trees. Therefore, in the event that the City Arborist determines that a significant tree cluster exists at a development site, then up to 20 percent of the non-Type I and II lands shall be devoted to the protection of those trees, either by dedication or easement. The exact percentage is determined by establishing the driplines of the trees or tree clusters that are to be protected. In order to protect the roots which typically extend further, an additional 10-foot measurement beyond the dripline shall be added. The square footage of the area inside this "dripline plus 10 feet" measurement shall be the basis for calculating the percentage (see figure below). The City Arborist will identify which tree(s) are to be protected. Development of non-Type I and II lands shall also require the careful layout of streets, driveways, building pads, lots, and utilities to avoid significant trees, tree clusters, heritage trees, and other natural resources pursuant to this code. Exemptions of subsections (B)(2)(c), (e), and (f) of this section shall apply. Please note that in the event that more than 20 percent of the non-Type I and II lands comprise significant trees or tree clusters, the developer shall not be required to save the excess trees, but is encouraged to do so.

c. Where stubouts of streets occur on abutting properties, and the extension of those streets will mean the loss of significant trees, tree clusters, or heritage trees, it is understood that tree loss may be inevitable. In these cases, the objective shall be to minimize tree loss. These provisions shall also apply in those cases where access, per construction code standards, to a lot or parcel is blocked by a row or screen of significant trees or tree clusters.

d. For both non-residential and residential development, the layout shall achieve at least 70 percent of maximum density for the developable net area. The developable net area excludes all Type I and II lands and up to 20 percent of the remainder of the site for the purpose of protection of stands or clusters of trees as defined in subsection (B)(2) of this section.

e. For arterial and collector street projects, including Oregon Department of Transportation street improvements, the roads and graded areas shall avoid tree clusters where possible. Significant trees, tree clusters, and heritage tree loss may occur, however, but shall be minimized.

f. If the protection of significant tree(s) or tree clusters is to occur in an area of grading that is necessary for the development of street grades, per City construction codes, which will result in an adjustment in the grade of over or under two feet, which will then threaten the health of the tree(s), the applicant will submit evidence to the Planning Director that all reasonable alternative grading plans have been considered and cannot work. The applicant will then submit a mitigation plan to the City Arborist to compensate for the removal of the tree(s) on an "inch by inch" basis (e.g., a 48-inch Douglas fir could be replaced by 12 trees, each four-inch). The mix of tree sizes and types shall be approved by the City Arborist.

Response: Exhibit C2 (Tree Removal, Grading, and Erosion Control Plan) shows all existing trees located on the subject property and adjacent to the subject property. There are two trees located on the site, which are proposed to be preserved and will be protected during construction. One off-site tree is proposed for removal, which is located in the public right-of-way and its removal is necessary in order to construct the City required sidewalk along the project's frontage. This 8-inch DBH deciduous tree is not defined as a Heritage tree and does not appear to be significant given its small size.

3. The topography and natural drainage shall be preserved to the greatest degree possible.

Response: As detailed on the submitted Grading Plan (Exhibit C2) and in the Stormwater Report (Attachment D) the topography and natural drainage have been preserved to the greatest degree possible. Additionally, the storm drainage was not diverted from its natural watercourse and no interbasin transfers of storm drainage are proposed (see Stormwater Report, Attachment D).

4. The structures shall not be located in areas subject to slumping and sliding. The Comprehensive Plan Background Report's Hazard Map, or updated material as available and as deemed acceptable by the Planning Director, shall be the basis for preliminary determination.

Response: As confirmed by City Staff, the proposed fire station will not be in an area subject to slumping and sliding. The GRI Geotechnical Report prepared for the site is presented in Attachment F.

5. There shall be adequate distance between on-site buildings and on-site and off-site buildings on adjoining properties to provide for adequate light and air circulation and for fire protection.

Response: Adequate distance has been provided between the station on-site and the existing residences to allow adequate light and air circulation as well as fire protection to all sites. The structure, parking and driveways are all located east of the existing residence.

6. Architecture

a. The proposed structure(s) scale shall be compatible with the existing structure(s) on site and on adjoining sites. Contextual design is required. Contextual design means respecting and incorporating prominent architectural styles, building lines, roof forms, rhythm of windows, building scale and massing of surrounding buildings in the proposed structure. The materials and colors shall be complementary to the surrounding buildings.

Response: The proposed fire station was designed using materials compatible with residential construction, with architectural details that incorporate and promote the residential feel of the surrounding properties. Design elements include aluminum clad wood windows, fiber cement siding, a metal roof and exposed wood for the porches. Utilizing residential materials and elements gives the fire station a residential feel and maintains the character of the surrounding neighborhood.

b. While there has been discussion in Chapter 24 CDC about transition, it is appropriate that new buildings should architecturally transition in terms of bulk and mass to work with, or fit, adjacent existing buildings. This transition can be accomplished by selecting designs that "step down" or "step up" from small to big structures and vice versa (see figure below). Transitions may also take the form of carrying building patterns and lines (e.g., parapets, windows, etc.) from the existing building to the new one.

Response: The proposed fire station was designed using multiple gables to minimize the mass created by the apparatus bay and allow the building to step back, further reducing scale.

c. Contrasting architecture shall only be permitted when the design is manifestly superior to adjacent architecture in terms of creativity, design, and workmanship, and/or it is adequately separated from other buildings by distance, screening, grade variations, or is part of a development site that is large enough to set its own style of architecture.

Response: The fire station has been designed to be compatible with adjacent architecture through the use of scale, materials and architectural features. This application is not pursuing approval any contrasting architecture.

d. Human scale is a term that seeks to accommodate the users of the building and the notion that buildings should be designed around the human scale (i.e., their size and the average

> *range of their perception). Human scale shall be accommodated in all designs by, for example, multi-light windows that are broken up into numerous panes, intimately scaled entryways, and visual breaks (exaggerated eaves, indentations, ledges, parapets, awnings, engaged columns, etc.) in the facades of buildings, both vertically and horizontally.*
>
> *The human scale is enhanced by bringing the building and its main entrance up to the edge of the sidewalk. It creates a more dramatic and interesting streetscape and improves the "height and width" ratio referenced in this section.*

Response: The proposed fire station was designed to accommodate human scale with multi-light windows, covered entry porches featuring exposed wood framing and cultured stone base.

> *e. The main front elevation of commercial and office buildings shall provide at least 60 percent windows or transparency at the pedestrian level to create more interesting streetscape and window shopping opportunities. One side elevation shall provide at least 30 percent transparency. Any additional side or rear elevation, which is visible from a collector road or greater classification, shall also have at least 30 percent transparency. Transparency on other elevations is optional. The transparency is measured in lineal fashion. For example, a 100-foot-long building elevation shall have at least 60 feet (60 percent of 100 feet) in length of windows. The window height shall be, at minimum, three feet tall. The exception to transparency would be cases where demonstrated functional constraints or topography restrict that elevation from being used. When this exemption is applied to the main front elevation, the square footage of transparency that would ordinarily be required by the above formula shall be installed on the remaining elevations at pedestrian level in addition to any transparency required by a side elevation, and vice versa. The rear of the building is not required to include transparency. The transparency must be flush with the building elevation.*

Response: The proposed fire station is designed provide transparency to the public areas along with apparatus bay but maintains privacy at living portions of the station. The main front elevation is 50% transparent. The east elevation featuring the community room parking is 40% transparent.

> *f. Variations in depth and roof line are encouraged for all elevations.*
>
> *To vary the otherwise blank wall of most rear elevations, continuous flat elevations of over 100 feet in length should be avoided by indents or variations in the wall. The use of decorative brick, masonry, or stone insets and/or designs is encouraged. Another way to vary or soften this elevation is through terrain variations such as an undulating grass area with trees to provide vertical relief.*

Response: The proposed fire station is not a commercial or office building. Therefore this criterion is not applicable.

> *g. Consideration of the micro-climate (e.g., sensitivity to wind, sun angles, shade, etc.) shall be made for building users, pedestrians, and transit users, including features like awnings.*

Response: The proposed fire station is designed with generous covered outdoor areas at public entries and living areas to provide protection from climatic elements.

> *h. The vision statement identified a strong commitment to developing safe and attractive pedestrian environments with broad sidewalks, canopied with trees and awnings.*

Response: The main entrance to the fire station is under a large covered porch and will be protected from the climate as shown in Exhibit G0.0 Cover Sheet.

> *i. Sidewalk cafes, kiosks, vendors, and street furniture are encouraged. However, at least a four-foot-wide pedestrian accessway must be maintained per Chapter 53 CDC, Sidewalk Use.*

Response: The proposed fire station does not include a sidewalk café, kiosks, vendor or street furniture. Therefore this criterion is not applicable.

> *7. Transportation Planning Rule (TPR) compliance. The automobile shall be shifted from a dominant role, relative to other modes of transportation, by the following means:*
>
> > *a. Commercial and office development shall be oriented to the street. At least one public entrance shall be located facing an arterial street; or, if the project does not front on an arterial, facing a collector street; or, if the project does not front on a collector, facing the local street with highest traffic levels. Parking lots shall be placed behind or to the side of commercial and office development. When a large and/or multi-building development is occurring on a large undeveloped tract (three plus acres), it is acceptable to focus internally; however, at least 20 percent of the main adjacent right-of-way shall have buildings contiguous to it unless waived per subsection (B)(7)(c) of this section. These buildings shall be oriented to the adjacent street and include pedestrian-oriented transparencies on those elevations.*
> > *For individual buildings on smaller individual lots, at least 30 lineal feet or 50 percent of the building must be adjacent to the right-of-way unless waived per subsection (B)(7)(c) of this section. The elevations oriented to the right-of-way must incorporate pedestrian-oriented transparency.*
> >
> > b. *Multi-family projects shall be required to keep the parking at the side or rear of the buildings or behind the building line of the structure as it would appear from the right-of-way inside the multi-family project. For any garage which is located behind the building line of the structure, but still facing the front of the structure, architectural features such as patios, patio walls, trellis, porch roofs, overhangs, pergolas, etc., shall be used to downplay the visual impact of the garage, and to emphasize the rest of the house and front entry.*
> >
> > c. Commercial, office, and multi-family projects shall be built as close to the adjacent main right-of-way as practical to facilitate safe pedestrian and transit access. Reduced frontages by buildings on public rights-of-way may be allowed due to extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations, not just inconveniences or design challenges.

Response: The proposed fire station is not a commercial, office or multi-family project. Therefore this criterion is not applicable.

> > *d. Accessways, parking lots, and internal driveways shall accommodate pedestrian circulation and access by specially textured, colored, or clearly defined footpaths at least six feet wide. Paths shall be eight feet wide when abutting parking areas or travel lanes. Paths shall be separated from parking or travel lanes by either landscaping, planters, curbs, bollards, or raised surfaces. Sidewalks in front of storefronts on the arterials and main store entrances on the arterials identified in CDC 85.200(A)(3) shall be 12 feet wide to accommodate pedestrians, sidewalk sales, sidewalk cafes, etc. Sidewalks in front of storefronts and main store entrances in commercial/OBC zone development on local streets and collectors shall be eight feet wide.*

Response: Paths have been provided leading from the parking area to the fire station allowing for safe pedestrian circulation and from Hidden Springs Road to the building (see Site Plan, Exhibit A1.01).

> > *e. Paths shall provide direct routes that pedestrians will use between buildings, adjacent rights-of-way, and adjacent commercial developments. They shall be clearly identified. They shall be laid out to attract use and to discourage people from cutting through parking lots and impacting environmentally sensitive areas.*

Response: Paths have been provided leading from the parking area to the fire station allowing for safe pedestrian circulation and from Hidden Springs Road to the building (see Site Plan, Exhibit A1.01).

> *f. At least one entrance to the building shall be on the main street, or as close as possible to the main street. The entrance shall be designed to identify itself as a main point of ingress/egress.*

Response: There is an entrance to the fire station on Hidden Springs Road, the main street frontage of the development.

> *g. Where transit service exists, or is expected to exist, there shall be a main entrance within a safe and reasonable distance of the transit stop. A pathway shall be provided to facilitate a direct connection.*

Response: There is no transit service within a quarter mile of the proposed station. Therefore, this criterion is not applicable.

> *h. Projects shall bring at least part of the project adjacent to or near the main street right-of-way in order to enhance the height-to-width ratio along that particular street. (The "height-to-width ratio" is an architectural term that emphasizes height or vertical dimension of buildings adjacent to streets. The higher and closer the building is, and the narrower the width of the street, the more attractive and intimate the streetscape becomes.) For every one foot in street width, the adjacent building ideally should be one to two feet higher. This ratio is considered ideal in framing and defining the streetscape.*

Response: The fire station has been located as near to Hidden Springs Road as possible while still maintaining adequate area for the fire apparatus to maneuver. The building is 29 feet in height. The existing right of way width for Hidden Springs Road on our half of the street is 30'. Right of way dedication will vary from 5' on west side to 12' on east side to match existing right of way widths on both sides of the project (per the City request/requirement).The new half street right of way width will, therefore, vary from 35' to 42'.This is shown on C1 and C3. The physical portion of the existing street (pavement and curb/gutter, again on Station 55's half street) is approximately 21' and will not change.

> *i. These architectural standards shall apply to public facilities such as reservoirs, water towers, treatment plants, fire stations, pump stations, power transmission facilities, etc. It is recognized that many of these facilities, due to their functional requirements, cannot readily be configured to meet these architectural standards. However, attempts shall be made to make the design sympathetic to surrounding properties by landscaping, setbacks, buffers, and all reasonable architectural means.*

Response: The proposed development is a fire station and through architectural and site design has been designed to be compatible with the existing neighborhood and blend in with the existing single-family uses to the greatest extent possible, while still fulfilling its emergency response function.

> *j. Parking spaces at trailheads shall be located so as to preserve the view of, and access to, the trailhead entrance from the roadway. The entrance apron to the trailhead shall be marked: "No Parking," and include design features to foster trail recognition.*

Response: The site does not include a trailhead. Therefore this criterion is not applicable.

C. Compatibility between adjoining uses, buffering, and screening.

> *1. In addition to the compatibility requirements contained in Chapter 24 CDC, buffering shall be provided between different types of land uses; for example, buffering between single-family homes and apartment blocks. However, no buffering is required between single-family homes and*

duplexes or single-family attached units. The following factors shall be considered in determining the adequacy of the type and extent of the buffer:

a. The purpose of the buffer, for example to decrease noise levels, absorb air pollution, filter dust, or to provide a visual barrier.

b. The size of the buffer required to achieve the purpose in terms of width and height.

c. The direction(s) from which buffering is needed.

d. The required density of the buffering.

e. Whether the viewer is stationary or mobile.

2. On-site screening from view from adjoining properties of such things as service areas, storage areas, and parking lots shall be provided and the following factors will be considered in determining the adequacy of the type and extent of the screening:

a. What needs to be screened?

b. The direction from which it is needed.

c. How dense the screen needs to be.

d. Whether the viewer is stationary or mobile.

e. Whether the screening needs to be year around.

Response: A retaining wall (ranging from 3.6' – 22' in height) will be built along the eastern portion of the developed site (Exhibit A4.01- Elevations). The Site Plan (Exhibit A1.01) and Figure 3 (aerial earlier in this document) shows the location of the existing road, existing vegetation and the homes to the east. The homes are located over 100' to the east of the developed portion of Station 55. As noted on the Landscape Plan (Exhibit L1.0), the eastern side of the developed site will be heavily landscaped with tree (Evergreen – 6' to 7' when planted) and shrubs and will screen the fire station from the existing residences. The landscaping proposed for screening of the highest portion of the retaining wall includes tall native evergreen and deciduous shrubs, with groupings of evergreen and deciduous trees. Landscaping closer to the road and neighboring residents includes a tall evergreen hedge and columnar trees that won't block surrounding views.

3. Rooftop air cooling and heating systems and other mechanical equipment shall be screened from view from adjoining properties.

Response: The fire station will not have rooftop air cooling and heating systems.

D. Privacy and noise.

1. Structures which include residential dwelling units shall provide private outdoor areas for each ground floor unit which is screened from view from adjoining units.

2. Residential dwelling units shall be placed on the site in areas having minimal noise exposure to the extent possible. Natural-appearing sound barriers shall be used to lessen noise impacts where noise levels exceed the noise standards contained in West Linn Municipal Code Section 5.487.

Response: The proposed development does not include any residential units. Therefore this criteria is not applicable.

3. Structures or on-site activity areas which generate noise, lights, or glare shall be buffered from adjoining residential uses in accordance with the standards in subsection C of this section where applicable.

Response: Buffering and screening have been provided as required in Section 55.100(C) and described in the findings provided above.

4. Businesses or activities that can reasonably be expected to generate noise in excess of the noise standards contained in West Linn Municipal Code Section 5.487 shall undertake and submit appropriate noise studies and mitigate as necessary to comply with the code. (See CDC 55.110(B)(11) and 55.120(M).)

If the decision-making authority reasonably believes a proposed use may generate noise exceeding the standards specified in the municipal code, then the authority may require the applicant to supply professional noise studies from time to time during the user's first year of operation to monitor compliance with City standards and permit requirements.

Response: Fire stations and emergency vehicles are exempt from City noise standards per Municipal Code exemption 5.487(5) (a). No acoustic study is required. Therefore, this criterion is not applicable.

E. Private outdoor area. This section only applies to multi-family projects…

F. Shared outdoor recreation areas. This section only applies to multi-family projects and projects with 10 or more duplexes or single-family attached dwellings on lots under 4,000 square feet. In those cases, shared outdoor recreation areas are calculated on the duplexes or single-family attached dwellings only. It also applies to qualifying PUDs under the provisions of CDC 24.170…

Response: The proposed fire station is not a multi-family project. Therefore this criterion is not applicable.

G. Demarcation of public, semi-public, and private spaces. The structures and site improvements shall be designed so that public areas such as streets or public gathering places, semi-public areas, and private outdoor areas are clearly defined in order to establish persons having a right to be in the space, to provide for crime prevention, and to establish maintenance responsibility. These areas may be defined by:

1. deck, patio, fence, low wall, hedge, or draping vine;

2. A trellis or arbor;

3. A change in level;

4. A change in the texture of the path material;

5. Sign; or

6. Landscaping.

Use of gates to demarcate the boundary between a public street and a private access driveway is prohibited.

Response: The landscaping proposed for the site has been designed to demarcate between the public off-site areas and the private on-site areas. There is a public community room for meeting space on-site, within the station, but there is no outdoor public gathering space on-site. Use of the community room is scheduled through and monitored by TVF&R.

H. Public transit.

> ***1.** Provisions for public transit may be required where the site abuts an existing or planned public transit route. The required facilities shall be based on the following…*

Response: The proposed fire station does not abut an existing or planned public transit route; therefore, this criterion is not applicable.

I. Public facilities. An application may only be approved if adequate public facilities will be available to provide service to the property prior to occupancy.

> *1. Streets. Sufficient right-of-way and slope easement shall be dedicated to accommodate all abutting streets to be improved to the City's Improvement Standards and Specifications. The City Engineer shall determine the appropriate level of street and traffic control improvements to be required, including any off-site street and traffic control improvements, based upon the transportation analysis submitted. The City Engineer's determination of developer obligation, the extent of road improvement and City's share, if any, of improvements and the timing of improvements shall be made based upon the City's systems development charge ordinance and capital improvement program, and the rough proportionality between the impact of the development and the street improvements.*
>
> *In determining the appropriate sizing of the street in commercial, office, multi-family, and public settings, the street should be the minimum necessary to accommodate anticipated traffic load and needs and should provide substantial accommodations for pedestrians and bicyclists. Road and driveway alignment should consider and mitigate impacts on adjacent properties and in neighborhoods in terms of increased traffic loads, noise, vibrations, and glare.*
>
> *The realignment or redesign of roads shall consider how the proposal meets accepted engineering standards, enhances public safety, and favorably relates to adjacent lands and land uses. Consideration should also be given to selecting an alignment or design that minimizes or avoids hazard areas and loss of significant natural features (drainageways, wetlands, heavily forested areas, etc.) unless site mitigation can clearly produce a superior landscape in terms of shape, grades, and reforestation, and is fully consistent with applicable code restrictions regarding resource areas.*
>
> *Streets shall be installed per Chapter 85 CDC standards. The City Engineer has the authority to require that street widths match adjacent street widths. Sidewalks shall be installed per CDC 85.200(A)(3) for commercial and office projects, and CDC 85.200(A)(16) and 92.010(H) for residential projects, and applicable provisions of this chapter. Where streets bisect or traverse water resource areas (WRAs) the street width shall be reduced to the minimum standard of 20 feet (two 10-foot travel lanes) plus four-foot-wide curb flush sidewalks or alternate configurations which are appropriate to site conditions, minimize WRA disturbance or are consistent with an adopted transportation system plan. The street design shall also be consistent with habitat friendly provisions of CDC 32.060(H).*
>
> *Based upon the City Manager's or Manager's designee's determination, the applicant shall construct or cause to be constructed, or contribute a proportionate share of the costs, for all necessary off-site improvements identified by the transportation analysis commissioned to address CDC 55.125 that are required to mitigate impacts from the proposed development. Proportionate share of the costs shall be determined by the City Manager or Manager's designee, who shall assume that the proposed development provides improvements in rough proportion to identified impacts of the development.*

Response: As shown in the Traffic Impact Analysis (Attachment E), Hidden Springs Road can accommodate anticipated traffic load and needs from the proposed fire station use, as well as will continue to provide accommodations for pedestrians and bicyclists. Driveway alignment for the proposed fire station has been designed to mitigate impacts on adjacent properties. Adequate transportation facilities will be available to provide service to the property prior to occupancy, meeting these approval criteria.

2. Repealed by Ord. 1635.

3. Municipal water. A registered civil engineer shall prepare a plan for the provision of water which demonstrates to the City Engineer's satisfaction the availability of sufficient volume, capacity, and pressure to serve the proposed development's domestic, commercial, and industrial fire flows. All plans will then be reviewed by the City Engineer.

Response: The Utility Plan (Exhibit C3) demonstrates the adequate provision of water service to the proposed fire station. Near the entrance of the fire station, on the north side of the site, there is a domestic water supply, a fire service value and a fire department connection. A water point of connection is located in the right-of-way on Hidden Springs Road.

4. Sanitary sewers. A registered civil engineer shall prepare a sewerage collection system plan which demonstrates sufficient on-site capacity to serve the proposed development. The City Engineer shall determine whether the existing City system has sufficient capacity to serve the development.

Response: The Utility Plan which demonstrates sufficient on-site sewerage collection system capacity to serve the proposed fire station is included in Exhibit C3.

5. Solid waste and recycling storage areas. Appropriately sized and located solid waste and recycling storage areas shall be provided. Metro standards shall be used.

Response: Per the Metro standards for a public development such as a fire station, a minimum solid waste storage and recycling storage area of 10 square feet plus 4 square feet per 1,000 square feet should be provided. The fire station is 8,340 square feet, requiring a storage area of 70 square feet. The proposed storage area is approximately 171 square feet. Therefore, this standard is met.

J. Crime prevention and safety/defensible space.

1. Windows shall be located so that areas vulnerable to crime can be surveyed by the occupants.

2. Interior laundry and service areas shall be located in a way that they can be observed by others.

3. Mailboxes, recycling, and solid waste facilities shall be located in lighted areas having vehicular or pedestrian traffic.

4. The exterior lighting levels shall be selected and the angles shall be oriented towards areas vulnerable to crime.

5. Light fixtures shall be provided in areas having heavy pedestrian or vehicular traffic and in potentially dangerous areas such as parking lots, stairs, ramps, and abrupt grade changes.

6. Fixtures shall be placed at a height so that light patterns overlap at a height of seven feet which is sufficient to illuminate a person. All commercial, industrial, residential, and public facility projects undergoing design review shall use low or high pressure sodium bulbs and be able to demonstrate *effective shielding so that the light is directed downwards rather than omni-directional. Omni-directional lights of an ornamental nature may be used in general commercial districts only.*

7. Lines of sight shall be reasonably established so that the development site is visible to police and residents.

8. Security fences for utilities (e.g., power transformers, pump stations, pipeline control equipment, etc.) or wireless communication facilities may be up to eight feet tall in order to protect public safety. No variances are required regardless of location.

Response: The windows of the fire station are located to provide easy visual access to the exterior of the site. Lighting has also been placed to illuminate the site and provide an additional level of safety (Exhibit E1.01, E1.01PH). All laundry and service areas have been incorporated in the floor plan (Exhibit A2.01, A2.02) to be visible and accessible. Additionally, appropriate lines of sight have been established to keep the site open to neighborhood residents and police. While the characteristics of the building are residential, the use is also for public safety.

K. Provisions for persons with disabilities.

1. The needs of a person with a disability shall be provided for. Accessible routes shall be provided between all buildings and accessible site facilities. The accessible route shall be the most practical direct route between accessible building entries, accessible site facilities, and the accessible entry to the site. An accessible route shall connect to the public right-of-way and to at least one on-site or adjacent transit stop (if the area is served by transit). All facilities shall conform to, or exceed, the Americans with Disabilities Act (ADA) standards, including those included in the Uniform Building Code.

Response: The proposed fire station has been designed to be compliant with all ADA standards, including those in the Uniform Building Code.

L. Signs.

1. Based on considerations of crime prevention and the needs of emergency vehicles, a system of signs for identifying the location of each residential unit, store, or industry shall be established.

2. The signs, graphics, and letter styles shall be designed to be compatible with surrounding development, to contribute to a sense of project identity, or, when appropriate, to reflect a sense of the history of the area and the architectural style.

3. The sign graphics and letter styles shall announce, inform, and designate particular areas or uses as simply and clearly as possible.

4. The signs shall not obscure vehicle driver's sight distance.

5. Signs indicating future use shall be installed on land dedicated for public facilities (e.g., parks, water reservoir, fire halls, etc.).

***6.** Signs and appropriate traffic control devices and markings shall be installed or painted in the driveway and parking lot areas to identify bicycle and pedestrian routes.*

Response: The site of the proposed fire station will contain a public community meeting room which is identified in the Floor Plan (Exhibit A2.01, A2.02). There are no areas dedicated to any future uses; therefore those criteria above relating to those items are not applicable. The fire station will have parking-related signage and traffic control devices or markings installed as appropriate within the parking area.

M. *Utilities. The developer shall make necessary arrangements with utility companies or other persons or corporations affected for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting, and cable television, shall be placed underground, as practical. The design standards of Tables 1 and 2 above, and of subsection 5.487 of the West Linn Municipal Code relative to existing high ambient noise levels shall apply to this section.*

Response: As shown on the plan set Composite Street Utility Plan (Exhibit C3) all utilities impacted by the proposed development and those utilities that are required to be installed as a result of the proposed development will be placed underground as required by the CDC.

N. *Wireless communication facilities (WCFs). (This section only applicable to WCFs.) WCFs as defined in Chapter 57 CDC may be required to go through Class I or Class II design review. The approval criteria for Class I design review is that the visual impact of the WCF shall be minimal to the extent allowed by Chapter 57 CDC. Stealth designs shall be sufficiently camouflaged so that they are not easily seen by passersby in the public right-of-way or from any adjoining residential unit. WCFs that are classified as Class II design review must respond to all of the approval criteria of this chapter.*

Response: The proposed fire station is not a wireless communication facilities; therefore this CDC section is not applicable

O. Refuse and recycling standards.

> *1. All commercial, industrial and multi-family developments over five units requiring Class II design review shall comply with the standards set forth in these provisions. Modifications to these provisions may be permitted if the Planning Commission determines that the changes are consistent with the purpose of these provisions and the City receives written evidence from the local franchised solid waste and recycling firm that they are in agreement with the proposed modifications…*

Response: The proposed fire station is not a commercial, industrial or multi-family development; therefore this criterion is not applicable.

55.110 The Site Analysis (Exhibit C1)

55.120 Site Plan (Exhibit A1.01)

55.125 Transportation Analysis (Attachment E)

55.130 Grading Plan (Exhibit C2)

55.140 Architectural Drawings (Exhibits A1.01 – A5.01)

55.150 Landscape Plan (Exhibit L1.0, L2.0)

Response: The above required plans have been submitted with this application

55.170 Exceptions to Underlying Zone, Yard, Parking, Sign Provisions, and Landscaping Provisions

> *A. The Planning Director may grant an exception to the dimensional building setback or yard requirements in the applicable zone based on findings that the approval will satisfy the following criteria:*

1. A minor exception that is not greater than 20 percent of the required setback.

2. A more efficient use of the site.

3. The preservation of natural features that have been incorporated into the overall design of the project.

4. No adverse affect to adjoining properties in terms of light, air circulation, noise levels, privacy, and fire hazard.

5. Safe vehicular and pedestrian access to the site and safe on-site vehicular and pedestrian circulation.

Response: The applicant is not requesting an exception to setback or yard requirements in the underlying zone; therefore, this criterion is not applicable.

B. The Planning Director may grant an exception to the off-street parking dimensional and minimum number of space requirements in the applicable zone so long as the following criteria are met:

1. The minor exception is not greater than 10 percent of the required parking;

2. The application is for a use designed for a specific purpose which is intended to be permanent in nature (for example, a nursing home) and which has a low demand for off-street parking; or

3. There is an opportunity for sharing parking and there is written evidence that the property owners are willing to enter into a legal agreement; or

4. Public transportation is available to the site reducing the standards and will not adversely affect adjoining uses, and there is a community interest in the preservation of particular natural feature(s) of the site which make it in the public interest to grant an exception to parking standards.

Response: The applicant is not requesting a minor exception for parking. Therefore, these criteria are not applicable.

C. The Planning Director may grant an exception to the sign dimensional requirements in the applicable zone when the following criteria are met:

1. The minor exception is not greater than 10 percent of the required applicable dimensional standard for signs;

2. The exception is necessary for adequate identification of the use on the property; and

3. The sign will be compatible with the overall site plan, the structural improvements, and with the structures and uses on adjoining properties.

Response: The applicant is not requesting an exception to the landscaping requirements; therefore, this section of the CDC is not applicable.

D. The Planning Director may grant an exception to the landscaping requirements in the applicable zone based on findings that the following criteria will be met:

1. A minor exception that is not greater than 10 percent of the required landscaped area.

2. A more efficient use of the site.

3. The preservation of natural features that have been incorporated into the overall design of the project.

4. No adverse effect to adjoining property.

Response: The applicant is not requesting an exception to the landscaping requirements; therefore, this section of the CDC is not applicable.

55.180 Maintenance

All on-site improvements shall be the ongoing responsibility of the property owner or occupant.

Response: The applicant understands that all on-site improvements will be the responsibility of the property owner.

55.190 Shared Open Space

Where the open space is designated on the plan as common open space, the following shall apply:

A. The open space area shall be shown on the final plan and recorded with the Planning Director.

B. The open space shall be conveyed in accordance with one of the following methods:

1. By dedication to the City as publicly owned and maintained as open space. Open space proposed for dedication to the City must be acceptable to it with regard to the size, shape, location, improvement, and budgetary and maintenance limitations.

2. By leasing or conveying title (including beneficial ownership) to a corporation, home association, or other legal entity with the City retaining the development rights to the property. The terms of such lease or other instrument of conveyance must include provisions suitable to the City Attorney for guaranteeing the following:

a. The continued use of such land for intended purposes.

b. Continuity of property maintenance.

c. When appropriate, the availability of funds required for such maintenance.

d. Adequate insurance protection.

e. Recovery for loss sustained by casualty and condemnation, or otherwise.

3. By any method that achieves the objectives set forth in subsection (B)(2) of this section.

Response: The proposed fire station contains no designated common open space; therefore this section of the CDC is not applicable.

55.195 Annexation and Street Lights

As a condition of approval for design review for any project that is being annexed to the City, the developer and/or homeowners association shall pay for all expenses related to street light energy and maintenance costs until annexed into the City. The approval for any property annexed must state: "This approval is contingent on voter approval of annexation of the subject property." This means that no *permit, final plat, or certificate of occupancy may be issued or approved until annexation is complete. (Ord. 1442, 1999; Ord. 1604 § 53, 2011)*

Response: The proposed fire station will be on a parcel that is already within City Limits. Therefore this section of the CDC is not applicable.

Chapter 60: Conditional Use Permit (CUP)

60.010 Purpose

The purpose of this chapter is to provide standards and procedures under which conditional uses may be permitted, enlarged, or altered if the site is appropriate and if other conditions can be met. (Ord. 1589 § 1 (Exh. A), 2010)

Response: The applicant understands that this chapter provides standards for which conditional uses may be allowed. The proposed fire station is a Conditional Use in the R-10 zone.

60.030 Administration and Approval Process

A. Conditional use applications shall be decided by the Planning Commission in the manner set forth in CDC 99.060(B). A petition for review by the Council may be filed as provided by CDC 99.240(B).

B. All approved conditional use applications in new buildings, or buildings with a major modification, shall be subject to design review under the provisions of Chapter 55 CDC, and in the manner set forth in CDC 99.060(B).

C. All approved conditional use applications within existing buildings shall not be subject to design review. (Ord. 1635 § 28, 2014)

Response: The applicant understands the procedures and approval process and is providing findings for the Conditional Use Permit approval process.

60.040 Time Limit on a Conditional Use Approval

Approval of a conditional use that required a design review shall be subject to the time limitations set forth in CDC 55.040. Approval of a conditional use that did not require design review shall be void unless either the use is commenced or an extension is granted per CDC 99.325 within three years of the approval. (Ord. 1408, 1998; Ord. 1589 § 1 (Exh. A), 2010; Ord. 1604 § 61, 2011)

Response: This CUP application requires a design review and the applicant is aware of the time limitations set forth in CDC 55.040

60.050 Building Permits for an Approved Conditional Use

Building permits for all or any portion of a conditional use shall be issued only on the basis of the conditional use plan and conditions as approved by the Planning Commission. (Ord. 1622 § 21, 2014)

Response: The applicant understands that building permits will be issued only on the basis of the conditions as approved by the Planning Commission.

60.060 Application

A. A conditional use application shall be initiated by the property owner or the owner’s authorized agent.

Response: This application is being submitted by the property owner, TVF&R (see “Applications” section of this submittal).

B. A prerequisite to the filing of an application is a pre-application conference at which time the Director shall explain the requirements and provide the appropriate forms as specified in CDC 99.030(B) and (C).

Response: A pre-application conference was held with City Staff on May 19, 2016. Pre-application notes have been submitted as Attachment B.

C. A prerequisite to the filing of an application is a meeting with the respective City-recognized neighborhood association, per CDC 99.038, at which time the applicant will present his/her proposal and receive comments.

Response: A neighborhood meeting was held with the Hidden Springs Neighborhood Association on June 21, 2016. The required documentation has been submitted as Attachment A.

D. An application for a conditional use shall include the completed application form and:

1. A narrative which addresses the approval criteria set forth in CDC 60.070 and which sustains the applicant's burden of proof; and

Response: This application provides responses to the approval criteria in Section 60.070 below.

2. A site plan as provided by CDC 60.080.

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the City. When the application submittal is determined to be complete, additional copies may be required as determined by the Community Development Department.

Response: The required Site Plan can be found in Exhibit A1.01 of this application. The required copies were submitted at the time of application submittal

E. Names and addresses of all who are property owners of record within 300 feet of the site shall be determined by the Director.

Response: The mailing labels used for the Neighborhood Meeting have been provided as part of Attachment A.

F. The applicant shall pay the requisite fee. (Ord. 1401, 1997; Ord. 1442, 1999; Ord. 1621 § 25, 2014; Ord. 1622 § 16, 2014)

Response: The requisite fee will be paid at the time of the application submittal.

60.070 Approval Standards and Conditions

A. The Planning Commission shall approve, approve with conditions, or deny an application for a conditional use, except for a manufactured home subdivision in which case the approval standards and conditions shall be those specified in CDC 36.030, or to enlarge or alter a conditional use based on findings of fact with respect to each of the following criteria:

1. The site size and dimensions provide:

a. Adequate area for the needs of the proposed use; and

b. Adequate area for aesthetic design treatment to mitigate any possible adverse effect from the use on surrounding properties and uses.

Response: As exhibited on the submitted Site Plan (Exhibit A1.01) there is sufficient area on-site to adequately accommodate the fire station and the necessary site design elements, including parking and landscaping. The fire station is designed to resemble the residential nature of the neighborhood. The fire station has a residential feel, and utilizes all residential materials, aluminum windows, fiber cement siding, metal roof, and exposed wood at the porches.

2. The characteristics of the site are suitable for the proposed use considering size, shape, location, topography, and natural features.

Response: As noted above, the proposed site is suitable for the proposed fire station given the parcel's size, shape and location. The location of the proposed fire station conforms to TVF&R's requirements and national standards for the provision of emergency services in a timely and efficient manner. As noted at the beginning of this application, locating a new fire station on this site will greatly enhance the District's ability to respond to emergency service calls in the area.

3. The granting of the proposal will provide for a facility that is consistent with the overall needs of the community.

Response: As noted in the project description, this fire station provides increased fire suppression coverage and advanced lifesaving (ALS) services to the community. The proposed location provides faster response times to fire, emergency, and medical needs of the community than were previously available. Further, fire resources in the City of West Linn will be better positioned to achieve the performance objectives outlined in NFPA1710.

4. Adequate public facilities will be available to provide service to the property at the time of occupancy.

Response: As shown in the Traffic Impact Analysis (Attachment E), Hidden Springs Road can accommodate anticipated traffic load and needs from the proposed fire station use, as well as will continue to provide accommodations for pedestrians and bicyclists. Driveway alignment for the proposed fire station has been designed to mitigate impacts on adjacent properties. Adequate transportation facilities will be available to provide service to the property prior to occupancy, meeting approval criteria related to street.

The Composite Street Utility Plan (Exhibit C3) demonstrates the adequate provision of other public services (sewer, water) to the proposed fire station.

5. The applicable requirements of the zone are met, except as modified by this chapter.

Response: The applicable requirements of the zone, including setback, building height, floor area ratio, lot coverage, lot width, front lot size and minimum lot size have been met by this project.

6. The supplementary requirements set forth in Chapters 52 to 55 CDC, if applicable, are met.

Response: Any applicable supplementary requirements of Chapters 52 to 55 have been address by this application.

7. The use will comply with the applicable policies of the Comprehensive Plan.

Response: The approval of the proposed fire station will comply with the applicable goals and policies within the West Linn Comprehensive Plan (amended June 2014) as detailed below:

Goal 2: Land Use Planning

Section 5: Intergovernmental Coordination

Includes a provision for "obtaining fire protection service from the Tualatin Valley Fire and Rescue District"

Response: TVF&R is the applicant for the proposed fire station. Under the agreement between the City of West Linn and TVF&R, the fire district provides the City with fire protection services. The construction of a new station is necessary to provide this area of Hidden Springs with adequate fire protection. The location of the station at the top of the hill is geographically important. This allows for more coverage of the city within a shorter amount of time. The station's purpose for locating at this specific location is due to topography and the road networks of West Linn. It allows far better coverage coming from the top of the hill than coming from one corner of the city and having to go up over the hill. The station will allow advance life support (ALS) to have more coverage, so that ALS services can be provided faster.

Goal 11: Public Facilities and Services

Section 4: Fire and Police: Provide a high level of fire, emergency and police services to protect life and property within the City

Response: The proposed fire station will allow TVF&R and the City to provide adequate fire services to protect life and property within the City.

B. An approved conditional use or enlargement or alteration of an existing conditional use shall be subject to the development review provisions set forth in Chapter 55 CDC.

Response: The development review provisions of Chapter 55 have been addressed earlier in this application.

C. The Planning Commission may impose conditions on its approval of a conditional use which it finds are necessary to assure the use is compatible with other uses in the vicinity. These conditions may include, but are not limited to, the following:

1. *Limiting the hours, days, place, and manner of operation.*
2. *Requiring design features which minimize environmental impacts such as noise, vibration, air pollution, glare, odor, and dust.*
3. *Requiring additional setback areas, lot area, or lot depth, or width.*
4. *Limiting the building height, size or lot coverage, or location on the site.*
5. *Designating the size, number, location and design of vehicle access points.*
6. *Requiring street right-of-way to be dedicated and the street to be improved including all steps necessary to address future street improvements identified in the adopted Transportation System Plan.*
7. *Requiring participation in making the intersection improvement or improvements identified in the Transportation System Plan when a traffic analysis (compiled as an element of a conditional use application for the property) indicates the application should contribute toward.*
8. *Requiring landscaping, screening, drainage, and surfacing of parking and loading areas.*
9. *Limiting the number, size, location, height, and lighting of signs.*
10. *Limiting or setting standards for the location and intensity of outdoor lighting.*
11. *Requiring berming, screening, or landscaping and the establishment of standards for their installation and maintenance.*
12. *Requiring and designating the size, height, location, and materials for fences.*
13. *Requiring the protection and preservation of existing trees, soils, vegetation, watercourses, habitat areas, and drainage areas.*

Response: The applicant has reviewed Section 60.070.C. 1-13 and understands that the Planning Commission can place conditions on the approval of this conditional use application as relating to those items listed in these criteria.

D. Aggregate extraction uses shall also be subject to the provisions of ORS 541.605.

Response: There is no aggregate extraction proposed for the site; therefore this criterion is not applicable.

E. The Historic Review Board shall review an application for a conditional use, or to enlarge a conditional use on a property designated as a historic resource, based on findings of fact that the use will:

1. Preserve or improve a historic resource which would probably not be preserved or improved otherwise; and

2. Utilize existing structures rather than new structures. (Ord. 1291, 1987; Ord. 1408, 1998; Ord. 1544, 2007; Ord. 1614 § 13, 2013)

Response: The proposed site is not designated as a historic resource; therefore this criterion is not applicable.

60.080 Site Plan and Map

A. All site plans and maps shall include the name, address, and telephone number of the applicant, the scale of the site plan, north arrow, and a vicinity map.

B. The applicant shall submit a site plan drawn to an appropriate scale (in order of preference, one inch equals 10 feet to one inch equals 30 feet) which contains the following information:

1. The subdivision name, block, and lot number or the section, township, range, and tax lot number.

2. The lot or parcel boundaries, dimensions, and gross area.

3. The applicant's property and the surrounding property to a distance sufficient to determine the relationship between the applicant's property and proposed development to the adjacent property and development.

4. The location, dimensions, and names of all existing and platted streets and other public ways and easements on adjacent property and on the site.

5. The location, dimensions, and setback distances of all:

a. Existing structures, improvements, utilities, and drainage facilities on adjoining properties;

b. Existing structures, improvements, utilities, and drainage facilities to remain on the site; and

c. Proposed structures or changes to existing structures, improvements, utilities, and drainage facilities.

6. The existing and proposed dimensions of:

a. The entrances and exits to the site;

b. The parking and circulation areas;

c. Loading and service areas for waste disposal, loading and delivery;

d. Pedestrian and bicycle circulation area;

e. On-site outdoor recreation spaces and common areas; and

f. Above-ground utilities.

7. The location of areas to be landscaped and the proposed landscape plan.

8. The location of all trees having a six-inch caliper at a height of five feet.

> *C. The applicant shall submit the site plan on a map showing two-foot contours up to 20 percent grade and 10-foot contours on grades above 20 percent. (Ord. 1636 § 43, 2014)*

Response: The required elements have been included on the Exhibits submitted with this development application.

60.090 Additional Criteria for Transportation Facilities (Type II)

> *A. Construction, reconstruction, or widening of highways, roads, bridges or other transportation facilities that are (1) not designated in the adopted West Linn Transportation System Plan ("TSP") or (2) not designed and constructed as part of an approved, active, development order are allowed in all zoning districts subject to the conditional use and all other applicable provisions of the CDC and satisfaction of all of the following criteria:*
>
> *1. The project and its design are consistent with West Linn's adopted TSP and consistent with the State Transportation Planning Rule, OAR 660-012 ("the TPR").*
>
> *2. The project design is compatible with abutting land uses in regard to noise generation and public safety and is consistent with the applicable zoning and development standards and criteria for the abutting properties.*
>
> *3. The project design minimizes environmental impacts to identified wetlands, wildlife habitat, air and water quality, cultural resources, and scenic qualities, and a site with fewer environmental impacts is not reasonably available.*
>
> *4. The project preserves or improves the safety and function of the facility through access management, traffic calming, or other design features.*
>
> *5. The project includes provisions for bicycle and pedestrian access and circulation consistent with the comprehensive plan, the requirements of this chapter, and the TSP.*
>
> *B. State transportation system facility or improvement projects. The State Department of Transportation ("ODOT") shall provide a narrative statement with the application demonstrating compliance with all of the criteria and standards in subsections (A)(1) through (5) of this section. Where applicable, an environmental impact statement or environmental assessment may be used to address one or more of these criteria.*
>
> *C. Proposal inconsistent with TSP/TPR. If the City determines that the proposed use or activity or its design is inconsistent with the TSP or TPR, then the applicant shall apply for and obtain a plan and/or zoning amendment prior to or in conjunction with conditional use permit approval. (Ord. 1584, 2008)*

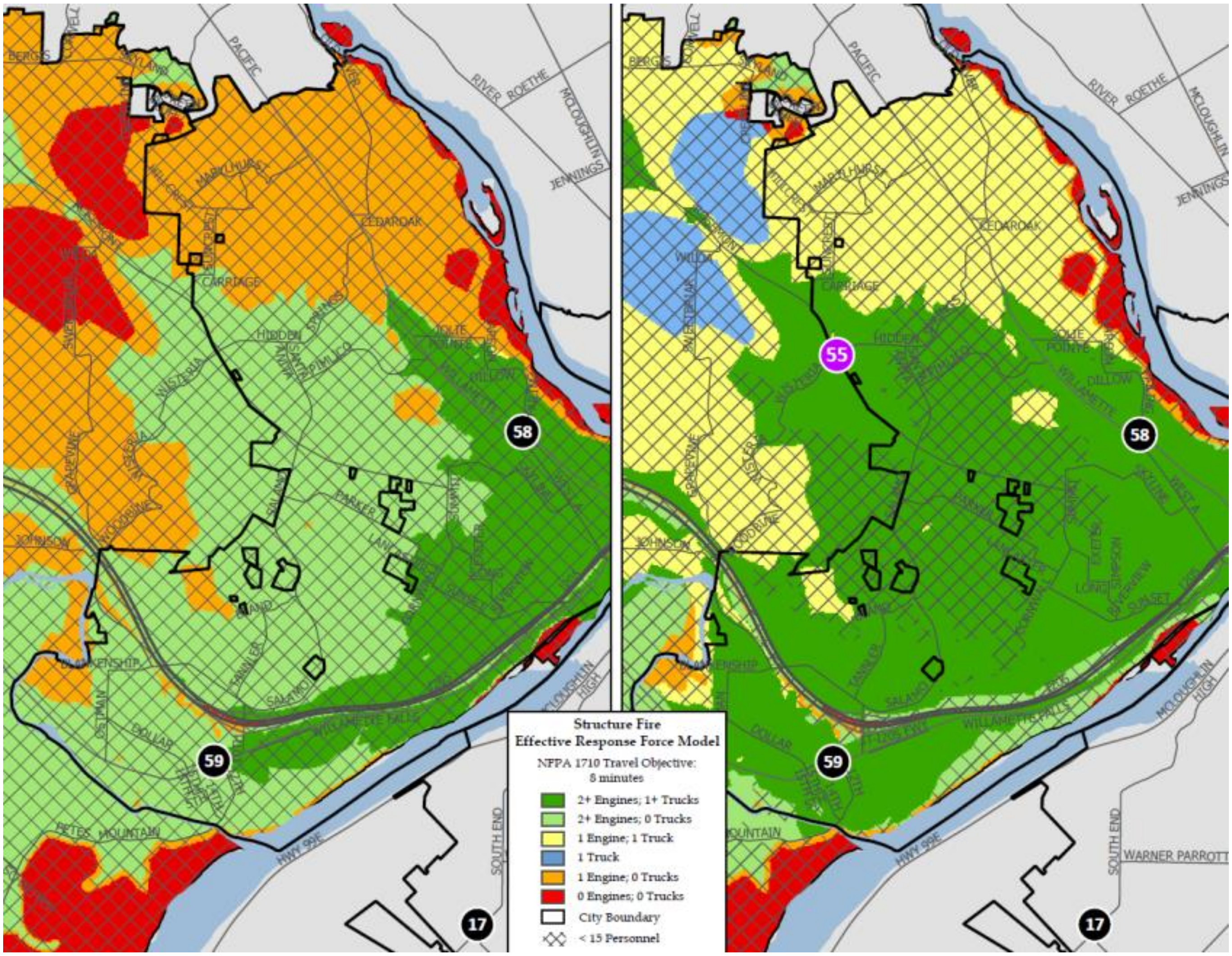
Response: The proposed fire station is not a transportation facility application; therefore this criterion does not apply.

60.100 Additional Criteria for Schools and Other Government Facilities

> *Schools and other government facilities that attract a regular and significant volume of users shall, to the greatest extent possible, be centrally located relative to the majority of the population that they will serve and be serviceable by sidewalks and bike routes/lanes. Police and fire stations shall meet these standards to the greatest extent possible but it is acknowledged that access to arterials remains a key locational determinant for those uses. (Ord. 1590 § 1, 2009)*

Response: TVF&R chose the proposed location taking into account capacity at surrounding stations, and location of future development and population. The proposed fire station is centrally located to the population that it will serve and access to Hidden Springs Road, an arterial roadway, is critical to meeting adequate emergency response times. Figure 1 earlier in this application noted that the ALS Effective Response Force performance increases in coverage due to the construction of new Station 55 at this location. Figure 5 shows the improved response times for structure fires for the majority of the city by locating Station 55 at this site. Station 55 is both centrally located and has access to key arterials to provide enhanced service delivery to the community.

Figure 5. Structure Fire Effective Response Force Model



Section 4

Attachment A: Neighborhood Meeting Documentation

Angelo planning group LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

May 27, 2016

RE: Neighborhood Review Meeting
Tualatin Valley Fire & Rescue
New Station 55

Dear Resident:

Tualatin Valley Fire & Rescue (TVF&R) is proposing to construct a new fire station on Hidden Springs Road at the location shown on the attached map. Construction of the new fire station will require the submittal of Design Review and Conditional Use applications with the City of West Linn. Prior to applying to the City we would like to take the opportunity to discuss the proposal in more detail with you. Pursuant to the City's Neighborhood Meeting requirements, you are invited to attend a meeting to discuss the proposal on:

Tuesday, June 21, 2016
7:00 PM
Rosemont Middle School
Room A102

Our presentation will be a part of the regularly scheduled Hidden Springs Neighborhood Association (HSNA) June meeting. Other HSNA items may be on the agenda. We encourage you to contact the HSNA President or HSNA representatives prior to the June 21st meeting to discuss this and any issues you would like TVF&R to be aware of in advance of the meeting.

The purpose of this meeting is to provide a forum for TVF&R and property owners/residents to review the proposal and identify issues so they may be considered before the formal application is submitted. This meeting will provide you the opportunity to share with us any special information you may have about the property. Please note this meeting will be an informational meeting on preliminary development plans. These plans may be altered prior to submittal of the application to the City. You may receive official notice from the City for you to either participate with written comments and/or provide an opportunity to attend a public hearing. We look forward to more specifically discussing the proposal with you. Please feel free to contact Frank Angelo at 503-227-3664 or fangelo@angeloplanning.com if you have any questions.

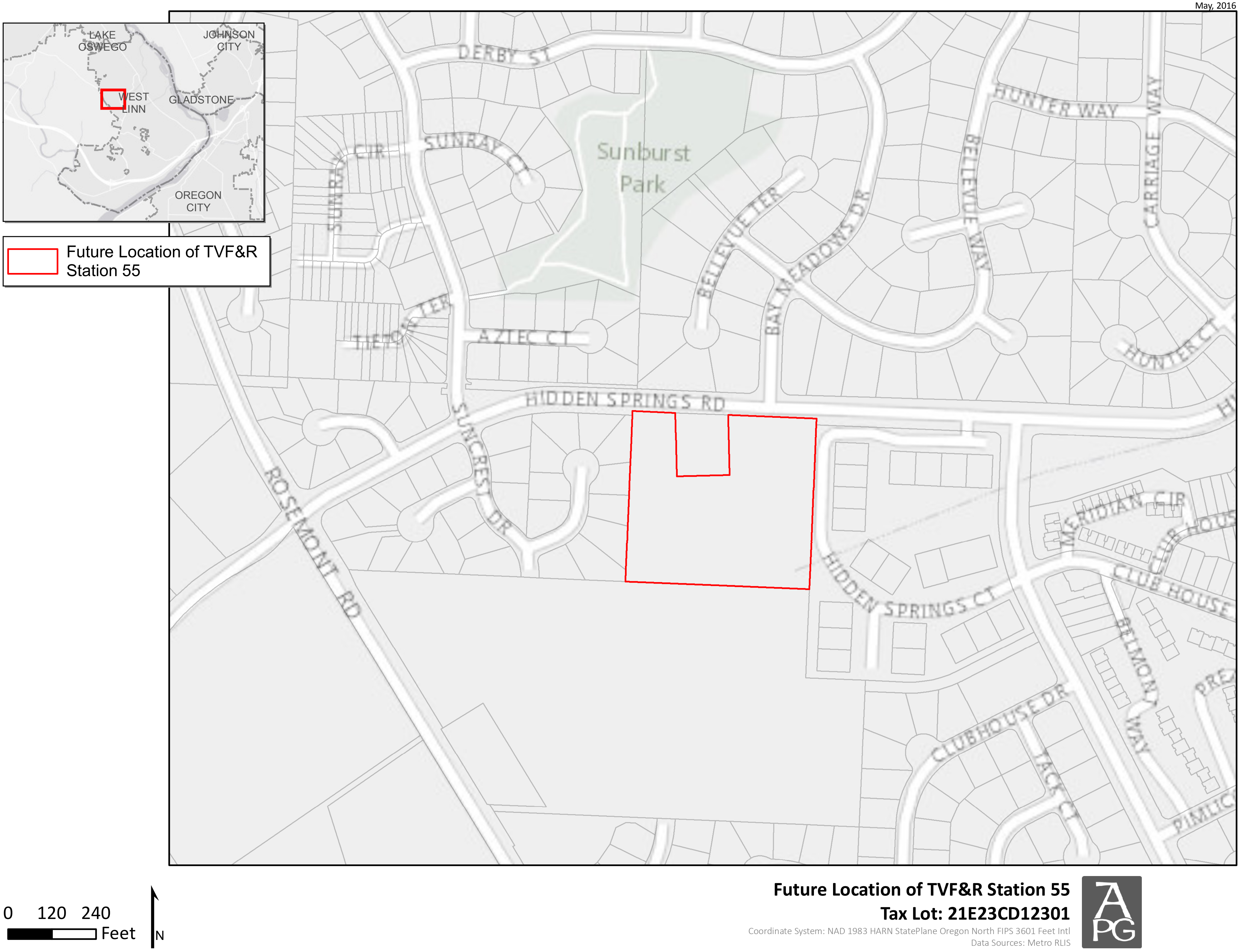
Sincerely,

Frank Angelo

Attachments:

- Station 55 Location Map

May, 2016



Future Location of TVF&R Station 55

Tax Lot: 21E23CD12301

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Sources: Metro RLIS

N:\Projects\006036 TVFR Station 55 (West Linn)\Public Notice\General_map.mxd - cdoxsee - 5/10/2016

MEETING NOTICE

PROPOSAL: New TVF&R Fire Station
Conditional Use Application

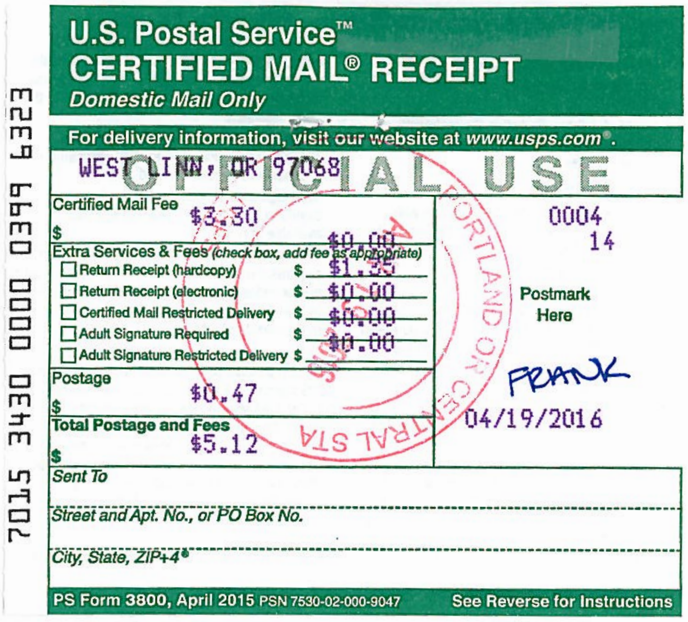
MTG DATE: Tuesday June 21, 2016

TIME: 7:00 P.M.

PLACE: Rosemont Middle School
Room A102

CONTACT: Frank Angelo, APG

NUMBER: 503-227-3664



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Postage $ $0.47

Total Postage and Fees $ $5.12

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APR 19 2016

FRANK

04/19/2016

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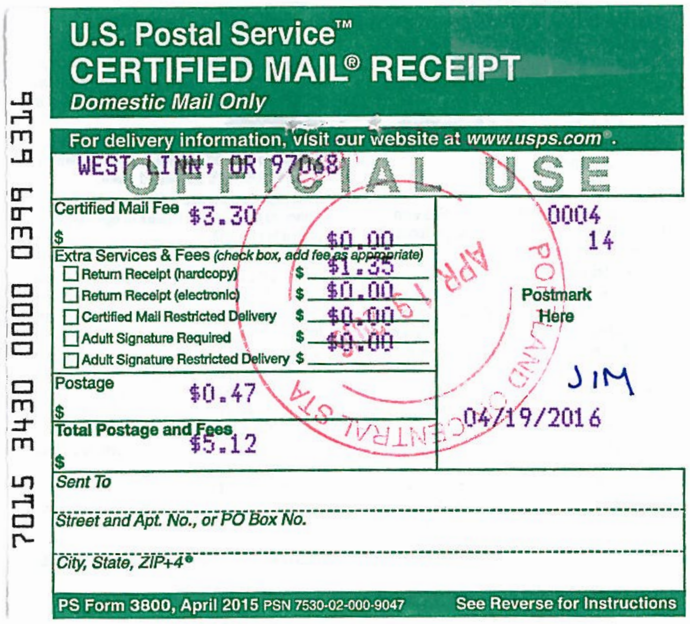

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APR 19 2016

JIM

04/19/2016

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City, State, ZIP+4®

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

Certified Mail Receipts for
H.S. Neigh. Assn.
April 19, 2016

NEIGHBORHOOD MEETING
AFFIDAVIT OF POSTING
NOTICE

STATE OF OREGON)
) ss
County of Multnomah)

I, Frank Angelo being duly sworn, depose and say that on the 27th day of May 2016 a sign for the neighborhood meeting was posted on the subject property for the proposed development at 20800 Hidden Springs Road, in accordance with the requirements of the West Linn Community Development Code 99.038.

Signature

Subscribed and sworn to, or affirmed, before me this 31st day of May,
2016.

OFFICIAL SEAL
KAREN L SIEGEL
NOTARY PUBLIC - OREGON
COMMISSION NO. 471465
MY COMMISSION EXPIRES SEPTEMBER 05, 2016

Karen Siegel
Notary Public for the State of Oregon
County of Multnomah

My Commission expires: Sept 5, 2016

NEIGHBORHOOD MEETING
AFFIDAVIT OF MAILING

STATE OF OREGON)
) ss
County of Multnomah)

I, Laura Krull, being duly sworn, depose and say that on the 27th day of May 2016 I caused to have mailed to each of the persons on the attached list a notice of a meeting to discuss a proposed development at 20800 Hidden Springs Road, copy of which notice so mailed is attached hereto and made a part hereof, in accordance with the requirements of the West Linn Community Development Code 99.038.

I further state that said notices were enclosed in envelopes plainly addressed to said persons and were deposited on the date indicated above in the United States Post Office with postage prepaid thereon.

Laura Krull

Signature

Subscribed and sworn to, or affirmed, before me this 31st day of May, 20 16.

OFFICIAL SEAL
KAREN L SIEGEL
NOTARY PUBLIC - OREGON
COMMISSION NO. 471465
MY COMMISSION EXPIRES SEPTEMBER 05, 201

Karen Siegel
Notary Public for the State of Oregon
County of Multnomah

My Commission expires: Sept. 5, 2016

HSNA
Hidden Springs Neighborhood Association
City of West Linn

Hidden Springs Neighborhood Association

HSNA Meeting Agenda
JUNE May 21, 2016 at 7 pm
Rosemont Ridge Middle School
Room A 102

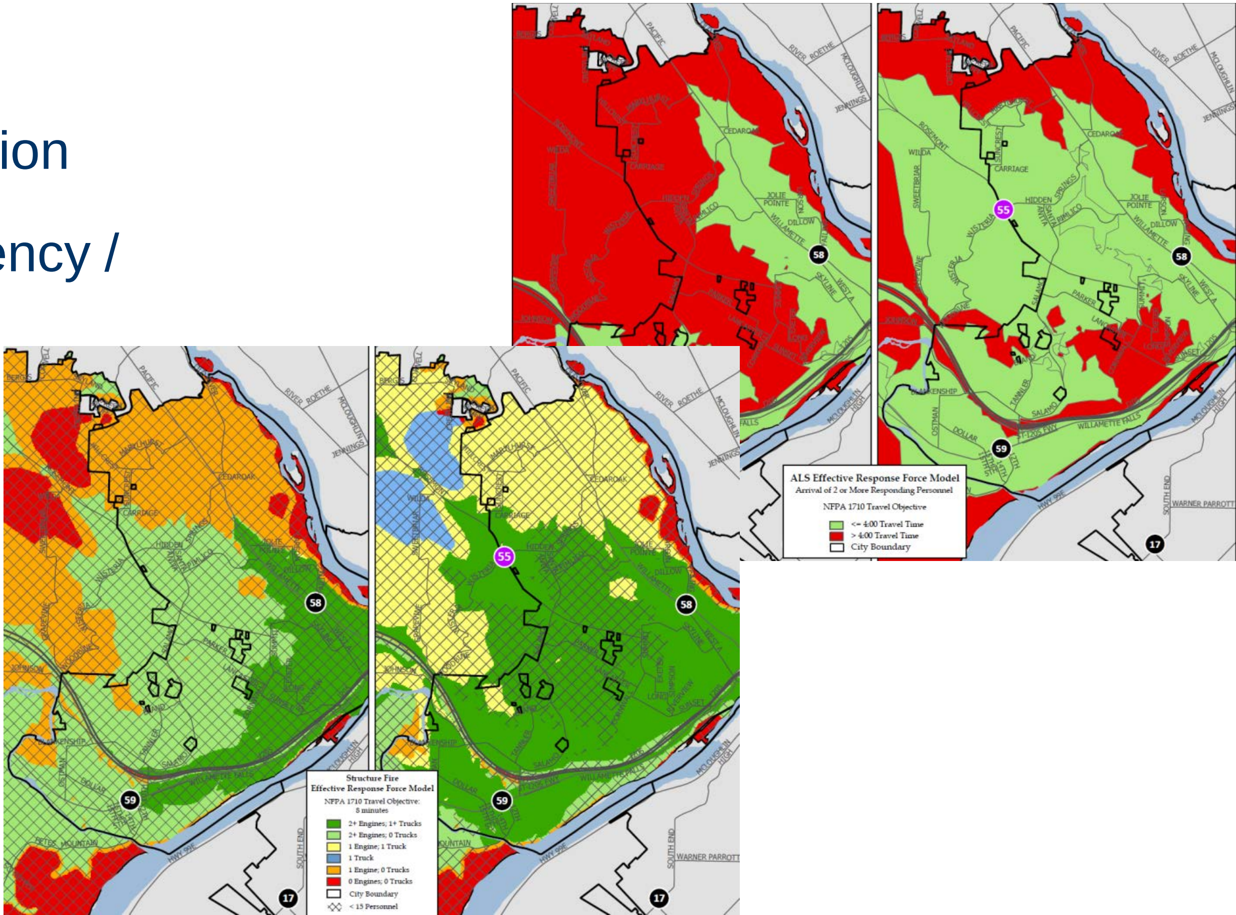
1. Call to Order
2. Approval of Minutes from April 19, 2015
3. Treasurer's Update
   a. Current HSNA Balance
4. Report on June 11 "E-Waste Recycling Day"
5. Angelo Planning Group's Presentation on TVF&R Rescue Station on Hidden Springs at Bay Meadows
6. Discussion on letter regarding Speeding on Santa Anita
7. Tanner Springs Assisted Living Facility – 16 Assisted Living Units, 32 Additional Senior Independent Living Units and 17 Parking Spaces
   See this link:
   https://westlinnoregon.gov/sites/default/files/fileattachments/planning/meeting/10942/applicant_submittal.pdf
8. Old Business / Miscellaneous
   18000 Upper Midhill Drive - 34 Lots - See attached June 28 and June 29 Hearing Notice

TVF&R Station 55
Hidden Springs Neighborhood Association

June 21, 2016

TVF&R Station 55 Background

- Data Analysis
- Choosing a Location
- Response Frequency / per day average



TVF&R Station 55 Background

- Station 55 Features
  - Four person crews
  - Apparatus
  - Community room
- Community Compatibility
- Construction Schedule

TVF&R Station 55 – City Review Process

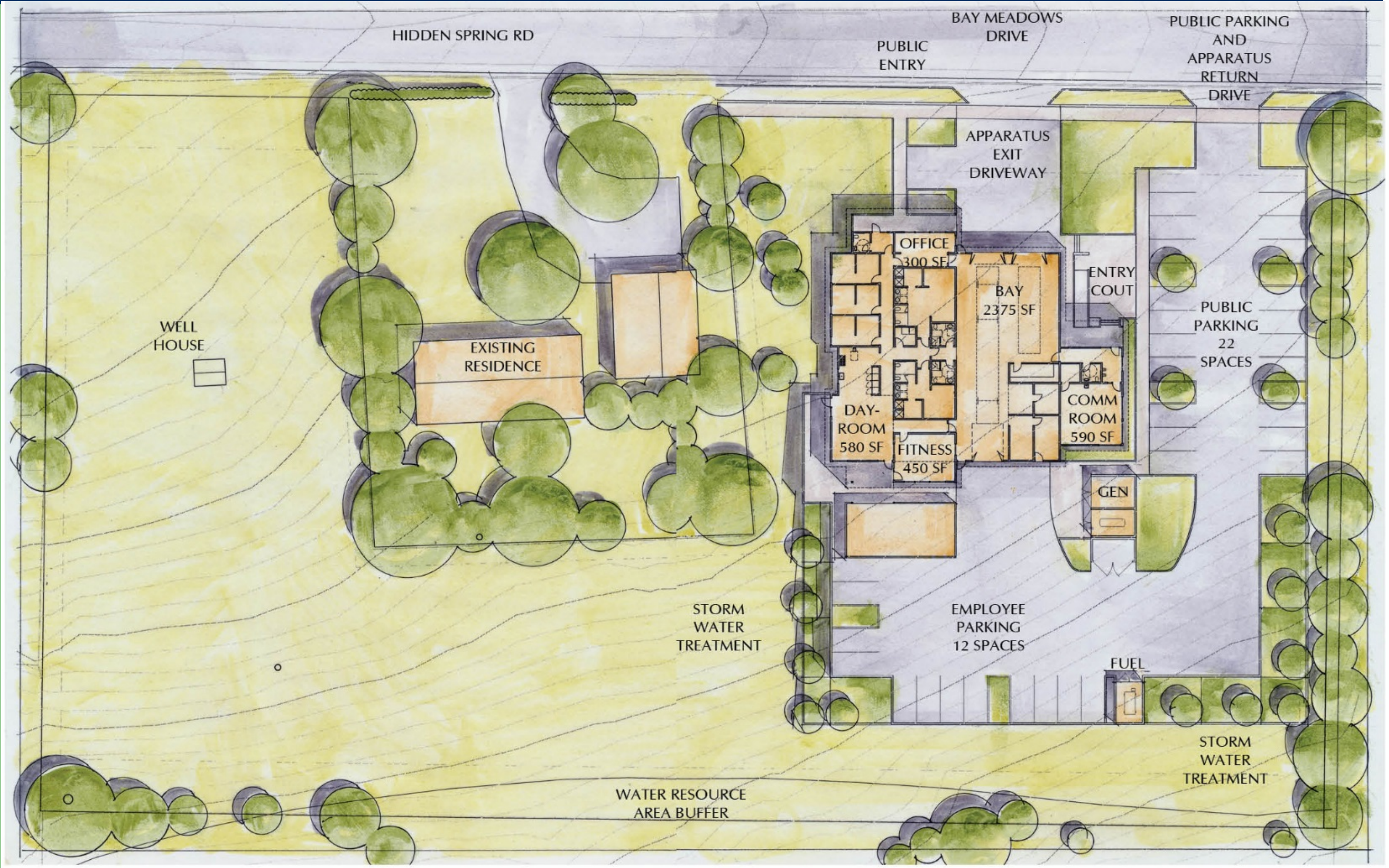
- Neighborhood Meeting
  - Provide information to Neighborhood
  - Identify potential issues before we submit our application
- R 10 Zone
- West Linn Land Use Applications
  - Conditional Use
  - Design Review
  - Planning Commission Public Hearing

TVF&R Station 55 – Site Location

TVF&R Station 55 – Site Plan

- Site is 4.82 acres
- Design similar to Stations 65 & 68
- Station size: 7,504 SF
- Community Room: 590 SF

TVF&R Station 55 – Site Plan



TVF&R Station 55 – Site Plan

NORTH

WEST

EAST

SOUTH

TVF&R Station 55 – Transportation

- Fire station traffic characteristics
  - Crew shift changes
  - Community room use
  - Call response
- Traffic Impact Study is in draft form
  - Consideration given to people walking and biking as well as people driving.

Station 55 (Rosemont) Incident Analysis | 1/1/11 - 12/31/15

2016 data are estimates

Tualatin Valley Fire & Rescue

Total Incidents in Station 55 First Due Area*	1,923
63% of incidents had at least one unit dispatched as Code 3	
Total Responses (units dispatched)	2,437

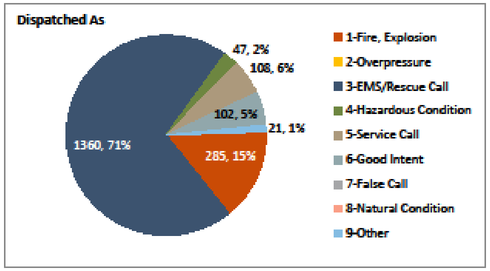
Approximate Incidents per Day: 1

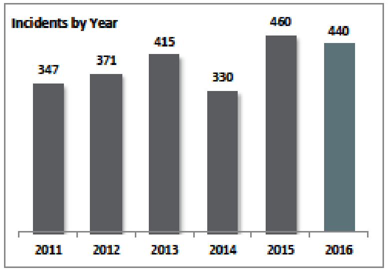
Approximate Responses per Day: 1.3

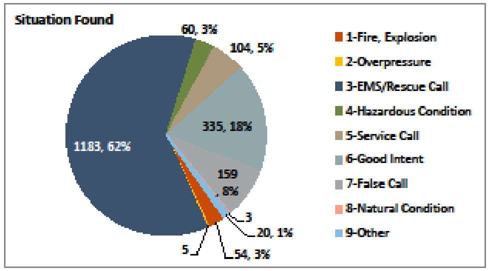
(1,826 days in date range)

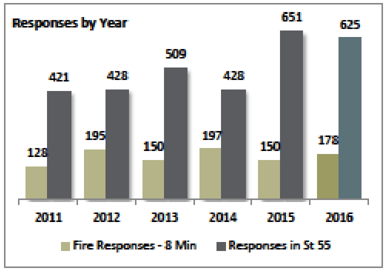
Incidents are a single count of a 9-1-1 call

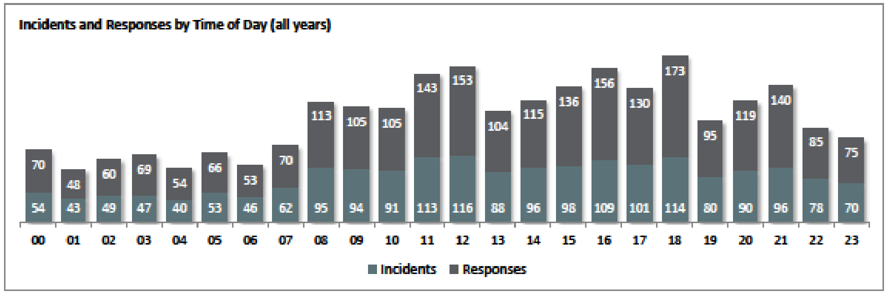
Responses are a count of all units dispatched to an incident, and included cancelled en route

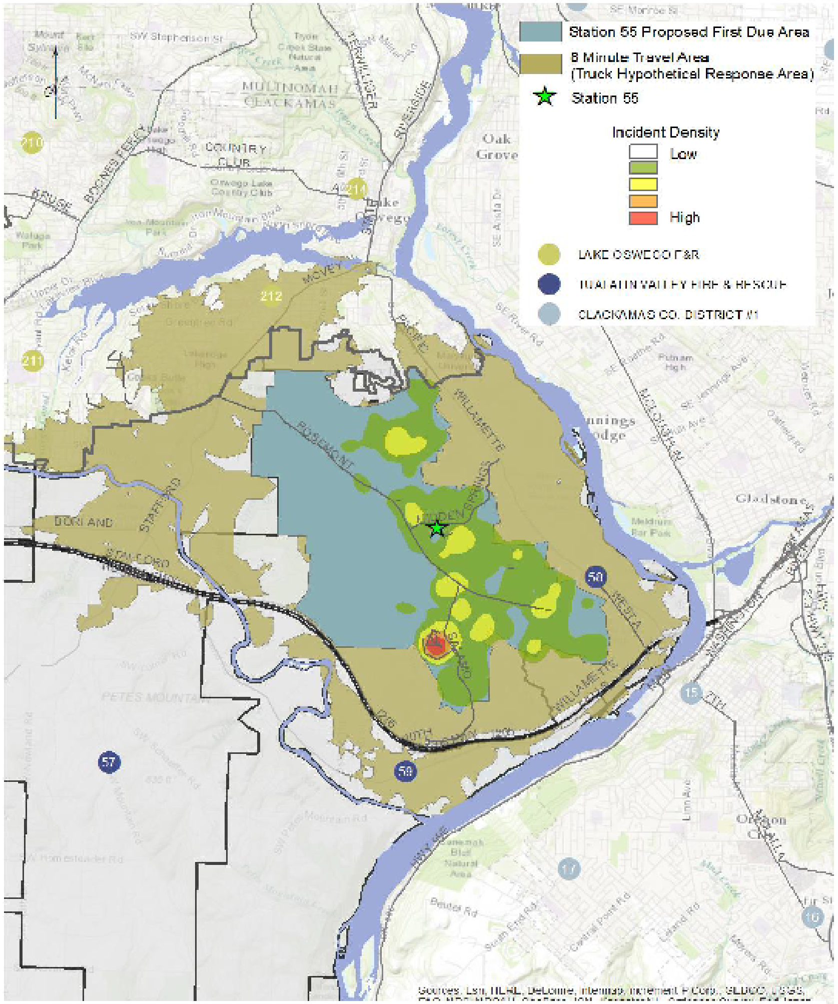












** First Due Area has not been finalized. This is a theoretical service area based on travel time, incident counts, street network, and surrounding stations. This service area may change after additional analysis is conducted.*

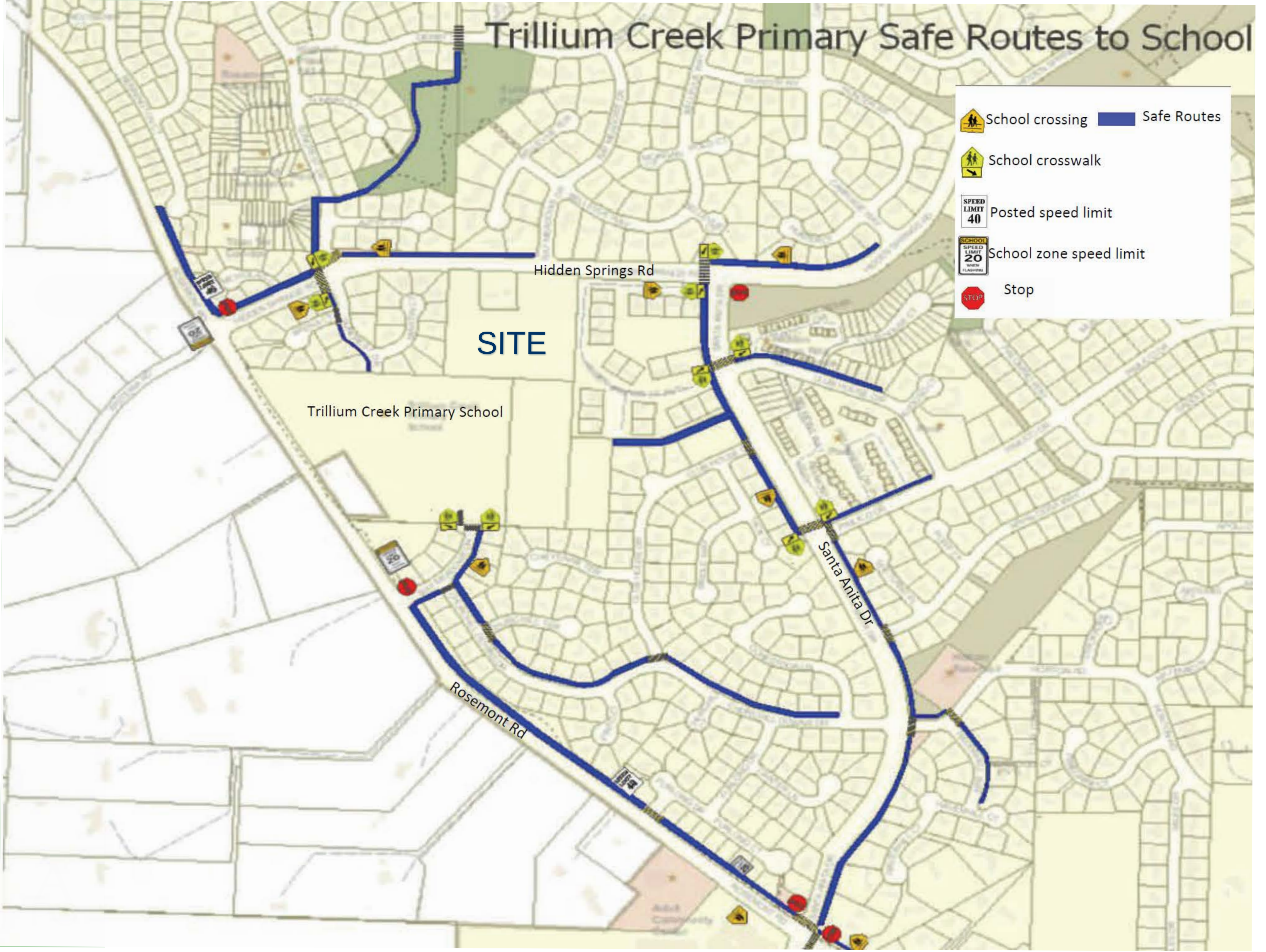
Non-TVF&R units are included in response count to indicate potential traffic effect.

Fire Responses by Year in graph above are units dispatched to fire incident types within the 8 minute travel area, to indicate potential truck responses to fires. This 8-minute area includes other TVF&R first due areas as well as Lake Oswego Fire District.

Mobile Health Care incidents excluded from total incident counts

Test incidents, move ups within boundary are excluded

Trillium Creek Primary Safe Routes to School



TVF&R Station 55

Questions

Meeting Summary
TVF&R Fire Station 55
Hidden Springs Neighborhood Association Meeting
Rosemont Middle School - 7:00 PM, June 21, 2016

SUMMARY

[Please note: the questions were asked throughout the presentation, but for clarity are listed after the summary of the presentation]

Frank Angelo introduced himself, and the team that would be speaking during the presentation, Chief Sherrard, Jeff Hope, and Todd Mobley. He gave a brief overview of the project, including where the site was, site size and how the city application process works. He gave an overview of how the presentation was an official neighborhood meeting for the project and informed everyone that this would be audio recorded (per city requirements) and meeting notes were being taken.

Chief Sherrard introduced himself as the District 2 Fire Chief for Tualatin Valley Fire & Rescue (TVF&R). He gave an overview of TVF&R, its role as a regional service provider across nine cities and three counties and a provider in West Linn. He thanked the citizens of West Linn for supporting a levy which allowed TVF&R to identify 7 sites where TVF&R service goals were deficient (i.e., they were not getting enough fire fighters to the scene for that response type and were not getting units there within response time guidelines). Rosemont Fire station was identified as being a significant gap, and from a response standpoint it's isolated. There is no truck company that is in the area to respond. Chief explained that the Rosemont station didn't have a truck company to respond to a fire in that area, and therefore they needed to add another facility. He described the process TVF&R went through to identify the need for a station and that there is a lot of information that goes into siting a fire station, including analyzing over 100,000 calls to look at the different types of calls, frequency of calls, day of the week, time of day and the necessary actions for that type of call. TVF&R also looked at the road network; the type of roads, expected growth etc., which all add to response time.

Chief then talked about the features of Station 55. It would include a fire truck company (a ladder truck), which is specialized equipment is used for structure fires and for more complicated calls like auto extrications. It's being built for the long term, expected to be staffed with 4 people, but can house up to 6 to accommodate potential future growth for the station. The station will have one ladder truck, but designed to have flexibility for extra apparatus'. There will be a community room, which can be used by public / non-profit groups for free, and is a way for TVF&R to be a part of the community. Chief Sherrard explained that the station will be designed to "fit in" to the neighborhood, and only use sirens when they absolutely have to, so you don't typically see or hear the fire stations. The capacity of the station will not be based on a high call rate (expecting between 1-2 calls a day from this location) and is instead based on the need for TVF&R to get to the area quickly because of the topography and road networks of West Linn. TVF&R also needs to get enough people there for the larger structure fires. Most of the calls are between 8AM – 6PM, when people are out doing things, and it's expected that the new station would have similar call distribution.

Questions were taken and then Frank Angelo talked about the City Review process. He explained that this is the formal neighborhood meeting, to provide information to the neighborhood to identify potential issues before TVF&R submits the application. Per city code, the meeting is being recorded (audio) and notes are being taken. Frank identified the site size and that the site is in the R-10 zone, which requires a public facility to go through a conditional use and design review process. The city has 30 days to review the application. Once deemed complete, a Public Hearing will be scheduled at the next Planning Commission meeting. Frank explained that if you received written notice for this meeting you will also receive notice for the Public Hearing.

Frank then introduced Jeff Hope. Jeff Hope introduced himself as the lead designer from Ankrom Moisan Architects. Jeff showed elevations and the site plan for the fire station, noting that the design is similar to other stations in the Tualatin Valley, like Stations 65 and 68. The site is a U-shaped site, and they chose to place the facilities on the east side of the lot. The apparatus bay entrance is directly across from Bay Meadows Drive. Jeff described how the drive-thru bay works, and that the apparatus return is coming in through the back side of the bay, which is also being used as public parking. Jeff explained where the community room was and that one of the challenges of the site is the slope (sloping to the south and to the east), and how to integrate the retaining wall into the site. Jeff described that overall the fire station has a residential feel, and is utilizing all residential materials, aluminum windows, cement boards, metal roof, and exposed wood at the porches.

Questions were taken and then Todd Mobley introduced himself from Lancaster Engineering and explained that they prepared an initial transportation study that was submitted for the pre-app and based on what is heard here TVR&F will revisions for what will be submitted with the conditional use application. Todd explained the different traffic generation expected from the fire station. As a whole, fire stations are not big traffic generators. Shift change will be the largest concentration of trips, at 7 AM, and this is pretty minor. Call response is expected to be low at 1-2 calls per day, so that is a small concentration of trips. The use of the community room generally happens in the evening (activities generally take place after work hours) so the traffic generated by the community room happens after the evening peak hour, therefore it will have little impact on the volumes on the adjacent streets. Overall, what little traffic is generated is dispersed throughout the day, so there won't be a peak of trip concentration like something like a school would have.

Todd described how the transportation study also looked at vehicle impacts from the station as well as pedestrians and bikes coming to and from the school. For vehicle impacts the study looked at hidden springs between Rosemont and Santa Ana including Bay Meadows and the side accesses. Todd showed a map of Safe Routes to School (from the adopted Safe Routes to School Plan) showing the walking routes to and from the adjacent school in the neighborhood. The map showed that there is some activity through the site, (there is a gate to the property) and TVF&R's plan is to the extent possible, continue pedestrian access through the site.

Questions were asked and then Frank thanked the neighborhood association for letting TVF&R come in and talk about the project and informed the room that they would take the display boards (with pictures of the proposed site plan) outside of the room so that the neighborhood association meeting could continue and any additional questions could be asked. Frank, Jeff, Todd, Bruce, Chief Sherrard and additional firefighters remained onsite to answer questions.

QUESTIONS

Q = Question by citizen
A = Answer by TVF&R representative
CC = Comment by citizen
CT = Statement by TVF&R representative
Additional details added in [ ] only when necessary for clarification

Q. What is the approximate size of the community room?
A. 590 sq. feet.

Q. How many people can it hold?
A. Approximately 20 people

Q. You said you anticipated 2 calls a day, will those 2 calls be for house fires, building fires or medical emergencies? What will the 1-2 calls be?
A. A majority of the calls across the district are medical call in nature. About 80 % of the calls served are medical responses. That's why every apparatus has at least 1 medic on board and they carry advance life support equipment and drugs they might need. We expect that this would continue to be the trend.

Q. Do you get paid for those calls by insurance?
A. That gets complicated. The Fire Department gets paid through property tax. But does have an arrangement with AMR for cost recovery.

Q. You don't bill for medical emergencies?
A. The short answer is no. Everything the Fire and Rescue does is paid for by property tax (from a fire and EMS standpoint). When it comes to who actually takes you to the hospital that is different. In Clackamas County the primary transport service is AMR (American Medical Response) each county has their own ambulance service area. However, who takes you to the hospital is different. AMR is the transport agency in the region. TVF&R is a sub-contractor to AMR. We have a medic unit at the Willamette Fire Station, which is basically an ambulance, so when AMR doesn't have a crew close enough to service the call then they send TVF&R and then it's billed to insurance.

Q. The primary purpose of the station is to add a fire truck to an area that doesn't have one?
A. Two fold – first is to add a fire truck to an area that doesn't have one, and second is to bring advanced life support (ALS) to this area. There is one paramedic on the truck with ALS on each truck to sustain life until transport arrives.

Q. Why can't you add another truck/modify other fire stations?
A. We can, but it wouldn't provide the coverage to best serve the West Linn area. Placing the station where we're proposing offers better coverage for the area given the topography and ability to offer services such as ALS quickly. You get far better coverage coming from the top of the hill with a larger piece of equipment than by responding from one corner of the city and having to go up over the hill.

Q. What about old Rosemont station?
A. It is not large enough to accommodate the infrastructure. The proposed location of the fire station is a larger property, and it is in an ideal location to best serve the city.

Q. When you're comparing the current response times to the potential improved response times, where are the current response times coming from, Lake Oswego?
A. Oregon City, or the Elligsen Road station by Costco in Wilsonville, those are the two closest stations with trucks. Lake Oswego does have a truck but again, none of those trucks can get here in a timely manner.

Q. If you were to use a site from below the hill could you get places fast enough?
A. From a truck standpoint yes, but not from a distribution standpoint. You would lack someone getting to your house in a timely manner, for advance life support needs.

Q. The station would become smaller then, if you got rid of the truck?
A. It wouldn't really alter the size of the station. The trucks are longer than the engines. But it's still based on the size of the rest of the facilities and we have drive-thru bays, where you drive in the front and drive out the back so having a little longer apparatus doesn't really shrink the size of the station.

Q. When you say truck, what exactly does that mean? How many trucks will be at the station?
A. A truck means a fire truck, which is also called a ladder truck that has the big ladder on top. There would only be one. The other type is a fire engine, which is also called an engine, or a pumper which has water and hose.
[Chief then explained a graphic of response time (or travel time – the time it takes to get from the station to the call location)]
NFPA1710 is a national standard that fire stations measure themselves against, and they use 4 minutes. Adding the station makes the majority of the city covered with four minute coverage, where before most of the city was not covered. The key takeaway is the increased coverage in the city for ALS, that medical attention can be administered with a 4 minute response time.

Q. What will the frequency of the trucks and crew be, as far as traffic generators?
A. Crew changes happen at 7AM, so that will have 4 people coming to the station and 4 people coming out. From a response standpoint, expecting an average 1-2 calls a day, where the apparatus will be going out on calls which could be any type of call (lights and sirens, or not). That doesn't include any leaving for training purposes.

Q. Is it fair to say less than 10 trips per day?
A. Generally yes, for staff. And Todd Mobley will talk in a little more detail a little later about traffic generation.

Q. Will you be servicing Stafford area properties as well?
A. There's a portion of the area that the station that is within the coverage, but not what this station is designed for. This station is primarily for West Linn. The station would be able to get down Rosemont Road a ways, but not where they would be servicing. Lake Oswego, Mount Rose and Elligsen Road stations would service part of that area.

Q. Is there any signalization proposed for bicycle or pedestrian traffic?
A. No.

Q. You said you were ready to go to the planning board with the proposal. Does that include construction schedule, cost, all of that stuff?

A. Yes we are getting ready in the next 4-6 weeks to file the application. We're going in for Conditional Use and Design Review, and likely going to Planning Commission Public Hearing in early fall. Construction/building permits will be applied for after that.

Q. Has the sale on the property been finalized?
A. Yes.

Q. What are the sizes of the Rosemont site versus this proposed site?
A. This piece of property is just under 5 acres. And the Rosemont site is maybe larger than 2 residential lots.

Q. Is there any documented impact on home values or insurance rates with a fire station this close? Do insurance companies look at that? Do we get any kind of a discount?
A. Insurance rates/companies do look at that; they look at distance from fire stations and fire hydrants. The city of West Linn has a very good rating with ISO, which is the insurance research company that does the ratings for your property tax. We have done studies and we have not seen any impact on home values. For a more rural setting there might be some savings in home insurance rates.

Q. How long would the construction be going on?
A. About a year, once the shovels hit the ground.

Q. Have you done any traffic studies? The reason I ask is that traffic up here is kind of spastic. Certain times of day it is quite variable.
A. Yes, Todd will talk about those in a bit.

CC. I've lived here for 20 years and there has been a lot of development. Some days in the winter time you cannot go up the hill. If we want to save the kids, we need to get up the hill and have a fire station that is up on the hill.

Q. Part of the traffic generation is from the community center, what about the impacts on other community resources? How much will the community center be used? How would it detract from the facility [the fire station] if it wasn't there?
A. It really depends on the community room, the neighborhood and how much people want to use the room. There's no real way to predict how used the community room would be. We don't use the room for training, so it wouldn't detract our ability to meet our mission other than our desire to be part of the community and provide a space for the community. We built a fire station in the Bethany area in a residential area, we had similar questions about the community room initially. After it was built, they wanted to know why we didn't build it bigger. We want to be a part of the community, and this is a way to stay involved.

CC. I'll just give you two examples of when a community room was a real asset to the community; the scouting food program, where we used a community room as a staging area. I'm also a planner and it's great to use it for neighborhood meetings.

CT. The use of the meeting room will be controlled by the District, so access and who gets to use it when will be scheduled through them.

Q. Have you guys thought at all about the “Big One”? Water especially will be important, is there any space on the property where we could store water? I’m bringing this up in case there is something you could build that would tie into that.
A. We have not contemplated having that type of facility on our property. We are primarily a rescue and response service and we rely on the water rather than provide it. We work closely with our water purveyors; we have over 19 water purveyors within TVF&R and have plotted on all our maps where all the water resources are so we don’t have to solely rely on hydrant system. We would be able to use a large tank.

Q. Thanks for doing the job that you’re doing, and putting this together in a way that is understandable. You said there’s going to be one truck, how many squads?
A. There’s one apparatus or one truck.

Q. So when you go to an ALS you just take a truck?
A. Correct. We have single-person response vehicles, two person medic units and then we have fire engines and fire trucks. Every type of call we have identified what tasks need to be handled and then we utilize vehicles accordingly based on that information. If they only need one person (no smoke, alarm ringing) maybe we only send single person vehicle, if someone falls down we may take a two person medic unit.

Q. What do the two people take?
A. The two people would take a medic unit. The closest medic unit is at the Willamette station.

Q. So the Willamette unit still has to send two person squads?
A. It depends on the call location. If the call comes from next to Station 55 we’re not going to wait for the two-person medic unit from Willamette station. We’re going to send Station 55 to administer ALS. Therefore, we can provide medical attention until others get there (like AMR for transport) versus waiting 15 minutes for AMR for *any* response to get there. We (TVF&R) are not in charge of ambulance service areas. Maybe if we were we’d choose to have an ambulance unit at the fire station, but it doesn’t make sense with the number of calls coming to the area. We have two units that we’re required to have as sub-contractors to AMR in Clackamas County.

Q. As far as apparatus’, what type of apparatus will this station have? I know Tualatin Valley has a Toyota FJ, will the station have one of those?
A. No, this station will have only a ladder truck

Q. So if a structure fire is close by then they can’t really do much?
A. They can’t put water on the fire, but to say that they wouldn’t be able to do much is not true. They carry tons of equipment. We control utilities, do ventilation, do forced entries, command and control functions. There are many, many things besides putting water on fires that the truck companies do.

Q. How high is the retaining wall?
A. Right now the highest is around 20 feet.

Q. How close is it to the existing residential street?
A. 30 feet from the street to the edge of the pavement.

Q. What is the distance from the retaining wall to the property line?

A. 5 feet east, from of the actual setback.

CC. Because I believe the road is actually about 5 feet from the property line. One concern to raise, the road and all the existing greenery is right there. 20 foot high retaining wall, and the size of the wall, will look like a monster, facing my house.

Q. What are the roads there?
A.[Jeff explained where Hidden Springs Road was, where Rosemont was (direction) and Bay Meadow Road, and the existing house driveway]

Q. Is that a wetland in the south?
A. It's a water resource buffer. It is mostly on the School District property, but the buffer does come onto TVF&R's property just a small amount.

Q. Does the site have any wetland issues?
A. There is a wetland buffer for the creek that is barely encroaching.

Q. How big a buffer is that?
A. 65 feet. When it was originally done it was a 50 foot buffer and the city has increased it to 65 feet.

Q. Does that wall have to be that high?
A. It needs to be tall. It will be 20 feet or lower. Most of it will be working on grading and trying to make the site level.

Q. In your application to the city you showed a driveway coming across the property. Is there a reason why you have the driveway as such rather than the original way?
A. The original reason was that we thought we'd save a lot of retaining wall, but when it came down to it we would have ended up with a pretty large retaining wall anyways, so this would minimize site work and keep all the work combined and to one area of the property.

CC. Understand that you have certain facility needs, but it might be a trade-off and I want to stress the importance of fitting the residential character of the area.

Q. Is the conditional use just for the fire station property? Will the remaining property stay R-10?
A. The conditional use is just for the TVF&R site, the residence in the middle will stay R-10.

Q. Do you have plans for the rest of the property?
A. No. There are some easements; for a residential well, and an easement down the far side of the property for school district access.

Q. How much land will TVF&R not be using?
A. Approximately 1.5 acres for the fire station site, so about 3.0 acres are not being used.

Q. The concern has been raised recently about the concern of children crossing the street in the overall area. Many times with fire stations you'll see traffic control or a traffic signal. Will there be any type of crosswalk or traffic control devices?

A. At this point we are not proposing any type of signalization like a fire signal or a pedestrian activated flashing beacon because we want to highlight the existing more controlled crossings for pedestrian traffic to and from the school. The station itself is not really a good route to cross.

Q. But none of those crossings have a signal.
A. That may be true, but they do at least have marked crossings and signing and the management of those is really between the school district and the city of West Linn. We're not adding or subtracting how pedestrians are crossing or how those crossings function.

Q. Would you be opposed to putting that in if the Neighborhood Association requested it?
A. We certainly will make a note of that, that it is a concern. That is what this meeting is about, hearing concerns like that. We've had preliminary discussions with the school district but we want to make sure that anything we do will be to support their already in place Safe Routes. We're not looking to create a different route for those kids to take, if there is a possibility to augment existing routes and doing something similar to what you're talking about, that is definitely possible to look at. Frankly, we don't want to highlight that [a crossing in front of the fire station] as a crossing to the school because once they get to the school that is not the best facility there and the district does not want to encourage that.

Q. What about putting in a sidewalk on the south side of Hidden Springs, just as they have on the north side, so they can walk down safely.
A. Yes but what we didn't want to do is start to highlight a route to and from school when that's not how the district wants things. As far as the sidewalk, that is a possibility.

Q. What I've noticed especially at Santa Anita and Hidden Spring you'll be sitting trying to make a left hand turn, if a fire engine is coming out, I think a yellow warning signal at that location would be useful.
A. Right, we can look at that. There is also an actual controller that stops all traffic lights while the fire truck is coming out of the station that forces everyone to stop while the fire truck is trying to get out. We can take a look at putting in a sort of warning. We have put in a station activated flasher at Station 68, so we have done that sort of thing in the past.

Q. There are certain times of day when there is traffic all the way from Rosemont to Santa Anita, when school is out. If you need to get out how are you going to get through that intersection?
A. If one side of the street is blocked then we would go into the oncoming traffic side and then utilize sirens to clear a path.

CC. Both lanes are full, coming and going! There's no place to get out. If you were watching it every day you would know that.
CC. If you look at the traffic study numbers there are multiple routes. If you look at the study, it's very thorough, looking at peak periods.
CC. [woman explaining back street route] is that the route you're going to take instead?
A. I'm not familiar enough with the local streets to know per say, but I will say that our trucks take the most expeditious routes to get to the call.

Q. But that's what I'm concerned about, that they aren't going to be able to get there fast enough. They are putting in 50 new homes there on Rosemont that aren't part of your traffic study. Because by state-law they're not allowed to include land that's coming up for development, I don't think intersections on Rosemont are part of your traffic study, and some of those areas are going to be developed soon.

A. We do look at things like growth rates, and including things like that in the model accounts for things that are in the pipeline, so we can captures things like that. As a general rule we [TVF&R] try to use the largest street possible because typically the travel speeds and the ability for us to navigate due to congestion is better for us. So residential streets have more factors (cars parked on streets, children playing). Sometimes we do have to go through those, but as a general rule we try to use large streets rather than residential streets.

Q. It looks like you have three truck bays, how many trucks will you have?
A. There's this drive through bay and a half bay.

Q. You'll have one truck there?
A. There's one drive through bay. [Explains how the truck drives through one entrance and exits another]. There is a half bay, which you do not drive through, you have to back in. This is an option for the future; if we need something down the line, we will have room for a reserve apparatus

Q. So the two trucks will be using Hidden Springs Road to back up?
A. No. If we were to utilize the half bay, which again, we're not planning on right now, they would pull in and they have a turnaround area where they would have room to back in, so they would never have to back in from the street.

Q. The retaining wall…it just seems that you have more land there to take advantage of and there's less of an impact. You might have a better chance of appeasing people is you reconsider the retaining wall. You might consider moving the parking, slide the fire house forward to change the gradient.
A. You have a 60 foot apron here, so that is what is setting the front so there's enough room for the truck to be out not blocking the sidewalk, so that is what setting that down where it is.
We've lined up the face of the station with Bay Meadow Court.

Q. I hope that we engineer the retaining wall so that it can withstand the Cascadia Earthquake so that the fire station is still there!
A. Fire stations are essential facilities designed to withstand such things.

Q. Could access to Bay Meadows Court provide a way for the trucks to back in rather than driving through?
A. No.

Q. The residential aspect of that. It is zoned R-10, you're not doing a zone change, you're getting a conditional use for the fire station, but you have no plans for the rest of the property. Is the rest of the property not developable?
A. I don't know if it is not developable, but there are easements going through impacting the property.

Q. If you want to expand the fire station would that require you to go through another design review process or just a modified conditional use permit?
A. Probably a modified conditional use permit.

Q. Are there any streets or access ways that are not going to be put in as a result of this property not being developed as a residential use?
A. Not that we are aware of.

Q. Would TVF&R consider putting a cell tower or TV tower? Can you write it into the application that you won't.
A. We're not planning on putting a cell tower or TV tower in.

Section 4

Attachment B: Pre-Application Conference Meeting Summary Notes

City of West Linn Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656.4211 • Fax 503.656.4106 • westlinnoregon.gov

PRE-APPLICATION CONFERENCE

THIS SECTION FOR STAFF COMPLETION

CONFERENCE DATE:	**TIME:**	**PROJECT #:**
STAFF CONTACT:		**FEE:**

Pre-application conferences occur on the first and third Thursdays of each month. In order to be scheduled for a conference, this form including property owner's signature, the pre-application fee, and accompanying materials must be submitted at least 14 days in advance of the conference date. Twenty-four hour notice is required to reschedule.

Address of Subject Property (or map/tax lot): 21E23CD12301

Brief Description of Proposal: New Tualatin Valley Fire & Rescue station (Station 55)

Applicant's Name: Siobhan Kirk, Tualatin Valley Fire & Rescue

Mailing Address: 11945 SW 70th Avenue Tigard, Oregon 97223

Phone No: (503) 259-1219 Email Address: siobhan.kirk@tvfr.com

Please attach additional materials relating to your proposal including a site plan on paper <u>up to 11 x 17 inches in size</u> depicting the following items:

- North arrow
- Scale
- Property dimensions
- Streets abutting the property
- Conceptual layout, design and/or building elevations
- Easements (access, utility, all others)
- Access to and from the site, if applicable
- Location of existing trees, highly recommend a tree survey
- Location of creeks and/or wetlands, highly recommend a wetland delineation
- Location of existing utilities (water, sewer, etc.)

Please list any questions or issues that you may have for city staff regarding your proposal:

Access points to Hidden Springs Rd. / Natural Resource requirements / pedestrian connections

By my signature below, I grant city staff <u>right of entry</u> onto the subject property in order to prepare for the pre-application conference.

Siobh m Kir, Tualatin Valley Fire & Rescue 4-28-2016

Property owner's signature Date

Property owner's mailing address (if different from above)

Angelo planning group
LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date: May 3, 2016

To: West Linn Planning Department

From: Frank Angelo, Principal

cc: Siobhan Kirk, TVF&R
Bruce Baldwin, AKS Engineering
Todd Mobley, Lancaster Engineering
Jeff Hope, AMA

Re: TVF&R Station 55 Pre-Application Conference – Applicant Questions

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Background

As we previously discussed with West Linn staff, the TVF&R Station 55 site (Hidden Springs) is zoned R-10. A Fire Station is allowed as a Conditional Use (listed as a Public Safety Facility use – Code Section 11.060.3). This will require a hearing before the West Linn Planning Commission. The land use application will address, at a minimum, the following sections of the Code:

- Section 55 Design Review
- Section 60 Conditional Uses

A Neighborhood Meeting will be required (Section 99.038) because non-residential uses over 1,500 square feet are required to conduct a Neighborhood Meeting. We have contacted the Hidden Springs Neighborhood Association and our meeting will be held on Tuesday, June 21, 2016 at the HSNA monthly meeting. We are in the process of preparing the required property / site notices and will mail them out and post the site in time to meet the City's requirements.

Pre-Application Conference Questions

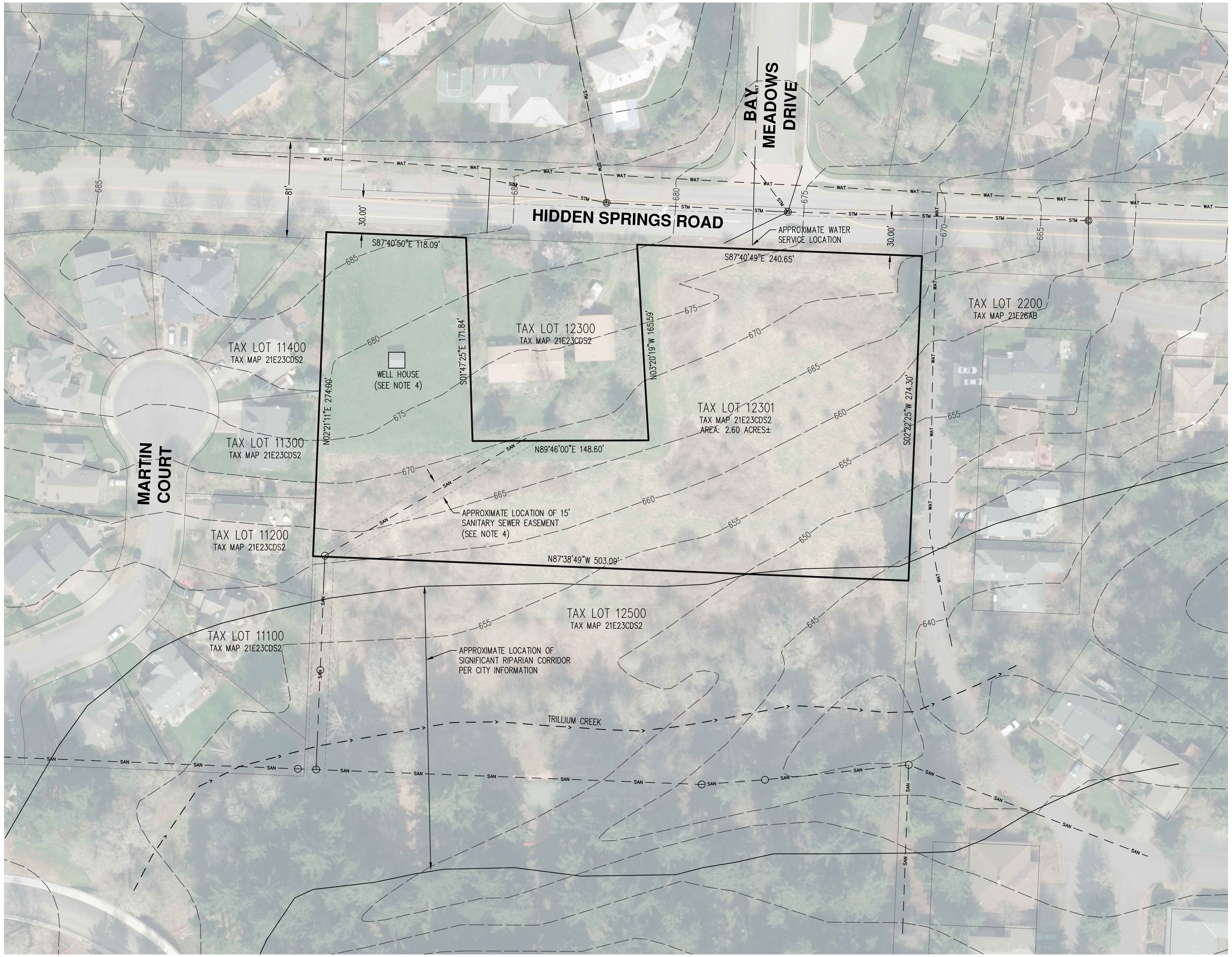
We have provided the required information for the Pre-Application Conference – site plan, elevations, draft traffic report, existing conditions, etc… In addition to the standard questions related to development requirements and City review procedures, we have the following questions that we would like to discuss with staff at the Pre-Application Conference:

1. We would like to confirm that the site access locations are acceptable.
2. Please confirm what improvements or right-of-way dedications will be required on Hidden Springs Road.
3. Please confirm that the setbacks shown are correct.
4. Will the eaves of the buildings be allowed within the building setbacks?
5. Will retaining walls be allowed within the building setbacks?
6. Is there a maximum height restriction for retaining walls? If so, are there different requirements for walls within and outside of the building setbacks?

7. Please confirm the parking requirements for the development.
8. Are there any known availability/capacity constraints/issues with utilities/services (i.e. sanitary sewer, water, stormwater, etc.)?
9. Is the stormwater facility discharge pipe considered public or private? An easement over the adjacent property to the south will be needed for stormwater discharge. Is this to be a public or private easement?
10. The school district owns the adjacent property to the south and previously completed a wetland delineation. The DSL wetland delineation concurrence has expired. Will the City still allow us to use this delineation for the purposes of our project? At the time the school district developed, the wetland buffer requirements were 50' which is what the school district provided as part of their project. It appears that the City has since changed the buffer requirements to 65'. Since the resource is on the school district property and the buffer was previously provided, does that stand for our project or do we need to provide an additional 15' of buffer? Please confirm wetland buffer requirements.
11. Are there any other environmental zones or overlays for this property?
12. Stormwater discharge pipe will need to be located in a portion of the wetland buffer. This will necessitate temporary construction impacts to install the pipe, and a small permanent impact for rip-rap outlet protection. Please confirm that this is acceptable, what the permitting requirements are, any mitigation, etc.
13. Please confirm whether on-site stormwater detention will be required for this project.
14. Are there any City access/easement requirements for the public sanitary sewer manhole located in the SW corner of the property?
15. Please let us know if there are any other issues or site constraints that you are aware of or any special studies or reports that will be required for this development application.

Thank you and we look forward to meeting with staff at the Pre-Application Conference. If you have any questions prior to the Conference, please contact me at 503-227-3664.

Attachments: Tax Map
Existing Conditions Figure
Site Plan
Building Elevations
Draft Traffic Report



SCALE 1" = 50 FEET

50 0 20 30 40 50

NOTES:

1. PROPERTY LINES, RIGHT-OF-WAY LINES, CONTOUR LINES, AND UTILITY LINES SHOWN ARE CONSIDERED APPROXIMATE AND ARE BASED ON GIS INFORMATION PROVIDED BY OTHERS.
2. CONTOUR INTERVAL IS 5.00 FEET. (NAVD 88 DATUM)
3. THIS MAP IS FOR FEASIBILITY MAPPING PURPOSES ONLY AND IS SUBJECT TO CHANGE.
4. RECORD DRAWINGS FROM GHD INC. DATED 6/14/2013 WERE PROVIDED BY OTHERS AND SHOW A PROPOSED 15' SANITARY SEWER EASEMENT (AS SHOWN ON MAP). DRAWINGS ALSO MAKE A NOTE OF AN AGREEMENT FOR EASEMENT PER DOC. NO. 89-58019 FOR THE WELL HOUSE TO BENEFIT TAX LOT 12300, EXACT LOCATION IS UNKNOWN.
5. THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY. NO TITLE RESEARCH HAS BEEN DONE AT THIS TIME.

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD STE 100
TUALATIN, OR 97062
P: 503.563.6151
F: 503.563.6152
aks-eng.com

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FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

TVFR STATION 55
ROSEMONT

WEST LINN **OREGON**
TAX LOT 12301 CLACKAMAS COUNTY TAX MAP 21E23CDS2

PRELIMINARY FEASIBILITY BASE MAP

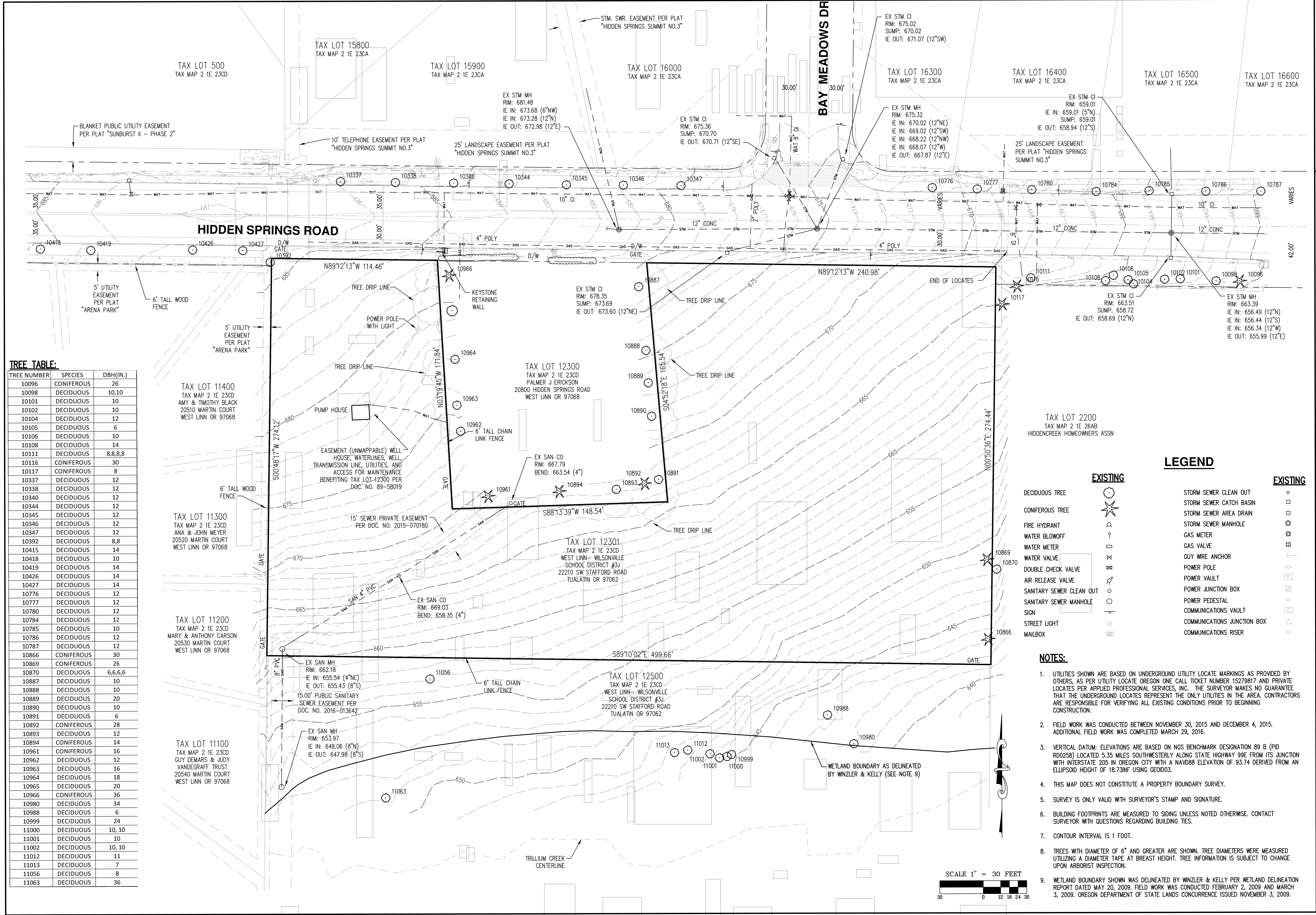
DESIGNED BY:
DRAWN BY: MSK
CHECKED BY: BRB/JN
SCALE: AS NOTED
DATE: 08/05/2015

REVISIONS

JOB NUMBER
4757

SHEET
01

AKS DRAWING FILE: PRELIM-EXCOND.DWG | LAYOUT: LAYOUT1



TREE TABLE:

TREE NUMBER	SPECIES	DBH(IN.)
10096	CONIFEROUS	26
10098	DECIDUOUS	10,10
10101	DECIDUOUS	10
10102	DECIDUOUS	10
10104	DECIDUOUS	12
10105	DECIDUOUS	6
10106	DECIDUOUS	10
10108	DECIDUOUS	14
10111	DECIDUOUS	8,8,8,8
10116	CONIFEROUS	30
10117	CONIFEROUS	8
10337	DECIDUOUS	12
10338	DECIDUOUS	12
10340	DECIDUOUS	12
10344	DECIDUOUS	12
10345	DECIDUOUS	12
10346	DECIDUOUS	12
10347	DECIDUOUS	12
10392	DECIDUOUS	8,8
10415	DECIDUOUS	14
10418	DECIDUOUS	10
10419	DECIDUOUS	14
10426	DECIDUOUS	14
10427	DECIDUOUS	14
10776	DECIDUOUS	12
10777	DECIDUOUS	12
10780	DECIDUOUS	12
10784	DECIDUOUS	12
10785	DECIDUOUS	10
10786	DECIDUOUS	12
10787	DECIDUOUS	12
10866	CONIFEROUS	30
10869	CONIFEROUS	26
10870	DECIDUOUS	6,6,6,6
10887	DECIDUOUS	10
10888	DECIDUOUS	10
10889	DECIDUOUS	20
10890	DECIDUOUS	10
10891	DECIDUOUS	6
10892	CONIFEROUS	28
10893	DECIDUOUS	12
10894	CONIFEROUS	14
10961	CONIFEROUS	16
10962	DECIDUOUS	12
10963	DECIDUOUS	16
10964	DECIDUOUS	18
10965	DECIDUOUS	20
10966	CONIFEROUS	36
10980	DECIDUOUS	34
10988	DECIDUOUS	6
10999	DECIDUOUS	24
11000	DECIDUOUS	10, 10
11001	DECIDUOUS	10
11002	DECIDUOUS	10, 10
11012	DECIDUOUS	11
11013	DECIDUOUS	7
11056	DECIDUOUS	8
11063	DECIDUOUS	36

LEGEND

	EXISTING		EXISTING
DECIDUOUS TREE	⊙	STORM SEWER CLEAN OUT	○
CONIFEROUS TREE	✶	STORM SEWER CATCH BASIN	□
FIRE HYDRANT	⚲	STORM SEWER AREA DRAIN	□
WATER BLOWOFF	⚲	STORM SEWER MANHOLE	◎
WATER METER	▭	GAS METER	⊠
WATER VALVE	⋈	GAS VALVE	⊠
DOUBLE CHECK VALVE	⊠	GUY WIRE ANCHOR	←
AIR RELEASE VALVE	⚲	POWER POLE	-○-
SANITARY SEWER CLEAN OUT	○	POWER VAULT	P
SANITARY SEWER MANHOLE	○	POWER JUNCTION BOX	△
SIGN	-o-	POWER PEDESTAL	□
STREET LIGHT	☼	COMMUNICATIONS VAULT	C
MAILBOX	MB	COMMUNICATIONS JUNCTION BOX	△
		COMMUNICATIONS RISER	⬠

NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, AS PER UTILITY LOCATE OREGON ONE CALL TICKET NUMBER 15279817 AND PRIVATE LOCATES PER APPLIED PROFESSIONAL SERVICES, INC. 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 BETWEEN NOVEMBER 30, 2015 AND DECEMBER 4, 2015. ADDITIONAL FIELD WORK WAS COMPLETED MARCH 29, 2016.
3. VERTICAL DATUM: ELEVATIONS ARE BASED ON NGS BENCHMARK DESIGNATION 89 B (PID RD0258) LOCATED 5.35 MILES SOUTHWESTERLY ALONG STATE HIGHWAY 99E FROM ITS JUNCTION WITH INTERSTATE 205 IN OREGON CITY WITH A NAVD88 ELEVATION OF 93.74 DERIVED FROM AN ELLIPSOID HEIGHT OF 18.73INF USING GEOID03.
4. THIS MAP DOES NOT CONSTITUTE A PROPERTY BOUNDARY SURVEY.
5. SURVEY IS ONLY VALID WITH SURVEYOR'S STAMP AND SIGNATURE.
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 BOUNDARY SHOWN WAS DELINEATED BY WINZLER & KELLY PER WETLAND DELINEATION REPORT DATED MAY 20, 2009. FIELD WORK WAS CONDUCTED FEBRUARY 2, 2009 AND MARCH 3, 2009. OREGON DEPARTMENT OF STATE LANDS CONCURRENCE ISSUED NOVEMBER 3, 2009.

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TVFR STATION 55
ROSEMONT

TIGARD
TAX LOT 2301

OREGON
CLACKAMAS COUNTY TAX MAP 2 1E 23CD

EXISTING CONDITIONS PLAN

DESIGNED BY:
DRAWN BY: BJA
CHECKED BY: NSW
SCALE: AS NOTED
DATE: 04/27/16

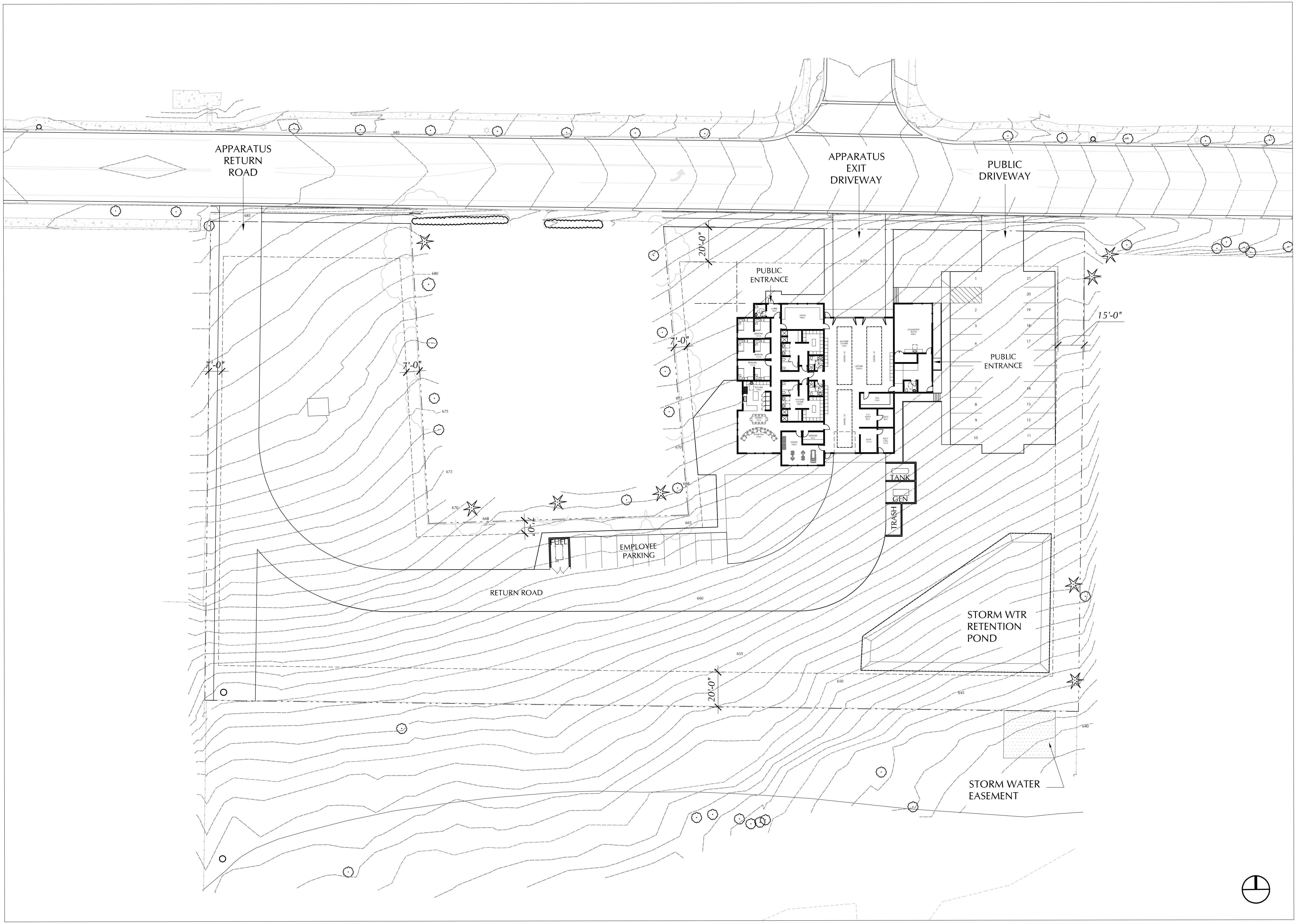
REGISTERED
PROFESSIONAL
LAND SURVEYOR
Nick White
OREGON
JANUARY 9, 2007
NICK WHITE
70652LS
RENEWS: 6/30/16

REVISIONS

JOB NUMBER
4757

SHEET
01

AKS DRAWING FILE: 4757 C000 EXCOND.DWG | LAYOUT: LAYOUT1



Ankrom Moisan

6720 SW MACADAM AVE, SUITE 100
PORTLAND, OR 97219
T 503-245-7100

1505 5TH AVE, SUITE 300
SEATTLE, WA 98101
T 206.576.1600

TVFR STATION 55-ROSEMONT

HIDDEN SPRINGS ROAD
WEST LINN, OR

PROPOSED SITE PLAN

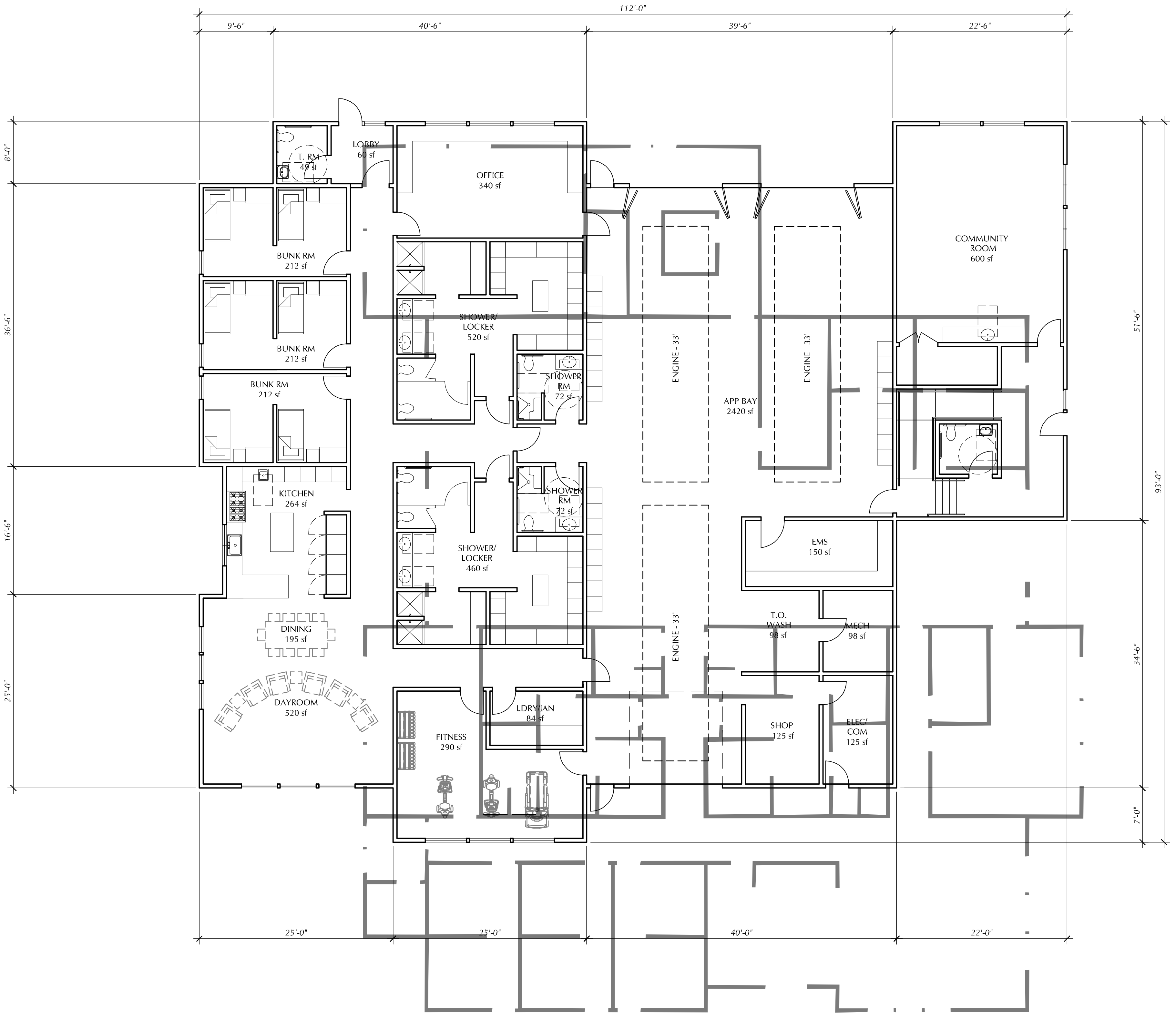
PRE APPLICATION CONFERENCE SUBMITTAL

DATE: 05/02/16

PROJECT #: 1620420

SCALE:

A1.1



Ankrom Moisan

6720 SW MACADAM AVE, SUITE 100
PORTLAND, OR 97219
T 503-245-7100

1505 5TH AVE, SUITE 300
SEATTLE, WA 98101
T 206.576.1600

TVFR STATION 55-ROSEMONT

HIDDEN SPRINGS ROAD
WEST LINN, OR

GROUND FLOOR
PLAN

PRE APPLICATION
CONFERENCE SUBMITTAL

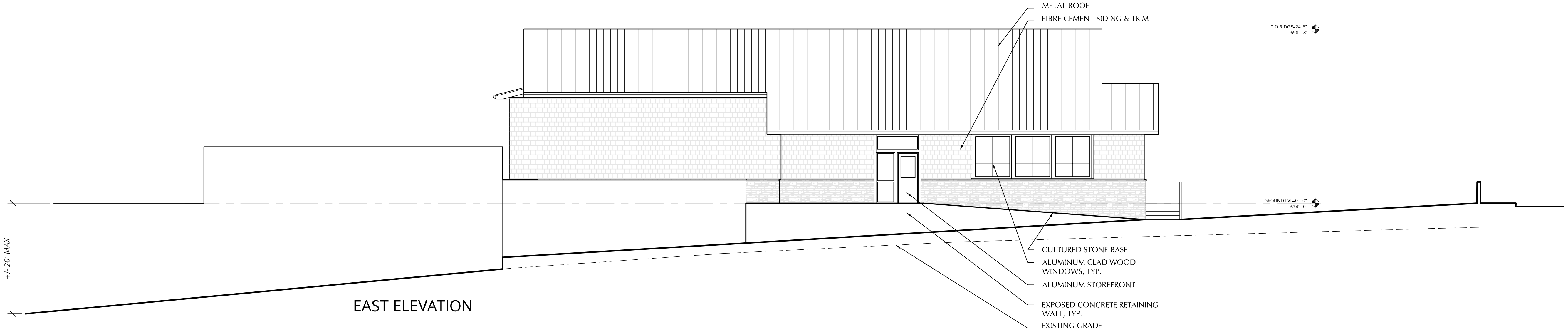
DATE: 05/02/16

PROJECT #: 1620420

SCALE: 1/16"=1'-0"

A2.1

NORTH ELEVATION



EAST ELEVATION

Ankrom Moisan

6720 SW MACADAM AVE, SUITE 100
PORTLAND, OR 97219
T 503-245-7100

1505 5TH AVE, SUITE 300
SEATTLE, WA 98101
T 206.576.1600

TVFR STATION 55-ROSEMONT
HIDDEN SPRINGS ROAD
WEST LINN, OR

BUILDING ELEVATIONS

PRE APPLICATION CONFERENCE SUBMITTAL

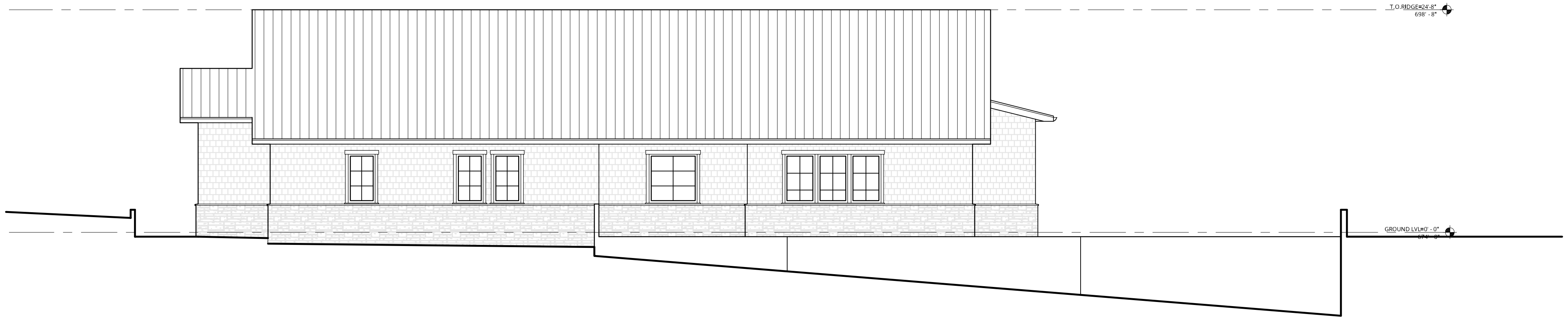
DATE: 05/02/16

PROJECT #: 1620420

SCALE: 1/16"=1'-0"

A3.1

SOUTH ELEVATION



WEST ELEVATION

Ankrom Moisan
6720 SW MACADAM AVE, SUITE 100
PORTLAND, OR 97219
T 503-245-7100
1505 5TH AVE, SUITE 300
SEATTLE, WA 98101
T 206.576.1600

TVFR STATION 55-ROSEMONT
HIDDEN SPRINGS ROAD
WEST LINN, OR

BUILDING
ELEVATIONS

PRE APPLICATION
CONFERENCE SUBMITTAL

DATE: 05/02/16

PROJECT #: 1620420

SCALE: 1/16"=1'-0"

A3.2

City of West Linn
PRE-APPLICATION CONFERENCE MEETING
SUMMARY NOTES
May 19, 2016

SUBJECT: Proposed TVFR Fire Station adjacent to 20800 Hidden Springs Road.

FILE: PA-16-06

ATTENDEES: Applicants: Siobhan Kirk, Frank Angelo, Todd Mobley, Bruce Baldwin, Ty Darby, Tim Woodley, Jenny Jenkins, Darci Rudzinski, Jeff Hepe
Staff: Peter Spir, Darren Wyss, Jennifer Arnold (Planning)

The following is a summary of the meeting discussion provided to you from staff meeting notes. Additional information may be provided to address any "follow-up" items identified during the meeting. <u>These comments are PRELIMINARY in nature</u>. Please contact the Planning Department with any questions regarding approval criteria, submittal requirements, or any other planning-related items. Please note disclaimer statement below.

<u>Site Information</u>

Site Address:	No assigned address (adjacent to 20800 Hidden Springs Road)
Tax Not No.:	Tax lots 12301 of assessor's map 21E23CD
Site Area:	113,272 square feet
Neighborhood:	Hidden Springs (HSRS)
Comp. Plan:	Low density residential
Zoning:	R-10 (Single family residential detached / 10,000 square foot minimum lot size)
Applicable code:	CDC Chapter 55: Design Review CDC Chapter 60: Conditional Use Permit (CUP) CDC Chapter 11: R-10 CDC Chapter 32: Water Resource Area (WRA)* CDC Chapter 28: Willamette and Tualatin River Protection Area permit*

<u>Project Details</u>: The site comprises a grass pasture sloping downhill at approximately 10 percent towards Trillium Creek on the adjacent school property. In the middle of the site, fronting on Hidden Springs Road, is a single family home which will remain and is not part of this application. The applicant proposes a single story hip roofed fire station to be staffed 24-hour a day by a crew of four. A community meeting room is also proposed in the station design. The station, driveways and parking will be to the east of the home. A trail/footpath from the Trillium School property is expected to connect to Hidden Springs Road.

*Staff notes that Trillium Creek and associated wetlands are located on the adjacent school property to the south. The wetland is mapped on the City of West Linn's adopted WRA Map and agrees with the wetland delineation prepared in 2009. The 65 foot WRA setback shall be measured from this wetland boundary. Also there is a 1,074 square foot area comprising a Riparian Corridor and Habitat Conservation Area (HCA) in the southeast corner of the property. If all development and grading can be done outside of those areas (WRA, Riparian Corridor and HCA), then no WRA or Willamette and Tualatin River Protection Area permits are required. Findings to that effect will be needed.

Required parking will rely on the standard used by the Planning Commission for the Failing Street and Willamette Falls Drive TVFR stations: one space for every 28 square feet of community meeting room plus one space per each employee during peak shift. Provided parking may only exceed the minimum amount required by 10 percent. Discussion is needed in the TIA to explain the need for that study per 85.170(B) (2) (c). The TIA was prepared with the assumption that a west driveway would be provided. Please provide an addendum that discusses the elimination of that driveway and its effect on the TIA.

Fire stations and emergency vehicles are exempt from City noise standards per Municipal Code exemption 5.487(5) (a). No acoustic study is required. A lighting/illumination study is needed. A geotechnical report is needed. A tree inventory is required.

Engineering Division Comments

Contact Khoi Le at kle@westlinnoregon.gov or 503-722-5517 for engineering requirements.

Process

For the CUP, address the submittal requirements and provide responses to the approval criteria of CDC Chapter 60, including 60.100. There is a deposit fee of $4,500 plus a $200 final inspection fee. For the Class II Design Review, address the submittal requirements and provide responses to the approval criteria of CDC Chapter 55. There is a deposit fee of $4,000 plus four percent of construction value to a maximum deposit fee of $20,000.

Please provide a limited discussion of the inapplicability of the WRA Chapter per 32.020(A) assuming that development will not occur in the WRA. Please provide a limited discussion of the inapplicability of the Willamette and Tualatin River Protection Area permit per 28.040(S) assuming that development will only occur in areas identified as “Habitat and Impact Areas not Designated as HCAs”. The CDC is online at http://westlinnoregon.gov/cdc.

N/A is not an acceptable response to the approval criteria. The submittal requirements may be waived, but the applicant must first identify the specific submittal requirement and request, in letter form, that it be waived by the Planning Manager and must identify the specific grounds for that waiver.

A neighborhood meeting is required per CDC 99.038. Follow the requirements of that section explicitly. The site is within the Hidden Springs neighborhood. Contact their president is available at HiddenSpringsNA@westlinnoregon.gov.

Once the application and deposit/fee are submitted, the City has 30 days to determine if the application is complete or not. If the application is not complete, the applicant has 180 days to make it complete or provide written notice to staff that no other information will be provided.

Once the submittal is deemed complete, staff will provide notice per CDC Chapter 99 and schedule a hearing with the Planning Commission. Appeals of the Planning Commission’s decision are heard by City Council.

Typical land use applications can take 6-10 months from beginning to end.

DISCLAIMER: This summary discussion covers issues identified to date. It does not imply that these are the only issues. The burden of proof is on the applicant to demonstrate that all approval criteria have been met. These notes do not constitute an endorsement of the proposed application ***or provide any assurance of potential outcomes***. Staff responses are based on limited material presented at this pre-application meeting. New issues, requirements, etc. could emerge as the application is developed. Pre-application notes are void after 18 months. After 18 months with no application approved or in process, a new pre-application conference is required. Any changes to the CDC standards may require a different design or submittal. Substantive changes to the design may require a new pre-application conference.

GENERAL NOTE

All work within the public right-of-way shall conform to the current City of West Public Works Design Standards, Standard Construction Specifications, and Standard Drawings.

GIS BASE MAP INFORMATION

Data Source: West Linn GIS
OGIC Disclaimer: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary date and information sources to ascertein the usability of the information.

ATTENTION

Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center. (Note: the telephone number for the Oregon Utility Notification Center is (503) 232-1987).

811 Know what's below. Call before you dig.

City of West Linn

CITY OF WEST LINN
22500 SALAMO ROAD
WEST LINN, OREGON 97068
WWW.WESTLINNOREGON.GOV
PHONE: (503) 567-0331
FAX: (503) 650-9041

CONSULTANT OR CONTRACTOR

NAME:
ADDRESS:

PHONE:
FAX:

PROJECT NO.:
DESIGNED BY: KLE
DRAWN BY: NMB

CHECKED BY:
DATE: JANUARY 26, 2015

20800 and Adjacent Properties
Hidden Springs Rd

IMPROVEMENT EXHIBIT

REVISION

DATE	DESCRIPTION

COVER SHEET
E1
SHEET 1 OF 1

Section 4

Attachment C: TVF&R Station 55 Natural Resource Assessment; AKS Engineering & Forestry, August 8, 2016

TVFR Station 55
West Linn, Oregon
Natural Resource Assessment

Date: August 8, 2016

Prepared for:
Tualatin Valley Fire & Rescue
Siobhan Kirk
11945 SW 70th Avenue
Tigard, OR 97223

Prepared By:
Stacey Reed, PWS, Senior Wetland Scientist
Kayla Katkin, Natural Resource Specialist
AKS Engineering & Forestry, LLC

Assessor's Information:
Tax Map # 2 1E 23CD;
Tax Lot# 12301

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

Contents

Table

Figures

Appendices

Introduction and Background

The project site is located at the intersection of Hidden Springs Road and Bay Meadows Drive in West Linn, Clackamas County, Oregon (Tax Lot 12301 of Tax Map 2 1E 23CD; Figures 1 and 2). The total project site is approximately 2.61 acres in size. No wetlands or waters were documented on the project site. The boundary of a wetland was delineated on the adjacent tax lot to the south in 2009 by Winzler & Kelly and received concurrence by the Oregon Department of State Lands (DSL) under DSL file number WD# 09-0240. The off-site wetland is mapped as a Locally Significant Wetland on the City of West Linn's Water Resource Area (WRA) map, requiring a 65-foot wide WRA buffer, which extends onto the project site. According to the City of West Linn WRA map, Significant Riparian Corridor is also mapped extending onto the southeastern portion of the project site. Habitat Conservation Area (HCA) is also mapped in the southeastern corner of the project site, but is mapped within the WRA and Significant Riparian Corridor areas.

The project consists of a Tualatin Valley Fire & Rescue (TVF&R) fire station and parking lot. Site development requires temporary impacts within the WRA (and Riparian Corridor) for the installation of a stormwater pipe and minor permanent encroachment for the riprap outfall pad. According to Table 32-1 of Section 32.030 of the City's Community Development Code, stormwater outfalls are allowed in WRA if no reasonable alternative exists. Temporary encroachment within WRA will be restored to pre-project contours and planted with native vegetation. This memo has been prepared to meet City of West Linn Community Development Code Chapter 32 *Water Resource Area Protection*.

Existing Site Conditions

The project site is undeveloped and primarily consists of open, regularly mowed field dominated by non-native grasses. A pump house is located in the center of the western portion of the site. Existing residential tax lots are adjacent to the site to the north, east, and west. Undeveloped forest, including Trillium Creek and associated wetlands are located to the south of the site. The topography on the site slopes south-southeast, toward the off-site wetlands and Trillium Creek.

According to the Natural Resources Conservation Service (NRCS) soil map for Clackamas County, Oregon, and the Clackamas County hydric soils list, the following soil units are mapped within the study area (Figure 3):

- Cornelius silt loam with 8% to 15% slopes (Unit 23C), non-hydric, with 4% hydric Delena inclusions in depressions
- Saum silt loam with 8% to 15% slopes (Unit 78C), non-hydric

Existing Protected Water Features

Lindsey Obermiller, AKS Natural Resource Specialist, conducted a site visit on March 29, 2016, to document site conditions. No wetlands or waters were determined to be present on the project site during the site visit. The site is dominated by a non-hydrophytic vegetation community. No hydric soils are mapped on the site. The 2009 DSL wetland delineation concurrence determined no wetlands and/or waters were present on the site. The 2009 DSL wetland delineation concurrence boundary on the site to the south is shown on the attached Existing Conditions Figure 6. The off-site wetland is a palustrine forested, palustrine shrub/scrub (PFO/PSS) wetland dominated by red alder (*Alnus rubra*), fringed false hellebore (*Veratrum fimbriatum*), soft rush (*Juncus effusus*), and creeping buttercup (*Ranunculus repens*). Trillium Creek flows through the wetland with an approximate 1-foot wide channel.

Extent of Water Resource Area (WRA) and Significant Riparian Corridor

According to Table 32-2 *Required Width of WRA* of Chapter 32.030 of the City's Community Development Code, the width of a WRA varies depending on the type of feature (wetland or water) and the slope adjacent to the protected water resource. Based on the City's criteria, the table below summarizes the WRA protection widths associated with the wetlands and waters delineated to the south of the project site. The slope measurements along each protected water feature are shown on attached Existing Conditions Figure 6. The total area of the on-site WRA is approximately 5,575 square feet (0.13 acres), as shown on Figure 6. Approximately 857 square feet of Riparian Corridor exists on-site beyond the WRA.

Table 1. Summary of Protected Water Resources and WRA Protection Widths

Protected Water Resource	Slope Adjacent to Sensitive Area	Width of WRA and/or Riparian Corridor (feet)
Wetland	<25%	65
Trillium Creek	<25%	100' from OHWM

Existing Condition of the Water Resource Area and Riparian Corridor

The existing condition of the on-site WRA and Significant Riparian Corridor was determined based on the presence of tree canopy and percent cover of native trees, shrubs, and groundcovers. The existing condition of the on-site WRA / Significant Riparian Corridor was documented at 2 VECO plots (Plot A and B). The data sheets for the VECO plots are included in Appendix A and the plot locations are shown on Existing Conditions Figure 6. Representative photos documenting the existing condition of the on-site WRA and Significant Riparian Corridor are included in Appendix B. The WRA / Significant Riparian Corridor on the site were determined to be in *degraded* condition throughout the project site due to the lack of tree canopy and the high percentage of non-native plant species. No trees were present in the project area. Trees were located off-site on the adjacent tax lot.

Project

The Site Plan includes a fire station, parking lot, stormwater quality facility, and stormwater outfall. No impacts to the HCA are required to accommodate this project. Unavoidable permanent and temporary encroachment into the WRA / Significant Riparian Corridor will occur to install the outfall pipe and rip rap pad. The Site Plan is included as Figure 7. Temporarily impacted areas will be restored to pre-project contours and planted with native shrubs upon project completion.

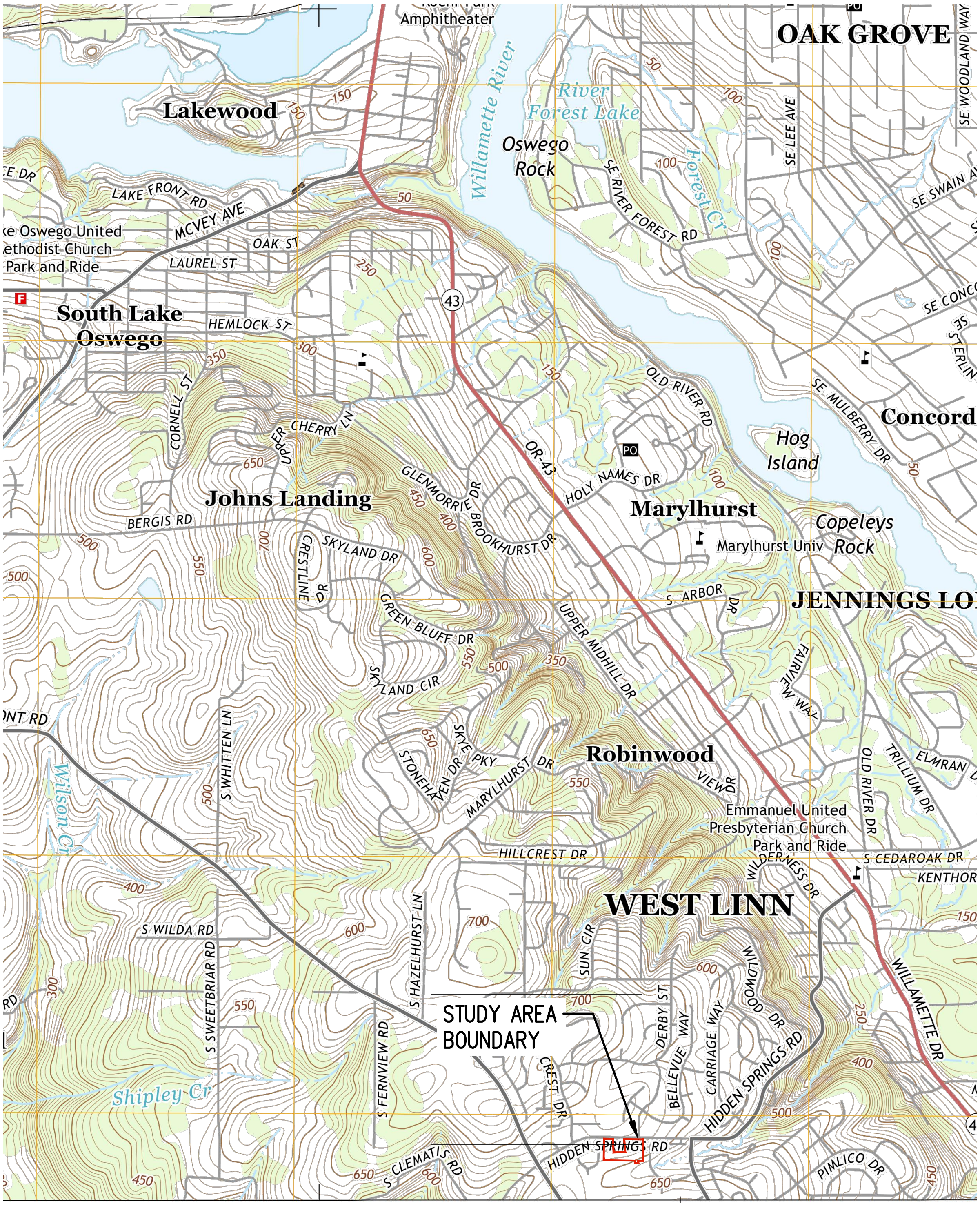
Impact Evaluation and Alternatives Analysis

Installation of the stormwater pipe and outfall within the WRA / Significant Riparian Corridor can be considered an allowed use according to Table 32-1 *Summary of Where Development and Activities May Occur in Areas Subject to This Chapter* of Chapter 32 *Water Resource Area Protection* of the West Linn Community Development Code. There is an existing public storm drainage system in Hidden Springs Road to the north, but it is not feasible to discharge to this system due to topographic constraints. There is an existing storm drainage system in Hidden Springs Court to the east, but it is not feasible to discharge to this system because both the street and storm drainage system are private facilities/ infrastructure that the subject project/ property is not entitled to. The properties to the west are developed residential parcels that do not provide opportunity for stormwater discharge. Therefore, the only reasonable and feasible stormwater discharge location is to the south towards Trillium Creek. Alternative discharge locations to the creek were analyzed. Discharging stormwater outside of the WRA would necessitate discharge onto slopes of approximately 15%, which may lead to erosive effects within the WRA and Significant Riparian Corridor. The proposed discharge location was selected due to the gentle slopes in that area (approximately 7%) and its location outside of the wetland and HCA. While the discharge location does encroach into the WRA, it is the minimal encroachment necessary to discharge onto gentle slopes. An underground pipe will be located within the steeper slopes and the outfall and riprap pad will be located on the gentler slopes. The proposed location of the stormwater outfall is necessary to ensure that the outfall does not have an erosive effect on the WRA or Significant Riparian Corridor, or diminish the stability of the slopes.

According to Table 32-1 of Chapter 32 of the West Linn Community Development Code, no mitigation is required for the approximately 61 square feet of permanent impact in the WRA / Significant Riparian Corridor from the stormwater outfall. The 1,360 square feet of temporary WRA / Significant Riparian Corridor disturbance will be replaced with native shrubs to restore native habitat in the WRA and Significant Riparian Corridor, which is consistent with Section 32.090 of City's Community Development Code.

List of Preparers

Stacey Reed	K. Katkin
Stacey Reed, PWS	Kayla Katkin
Senior Wetland Scientist	Natural Resource Specialist
Report QA/QC	Report Preparation



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: LAKE OSWEGO, OR (2014)

SCALE 1" = 2000 FEET

2000 0 2000

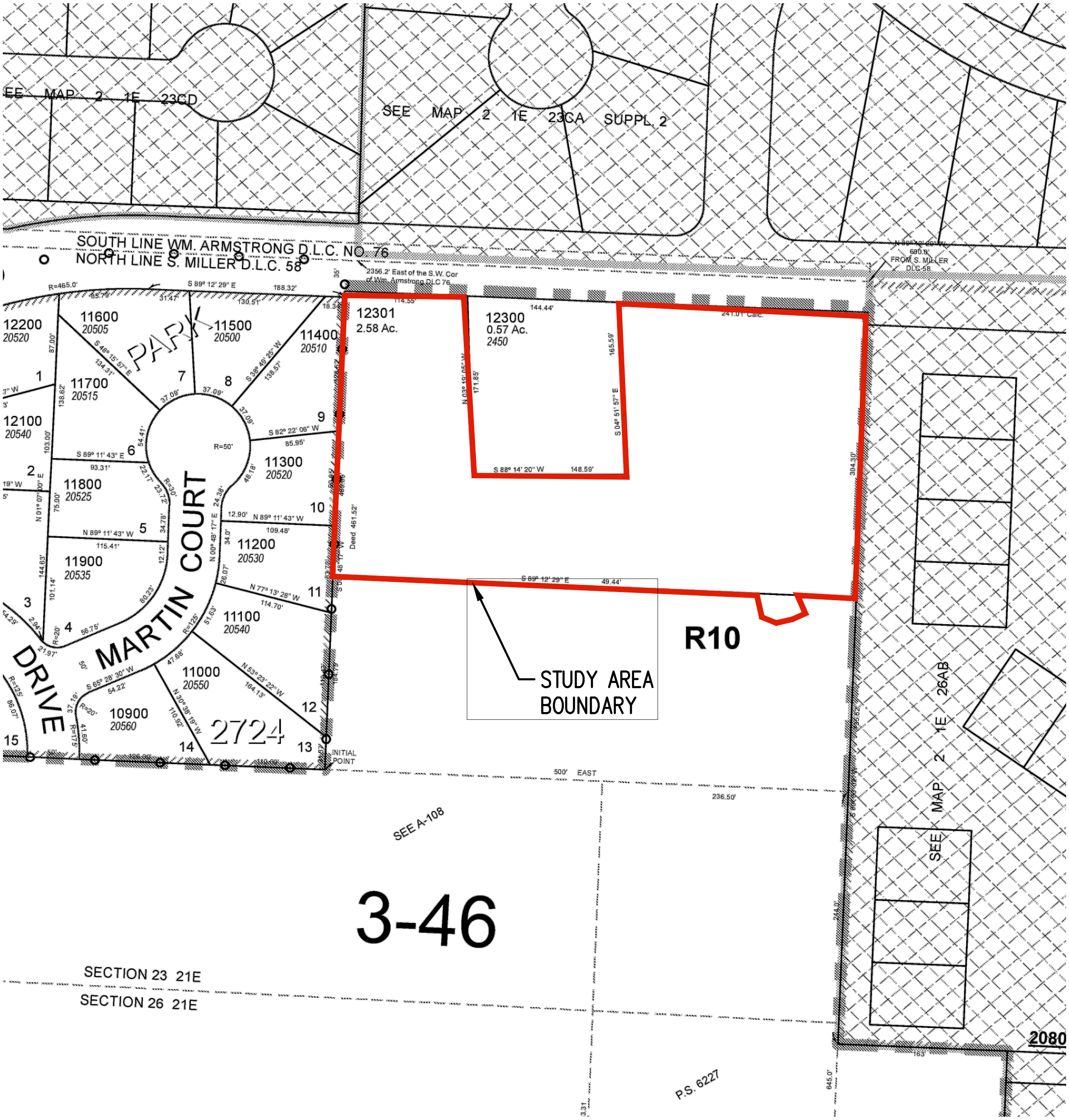
DATE: 8/2/2016

VICINITY MAP
TVFR STATION 55 NATURAL RESOURCE ASSESSMENT

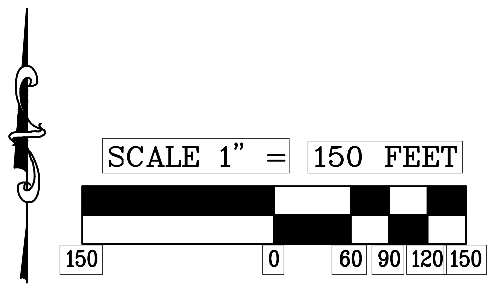
FIGURE
1

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: KMK
CHKD: SAR
AKS JOB: 4757



TAX LOT 12301
TAX MAP 2 1E 23CD
WEST LINN



SCALE 1" = 150 FEET

DATE: 8/2/2016

TAX MAP (MAP 2 1E 23CD)
TVFR STATION 55 NATURAL RESOURCE ASSESSMENT

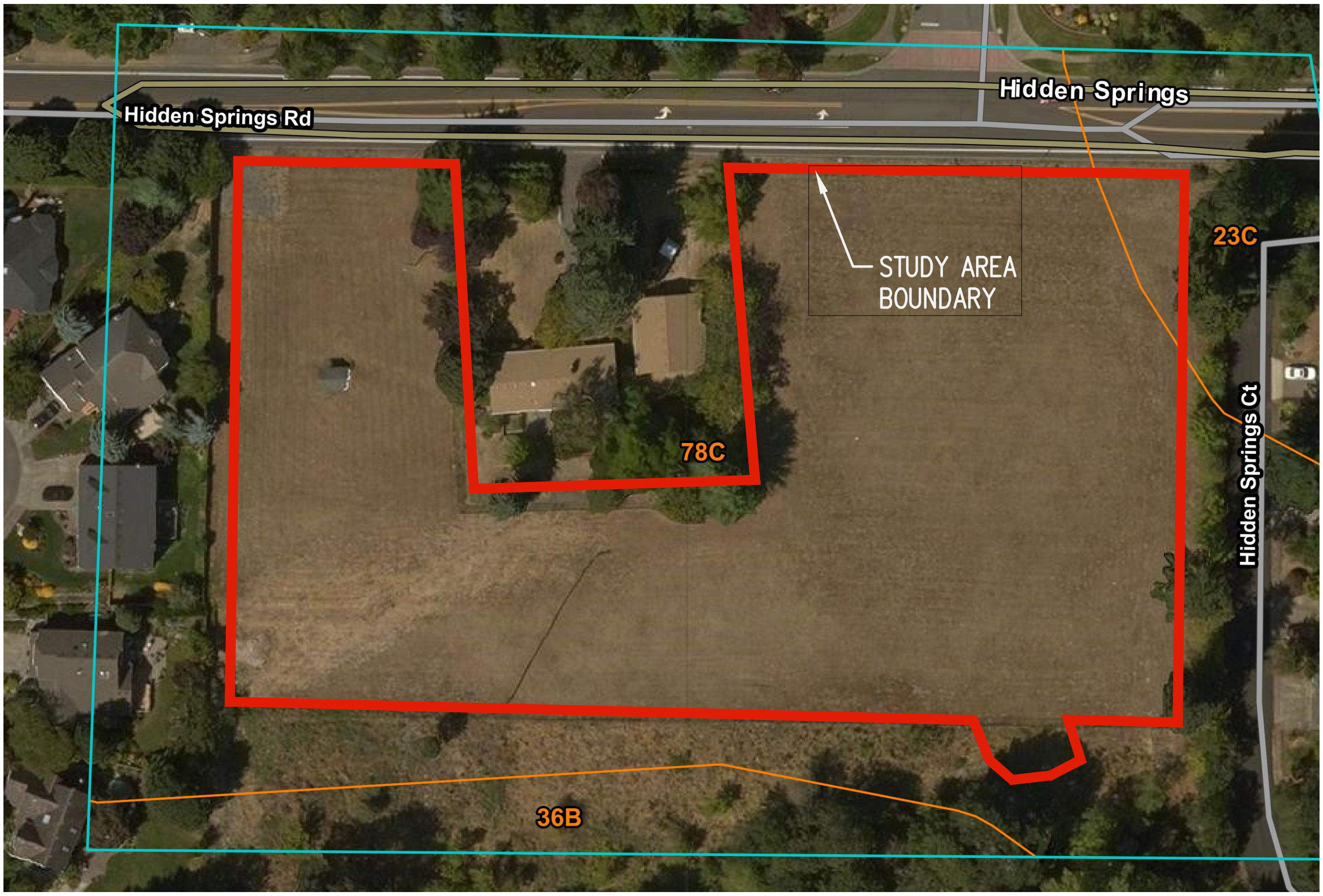
FIGURE
2

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

AKS

DRWN:	KMK
CHKD:	SAR
AKS JOB:	4757

DWG: 4757 NRA FIGURES | FIGURE 2



MAP UNIT SYMBOL	MAP UNIT NAME
23C	CORNELIUS SILT LOAM, 8–15% SLOPES; NON–HYDRIC
78C	SAUM SILT LOAM, 8–15% SLOPES; NON–HYDRIC

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY

SCALE 1" = 100 FEET

100 0 40 60 80 100

DATE: 8/2/2016

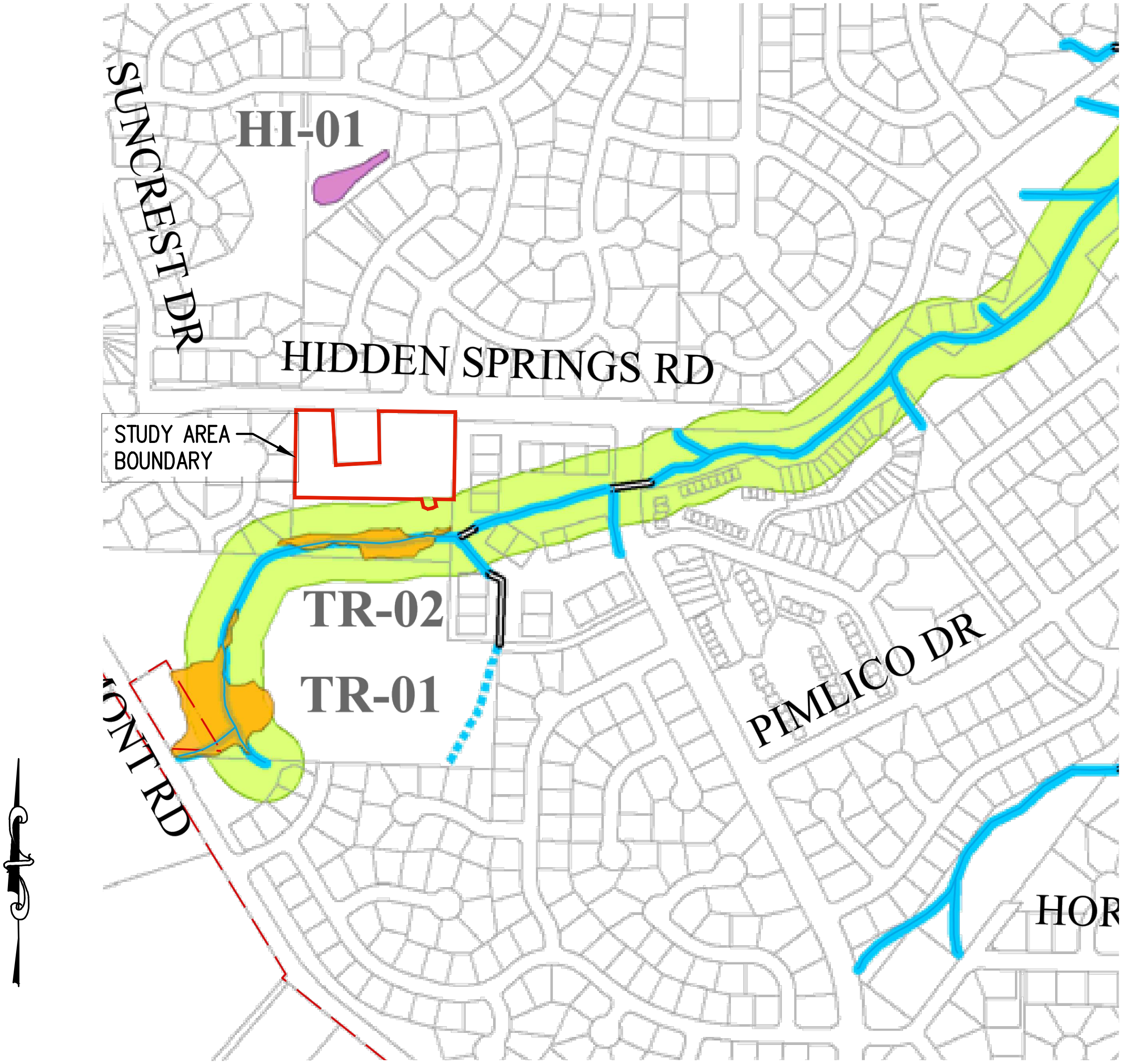
SOIL SURVEY MAP
TVFR STATION 55 NATURAL RESOURCE ASSESSMENT

FIGURE 3

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks–eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: KMK
CHKD: SAR
AKS JOB: 4757

DWG: 4757 NRA FIGURES | FIGURE 3



Goal 5 Significant Riparian Corridors*

- 🟩 Significant Riparian Corridors
- 〰 Streams
- 〰 Ephemeral Stream
- 〰 Piped Segments
- 🟥 Upper Stream Reach of Fish Inventory 2003/2004 Survey

Goal 5 Wetland Inventory**

- 🟧 Locally Significant Wetlands, DSL 2005
- 🟪 Other Wetlands, DSL 2005
- TA-05 Specific Wetland Identifier
- Rivers & Ponds
- West Linn City Limits
- ☐ Taxlot Base Map***

CITY OF WEST LINN
WATER RESOURCE AREA (WRA) MAP
MAY, 2014

DATE: 8/2/2016

SCALE 1" = 500 FEET

500 0 500

CITY OF WEST LINN WRA MAP
TVFR STATION 55 NATURAL RESOURCE ASSESSMENT

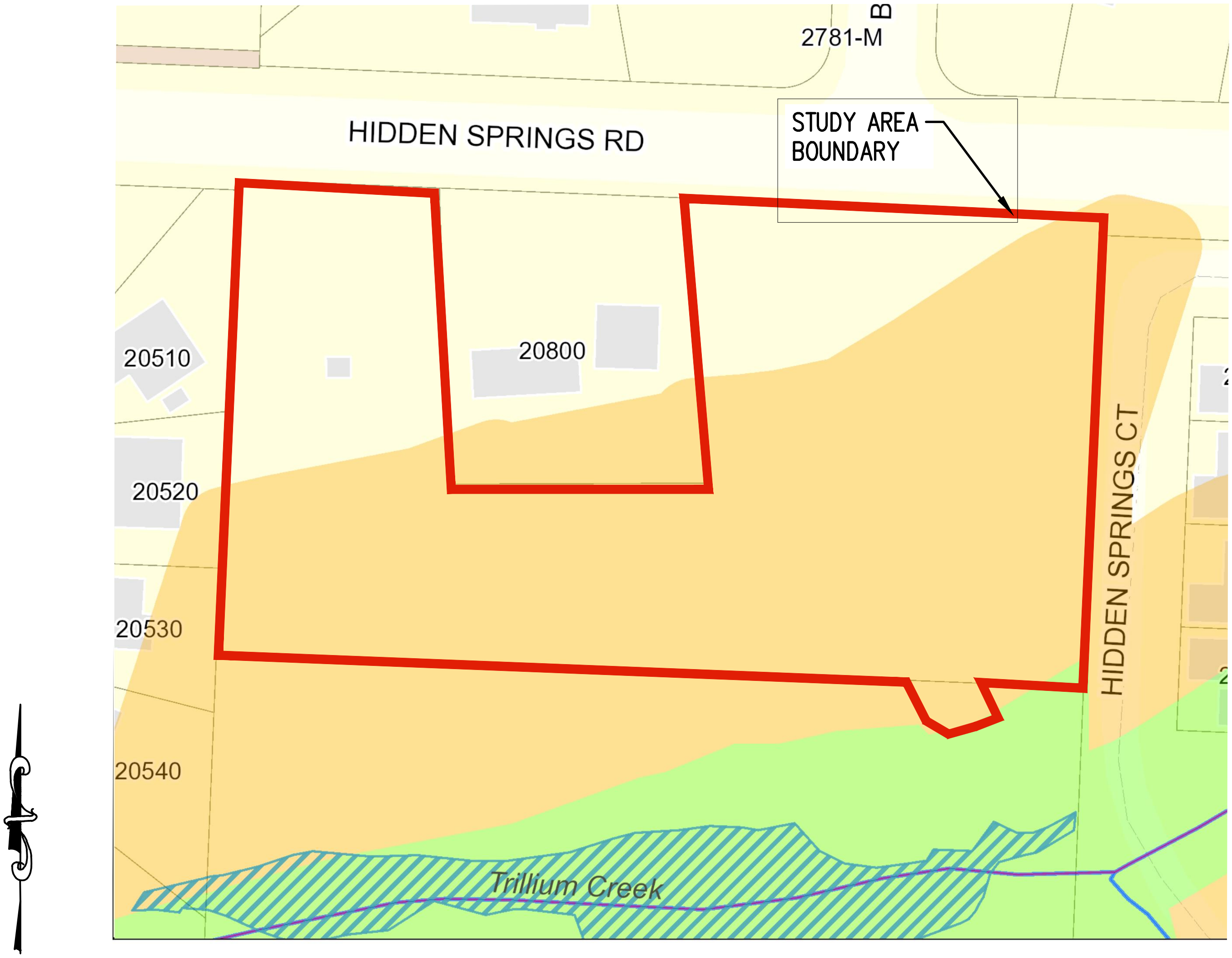
FIGURE
4

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

AKS

DRWN: KMK
CHKD: SAR
AKS JOB:
4757

DWG: 4757 NRA FIGURES | FIGURE 4



Stream Lines

Metro Habitat Protection
Published October 2005

🟩 Habitat Conservation Area

🟧 Allow Development

CITY OF WEST LINN
HABITAT CONSERVATION MAP
OCTOBER, 2005
GIS

SCALE 1” = 500 FEET

500 0 500

DATE: 8/2/2016

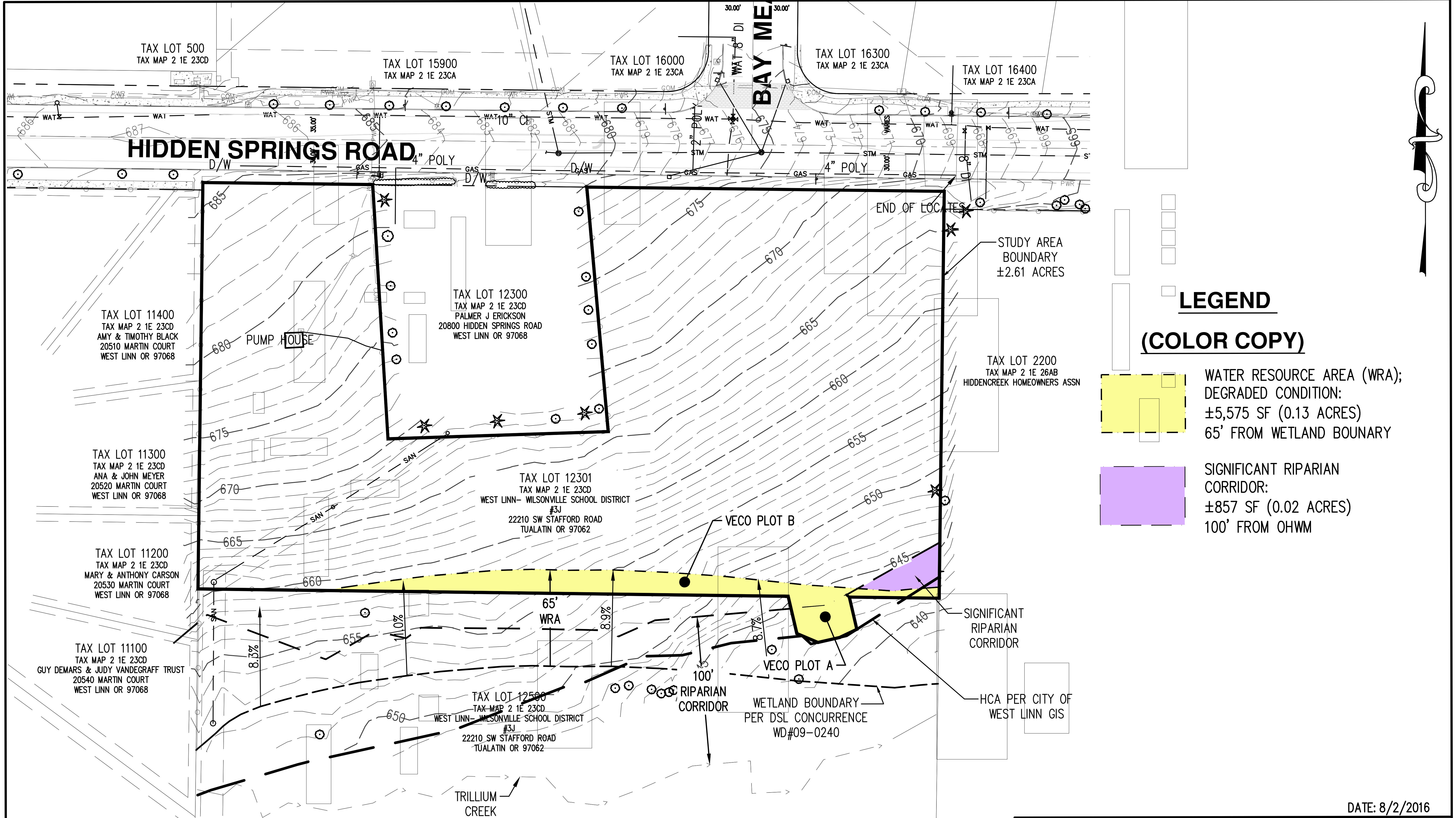
CITY OF WEST LINN HCA MAP
TVFR STATION 55 NATURAL RESOURCE ASSESSMENT

FIGURE
5

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: KMK
CHKD: SAR
AKS JOB: 4757

DWG: 4757 NRA FIGURES | FIGURE 5



LEGEND

(COLOR COPY)

🟨	WATER RESOURCE AREA (WRA); DEGRADED CONDITION: ±5,575 SF (0.13 ACRES) 65' FROM WETLAND BOUNARY
🟪	SIGNIFICANT RIPARIAN CORRIDOR: ±857 SF (0.02 ACRES) 100' FROM OHWM

SCALE 1" = 60 FEET

11x17

60 0 24 36 48 60

DATE: 8/2/2016

TVFR STATION 55
EXISITING CONDITIONS

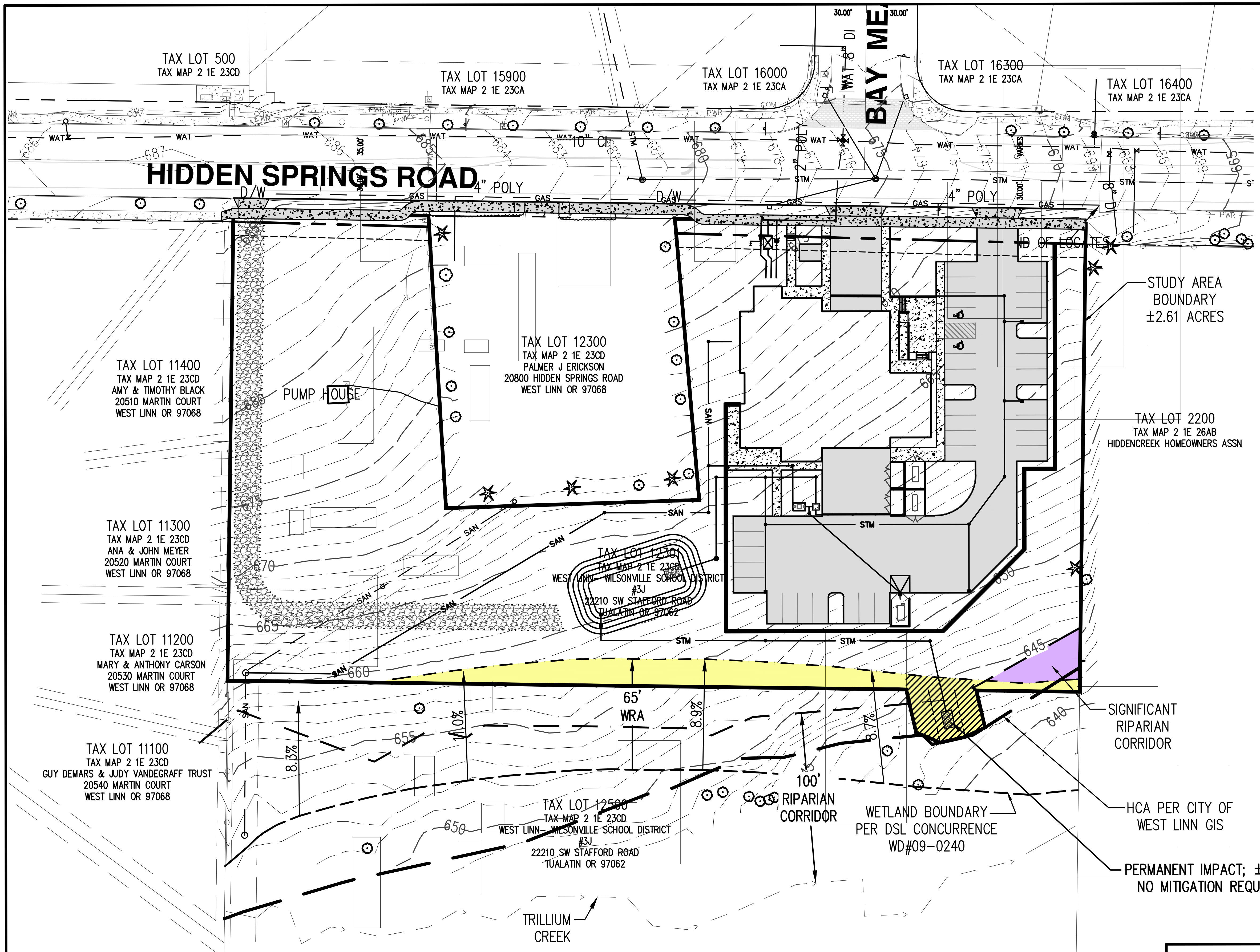
WEST LINN, OREGON

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com

FIGURE
6

DRWN: KMK
CHKD: SAR
AKS JOB:
4757

DWG: 4757 EXCOND AND SITE PLAN | EXCOND



LEGEND

(COLOR COPY)

🟨	WATER RESOURCE AREA (WRA); DEGRADED CONDITION: ±4,154 SF (0.10 ACRES) 65' FROM WETLAND BOUNARY
🟪	SIGNIFICANT RIPARIAN CORRIDOR: ±857 SF (0.02 ACRES) 100' FROM OHWM
▨	TEMPORARY IMPACT: ±1,360 SF (0.03 ACRES) TO BE RESTORED TO EXISTING CONTOURS AND PLANTED WITH NATIVE VEGETATION PER ATTACHED PLANTING TABLE

SCALE 1" = 60 FEET

60 0 24 36 48 60

11x17

DATE: 8/2/2016

TVFR STATION 55
SITE PLAN

WEST LINN, OREGON

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com

FIGURE
7

DRWN: KMK
CHKD: SAR
AKS JOB:
4757

DWG: 4757 EXCOND AND SITE PLAN | SITE PLAN

Appendix A: VECO Data Sheets

Vegetated Corridor (VECO) Condition Assessment for City of West Linn Natural Resource Assessment

Site: TVFR Station 55
Job Number: 4757
Investigators: Lindsey Obermiller
Date: March 29, 2016

Community: Mixed Forest
Location: Southern portion of site within easement
Plot ID: VECO Plot A

Tree species, % Cover, Native, Invasive - 30 foot radius, >5% cover: 2%

*	*Quercus garryana*	Oregon white oak	native	2%

Shrub species, % Cover, Native, Invasive - 30 foot radius, >5% cover: 35%

*	*Oemleria cerasiformis*	oso-berry	native	15%
*	*Rubus armeniacus*	Himalayan blackberry	invasive, noxious	10%
*	*Hedera helix*	English ivy	invasive, noxious	10%

Herb Species, % Cover, Native, Invasive - 10 foot radius, >5% cover: 60%

*	*Agrostis capillaris*	colonial bent	non-native	60%

* Dominant

Total Cover 97%

	Absolute areal cover
% Tree canopy:	**2%**
% Cover by natives:	17%
% Invasive:	20%
% Non-native:	60%
	97%

Corridor Condition: Degraded

Vegetated Corridor (VECO) Condition Assessment for City of West Linn Natural Resource Assessment

Site: TVFR Station 55
Job Number: 4757
Investigators: Lindsey Obermiller
Date: March 29, 2016

Community: Open, mowed field
Location: Southern portion of site, northern side of fence
Plot ID: VECO Plot B

Tree species, % Cover, Native, Invasive - 30 foot radius, >5% cover: 0%

Shrub species, % Cover, Native, Invasive - 30 foot radius, >5% cover: 0%

Herb Species, % Cover, Native, Invasive - 10 foot radius, >5% cover: 60%

*	*Agrostis capillaris*	colonial bent	non-native	40%
*	*Leucanthemum vulgare*	ox-eye daisy	non-native	20%

* Dominant

Total Cover 60%

	Absolute areal cover
% Tree canopy:	**0%**
% Cover by natives:	0%
% Invasive:	0%
% Non-native:	60%
	60%

Corridor Condition: Degraded

Appendix B: Representative Ground-Level Photographs

Photo A. View north of on-site degraded condition WRA.

Photo B. View of western portion of the site and pump house.

Photo C. View of southern portion of the project site. Site is regularly mowed and fenced along the tax lot boundaries.

Photo D. View of Trillium Creek off-site to the south. Channel is approximately 1 foot wide.

Photos taken by Lindsey Obermiller, March 29, 2016

Appendix C: Water Resource Area Re-Vegetation Planting Specifications

Water Resource Area Re-Vegetation Planting Specifications

Planting specifications for the restoration and re-vegetation of 1,360 square feet of temporarily disturbed WRA and Significant Riparian Corridor.

Scientific Name	Common Name	Size*	Spacing/Seeding Rate	Quantity
Shrubs (total 68)				
Cornus sericea	Redosier dogwood	1 gallon	4-5 feet on center	14
Mahonia aquifolium	Tall Oregon Grape	1 gallon	4-5 feet on center	14
Acer circinatum	Vine Maple	1 gallon	4-5 feet on center	14
Sambucus racemosa	Red Elderberry	1 gallon	4-5 feet on center	13
Symphoricarpos albus	Common Snowberry	1 gallon	4-5 feet on center	13
Seed Mix				
Agrostis exarata	spike bentgrass	seed	1 lb pls/acre	As needed for bare soil areas >25 square feet
Deschampsia elongata	slender hairgrass	seed	2 lbs pls/acre	

**Bare root plants may be substituted for container plants based on availability. If bare root plants are used, they must be planted during the late winter/early spring dormancy period.*

Planting and Maintenance Notes (per City of West Linn Chapter 32.100 Re-Vegetation Plan Requirements)

1. All shrubs and ground cover to be planted must be native plants selected from the Portland Plant List.

2. Plant Size. Shrubs must be in at least a 1-gallon container or the equivalent in ball and burlap and must be at least 12 inches in height.

3. Native trees and shrubs are required to be planted at a rate of five trees and 25 shrubs per every 500 square feet of disturbance area (calculated by dividing the number of square feet of disturbance area by 500, then multiplying that result times five trees and 25 shrubs, and rounding all fractions to the nearest whole number of trees and shrubs; for example, if there will be 330 square feet of disturbance area, then 330 divided by 500 equals 0.66, and 0.66 times 5 equals 3.3, so three trees must be planted, and 0.66 times 25 equals 16.5, so 17 shrubs must be planted). Bare ground must be planted or seeded with native grasses or herbs. Non-native sterile wheat grass may also be planted or seeded in equal or lesser proportion to the native grasses or herbs.

4. Shrubs must be planted between 4 and 5 feet on center or clustered in single species groups of no more than four plants, with each cluster planted between 8 and 10 feet on center. When planting near existing trees, the dripline of the existing tree must be the starting point for plant spacing measurements.

5. Plant Diversity. Shrubs must consist of at least two different species. If 10 trees or more are planted, then no more than 50% of the trees may be of the same genus.

6. Invasive Vegetation. Invasive non-native or noxious vegetation must be removed within the mitigation area prior to planting.

7. Tree and Shrub Survival. A minimum survival rate of 80% of the trees and shrubs planted is expected by the third anniversary of the date that the mitigation planting is completed.

8. Monitoring and Reporting. Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die must be replaced in kind.

9. To enhance survival of tree replacement and plantings, the following practices are required:

   a. Mulching. Mulch new plantings a minimum of 3 inches in depth and 18 inches in diameter to retain moisture and discourage weed growth.

   b. Irrigation. Water new plantings 1 inch per week between June 15th and October 15th for the three years following planting.

   c. Weed Control. Remove or control non-native or noxious vegetation throughout the maintenance period.

   d. Planting Season. Plant bare root trees between December 1st and February 28th, and potted plants between October 15th and April 30th.

   e. Wildlife Protection. Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.

10. When weather or other conditions prohibit planting according to schedule, the applicant will ensure that disturbed areas are correctly protected with erosion control measures and provide the City with funds in the amount of 125% of a bid from a recognized landscaper or nursery that will cover the cost of the plant materials, installation, and any follow-up maintenance. Once the planting conditions are favorable, the applicant will proceed with the plantings and receive the funds back from the City upon completion, or the City will complete the plantings using those funds.

Section 4

Attachment D: TVF&R Station 55 Preliminary Stormwater Report; AKS Engineering & Forestry, August 2016

TUALATIN VALLEY FIRE & RESCUE STATION 55

PRELIMINARY STORMWATER REPORT

Date:	August, 2016
Client:	Tualatin Valley Fire & Rescue 11945 SW 70th Avenue Tigard, OR 97223
Engineering Contact:	Alex Hurley, PE, PLS Alex@aks-eng.com
Engineering Firm:	AKS Engineering & Forestry, LLC.

12965 SW Herman Road, Suite 100
Tualatin, OR 97062
P: (503) 563-6151
www.aks-eng.com

Table of Contents

Tables

Figures

Appendices

Preliminary Stormwater Report

TUALATIN VALLEY FIRE & RESCUE
STATION 55

1.0 Purpose of Report

The purpose of this report is to analyze the effects the proposed development will have on the existing stormwater conveyance system; document the criteria, methodology, and informational sources used to design the proposed stormwater system; and present the results of the preliminary hydraulic analysis.

2.0 Project Location/Description

The proposed fire station will be located to the south of the intersection of Hidden Springs Road and Bay Meadows Drive in West Linn, Oregon, encompassing ±2.58 acres (Tax Lot 12301, Tax Map 2S 1E 23CD).

The proposed project will consist of a fire station, associated underground utilities, parking, walkways, and landscaping. The project will also include a public sidewalk.

3.0 Regulatory Design Criteria

The City of West Linn's *Public Works Design Standards Section 2* provides some design requirements for treating and controlling runoff from new developments located in the city. For situations that are not specifically addressed in those standards, the City of Portland *Stormwater Management Manual* will be used as guidance.

3.1 STORMWATER QUANTITY

Per the City of West Linn's *Public Works Design Standards, Section 2.0041* Stormwater Detention and/or Treatment:

> 2. *All development creating 500 sq. ft. or more of new impervious area will be required to provide treatment of the stormwater runoff from the new impervious area. For development or redevelopment creating more than 5,000 sq. ft. of new impervious area, treatment as well as detention will be required.*

The proposed project's private site improvements will create ±38,650 sq. ft. of new impervious area. Therefore, stormwater detention will be required. A stormwater facility has been designed to limit the post-developed discharge rate to that of the pre-developed discharge rate for the 2, 5, 10, 25, and 100-year events per section 2.0013 of the City of West Linn's Public Works Design Standards.

Per discussions with the City of West Linn, detention will not be required for the ±4040 sq. ft. of impervious area created by the public improvements for this project.

3.2 STORMWATER QUALITY

Per the City of West Linn's *Public Works Design Standards, Section 2.0041* Stormwater Detention and/or Treatment:

> 1. *For commercial or residential site redevelopment, all newly created impervious area, whether or not replacing existing impervious area, may be required to provide stormwater treatment to bring site discharge into compliance with current City water quality requirement.*

Stormwater quality management for the private improvements of this project will be met by routing on site runoff from the water quality event to the stormwater facility located in the southern portion of the property with water quality volume sized per the City of Portland's *Stormwater Management Manual Appendix A.3* which requires the facility's water quality volume to be twice the volume of water generated by runoff from the water quality storm.

For the public improvements (sidewalks and driveway approaches not including Taxlot 12300 frontage), stormwater quality management will be met by routing runoff from the water quality event through curb cuts into Green Street swales sized per the City of Portland's *Stormwater Management Manual* Section 2.3.4.6 located in the planter strip of Hidden Springs Road

4.0 Design Methodology

The Santa Barbara Urban Hydrograph (SBUH) Method was used to analyze stormwater runoff from the site. This method utilizes the NRCS Type 1A 24-hour storm distribution. HydroCAD 8.5 computer software aided in the analysis. Representative CN numbers were obtained from NRCS *Urban Hydrology for Small Watersheds Technical Release 55* and are included in Appendix D.

5.0 Design Parameters

5.1 DESIGN STORMS

Per City of West Linn requirements, the stormwater analysis utilized the 24-hour storm for the evaluation and design of the existing and proposed stormwater facilities. The following 24-hour rainfall intensity was utilized as the design storm for the recurrence interval:

Table 5-1: Rainfall Intensities

Recurrence Interval (Years)	Total Precipitation Depth (Inches)
WQ	0.83
2	2.40
5	2.90
10	3.40
25	3.90
100	4.40

5.2 PRE-DEVELOPED SITE CONDITIONS

5.2.1 Site Topography

Existing on-site grades generally vary from ±8% to ±15%, with the site draining towards Trillium Creek, located south of the property. The site has a high point of ±685 feet located near the northwest corner of the property and a low point of ±642 feet located near the southeast corner of the property.

5.2.2 Land Use

The existing site consists of an open grass-covered field.

5.3 SOIL TYPE

The soil beneath the project site and associated drainage basins is classified as Saum silt loam and Cornelius silt loam, according to the USDA Soil Survey for Clackamas County. The following table outlines the Hydrologic Soil Group ratings for the soil types:

Table 5-2: Hydrologic Soil Group Ratings

NRCS Map Unit Identification	NRCS Soil Classification	Hydrologic Soil Group Rating
23C	Cornelius silt loam, 8 to 15 percent slopes	C
78C	Saum silt loam, 8 to 15 percent slopes	C

Further information on this soil type is included in the NRCS Soil Resource Report located in Appendix C of this report.

5.4 POST-DEVELOPED SITE CONDITIONS

5.4.1 Site Topography

The on-site slopes will be modified with cuts, fills, and retaining walls to accommodate the construction of a public sidewalk, a fire station facility with additional site improvements, and a stormwater facility.

5.4.2 Land Use

The post-developed site land use will consist of a fire station with associated underground utilities, parking, walkways, and landscaping.

5.4.3 Post-Developed Input Parameters

See HydroCAD Analysis in the attached appendices.

5.4.4 Description of Off-Site Contributing Basins

A residential property (Basin 20S, Taxlot 12300, Clackamas County Tax Map 2 1E 23CD), separating the proposed site's frontage along Hidden Springs Road to the north currently directs its stormwater to the proposed site. The stormwater facility will be designed to safely convey this runoff to Trillium Creek, but treatment and detention will not be required.

6.0 Design Methodology

6.1 PROPOSED STORMWATER CONDUIT SIZING AND INLET SPACING

The proposed on-site catch basins will be spaced to properly convey stormwater runoff. The proposed storm system pipes will be sized using Manning's equation to convey the peak flows from the 100-year storm event per the City of West Linn's Public Works Design Standards, Section 2.0013.C.6.

6.2 PROPOSED STORMWATER QUALITY CONTROL FACILITY

The proposed site will utilize a stormwater facility designed per the City of Portland's *Stormwater Management Manual Section 2.3.4* and *Appendix A.3* to provide water quality treatment for the site's private improvements. *Appendix A.3* requires that a volume-based stormwater treatment facility provide a water quality volume of twice the runoff generated by the water quality storm, or a V_b/V_r ratio of 2. The following table outlines the water quality volume sizing requirements:

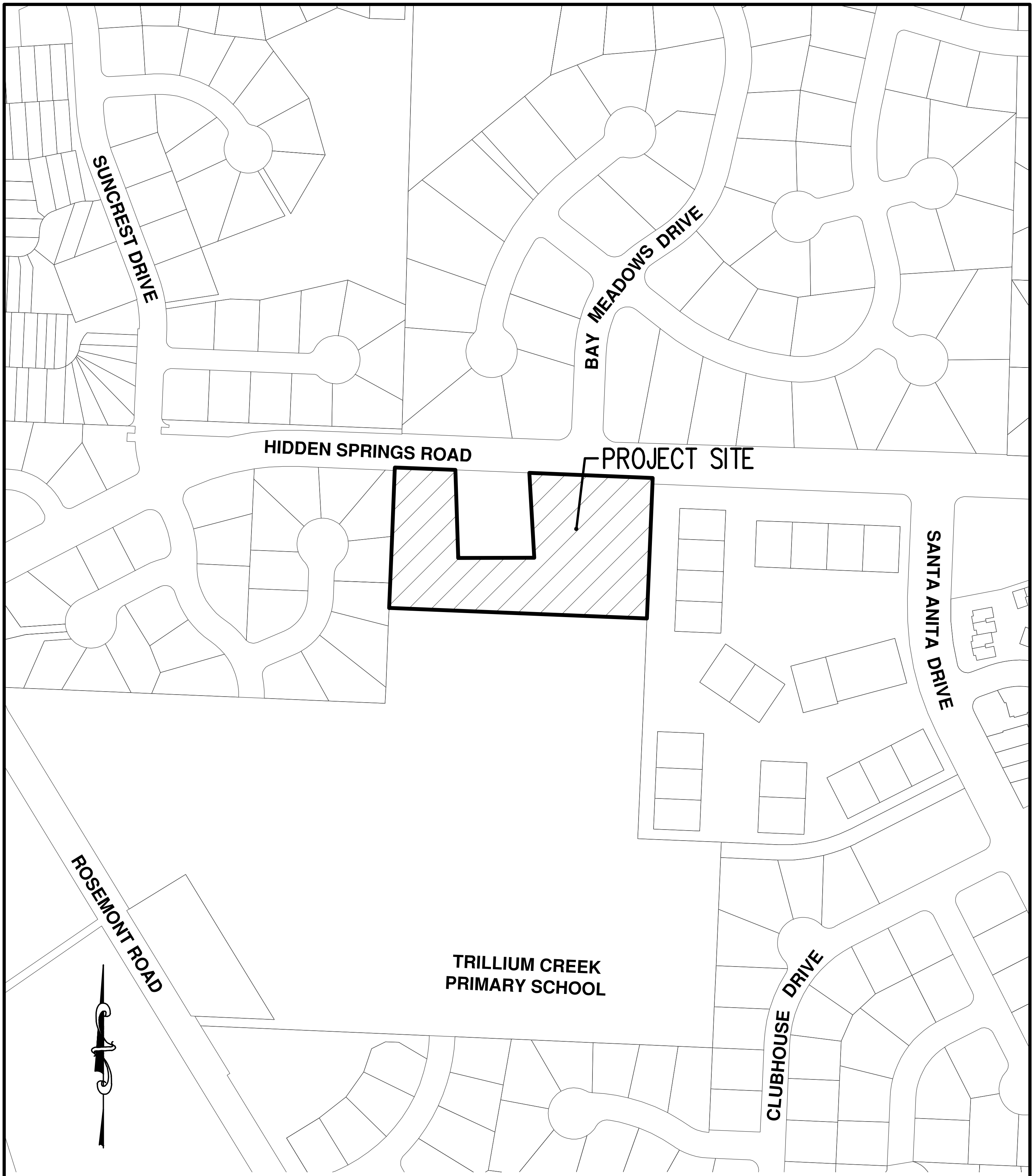
Table 6-1: Water Quality Volume Sizing

Runoff Generated by Water Quality Event, V_r (cu. ft.)	Water Quality Volume Provided in Stormwater Facility, V_b (cu. ft.)	V_b/V_r Ratio
1,742	4,870	2.79

Water quality treatment for the public improvements (sidewalks and driveway approaches not including Taxlot 12300 frontage) will be provided by Green Street Swales sized per the City of Portland's *Stormwater Management Manual* Section 2.3.4.6 located in the planter strip on Hidden Springs Road. The following table outlines the requirements for sizing a Green Street Swale using the simplified approach:

Table 6-2: Green Street Swale Sizing

Public Improvements Impervious Area to be Treated (sq. ft.)	Sizing Factor	Required Green Street Swale Size (sq. ft.)	Available Planter Strip Area (sq. ft.)
3,090	0.09	295	1,334



NOTE: SCALE BAR ACCURATE
WHEN PLOTTED ON 8.5"x11" SHEET

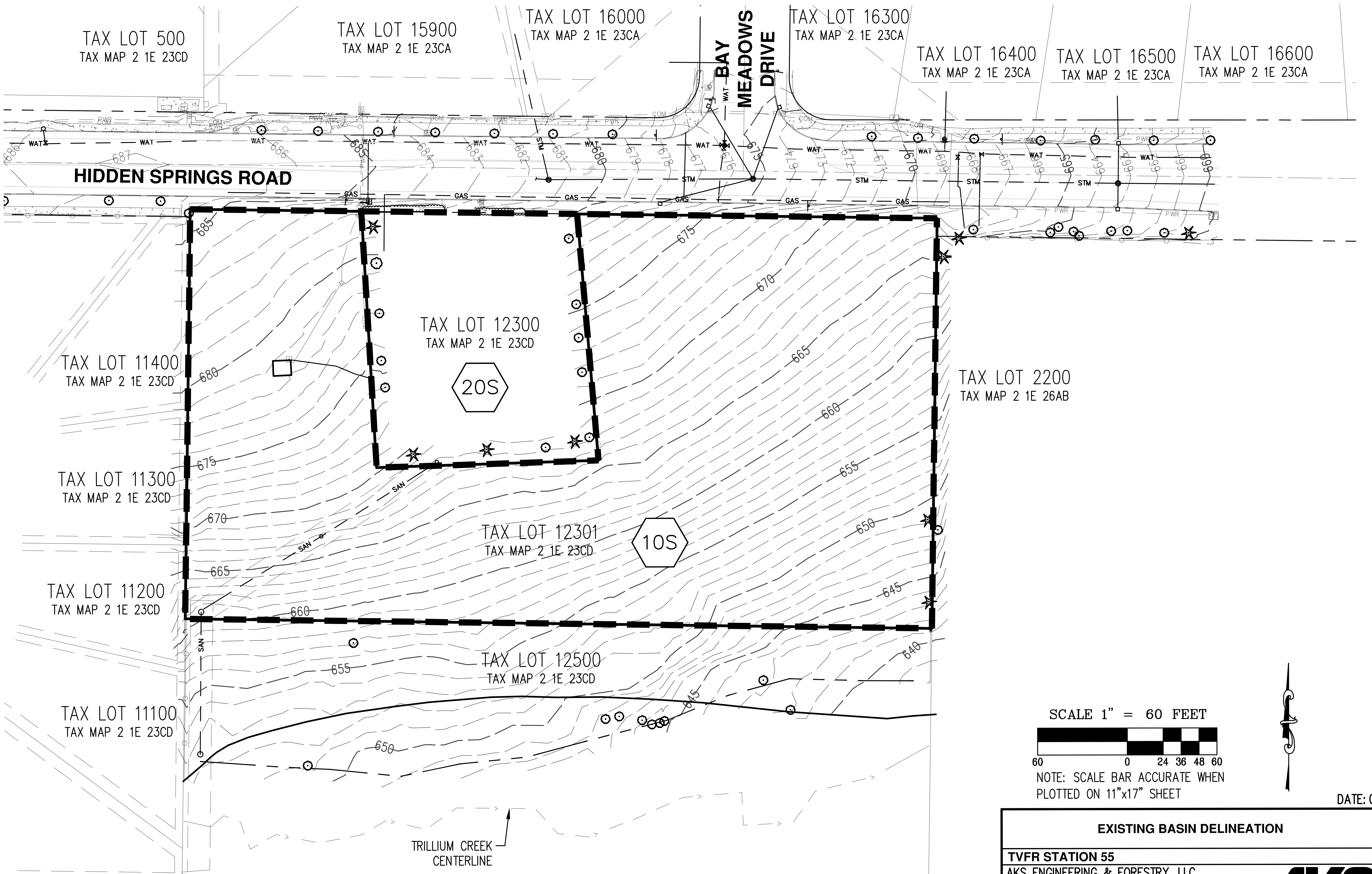
DATE: 08/26/2016

VICINITY MAP

FIGURE
1

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com

DRWN: LTP
CHKD: AHH
AKS JOB:
4757



DATE: 08/26/2016

EXISTING BASIN DELINEATION

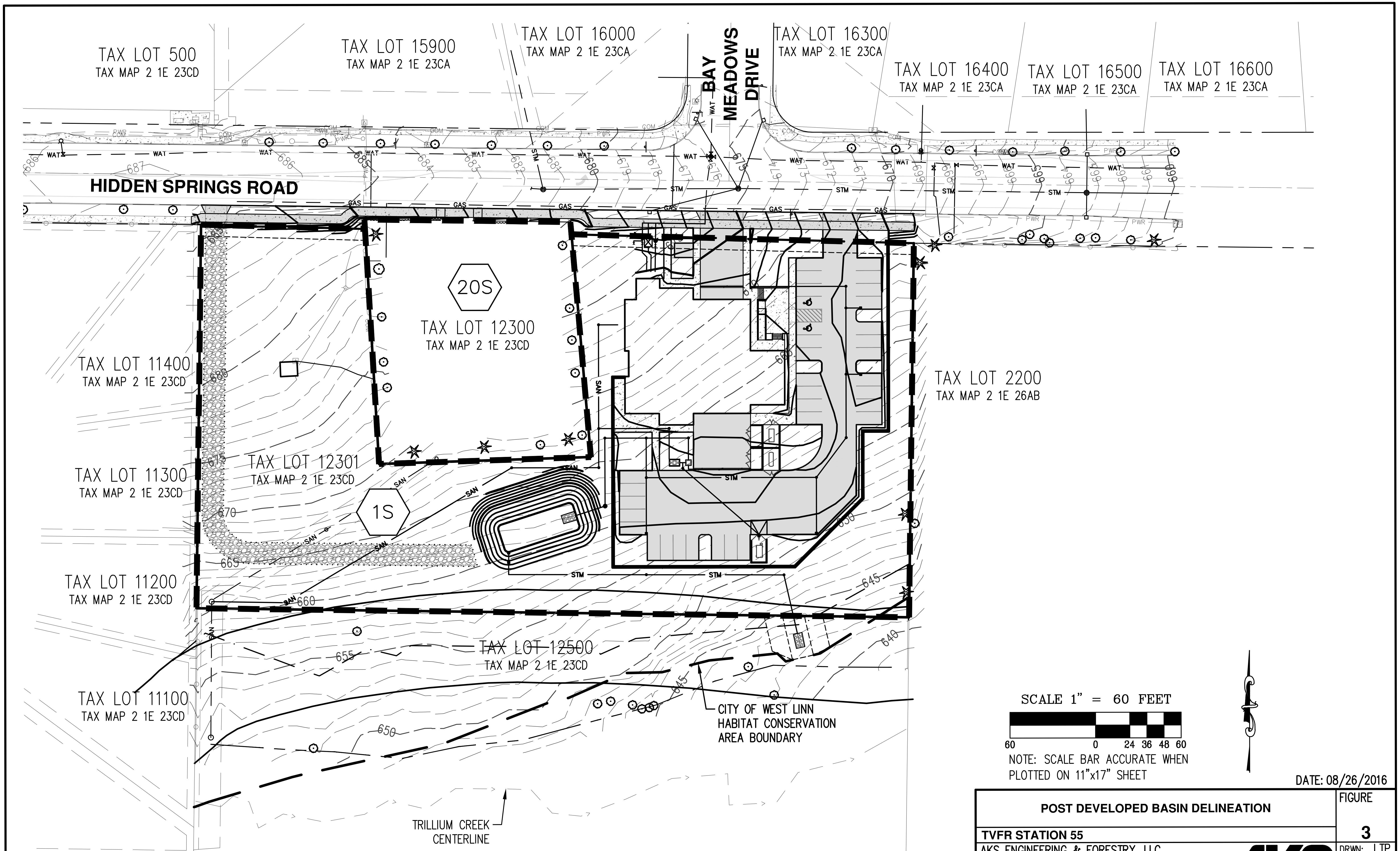
FIGURE 2

TVFR STATION 55

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P:503.563.6151 F:503.563.6152 aks-eng.com

DRWN: LTP
CHKD: AHH
AKS JOB: 4757

DWG: PRE-DEVELOPED | FIGURE 2



DATE: 08/26/2016

POST DEVELOPED BASIN DELINEATION

FIGURE

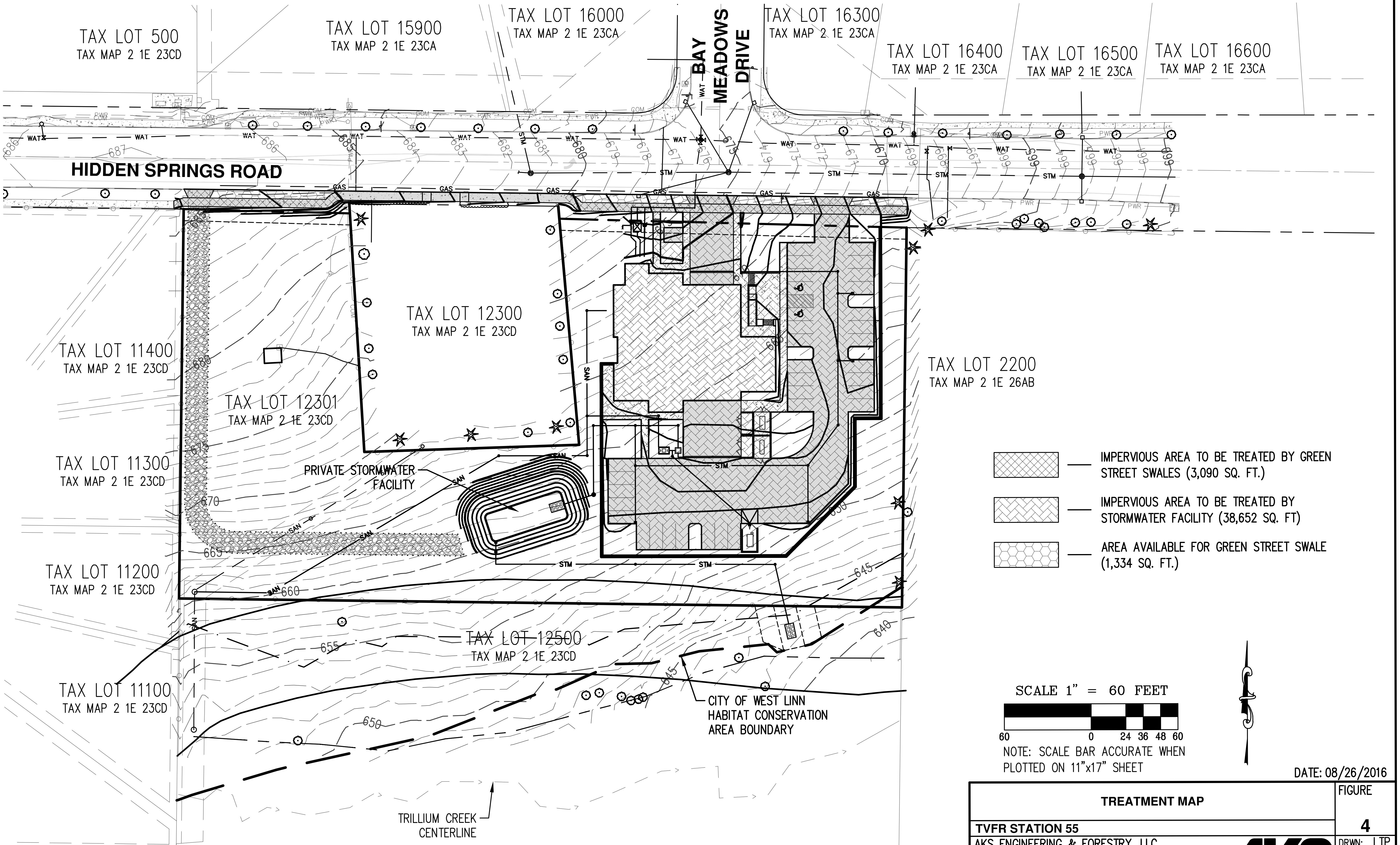
3

TVFR STATION 55

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com

DRWN: LTP
CHKD: AHH
AKS JOB:
4757

DWG: POST-DEVELOPED | FIGURE 3



▨ — IMPERVIOUS AREA TO BE TREATED BY GREEN STREET SWALES (3,090 SQ. FT.)

▨ — IMPERVIOUS AREA TO BE TREATED BY STORMWATER FACILITY (38,652 SQ. FT)

⬡ — AREA AVAILABLE FOR GREEN STREET SWALE (1,334 SQ. FT.)

SCALE 1" = 60 FEET

60 0 24 36 48 60

NOTE: SCALE BAR ACCURATE WHEN PLOTTED ON 11"x17" SHEET

DATE: 08/26/2016

TREATMENT MAP

FIGURE 4

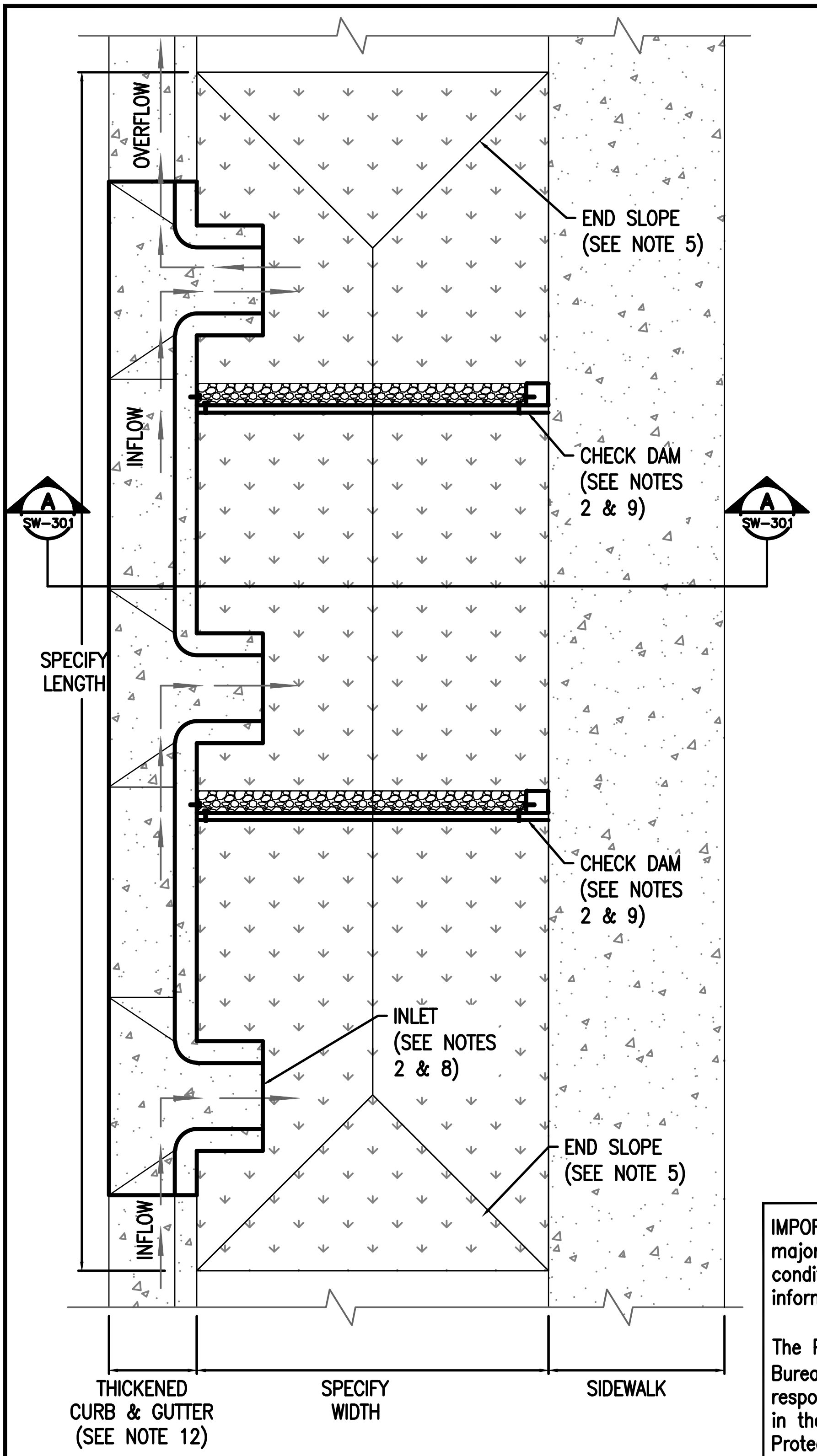
TVFR STATION 55

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
P: 503.563.6151 F: 503.563.6152 aks-eng.com

DRWN: LTP
CHKD: AHH
AKS JOB: 4757

DWG: TREATMENT | FIGURE 4

FIGURE 5



PLAN VIEW

- DRAWING NOT TO SCALE -

DESIGNER INFORMATION:

1. Adapt this plan view example to your engineered design. Maximize surface storage.
2. Provide beginning and ending stations for each facility. Provide stationing and/or dimensions and elevations at each inlet, outlet and check dam.
3. Sidewalk elevation must be set above check dam and inlet elevations to allow overflow to drain to street before sidewalk.
4. Existing utility lines must be sleeved or relocated. Proposed utility lines to be located out of facility.
5. End slopes 1:4. See swale sections on SW-301 for side slopes.
6. Longitudinal slope of swale matches the road.
7. Area and Depth of facility are based upon engineering calculations and right-of-way constraints. See chapter 2 of the City of Portland Stormwater Management Manual (SWMM).

RELATED DETAILS AND RESOURCES:

8. Concrete Inlet detail SW-300
9. Check Dam details SW-340 and SW-341
10. Special requirements for water lines, meters, and fire hydrants (see SW-304)
11. Swale Planting Template (see SW-303)
12. Thickened Curb and Gutter per PBOT standard drawing P-540
13. Stormwater facility construction and topsoil requirements see City of Portland Standard Construction Specifications, sections 00415 and 01040.14(d)

IMPORTANT: Utility conflicts and existing conditions can create major design variables. Locate utilities and survey existing conditions prior to beginning design work and include information on design drawings.

The Portland Bureau of Transportation (PBOT), Portland Water Bureau (PWB), and Bureau of Environmental Services (BES) are responsible for the review and approval of Stormwater Swales in the public right of way. Stormwater facilities in Wellhead Protection Areas may require special containment measures as required by City Code 21.35.

For more information contact:

PBOT	(503) 823-7884	BES	(503) 823-7761
PWB	(503) 823-7368	Urban Forestry	(503) 823-4489

STORMWATER MANAGEMENT MANUAL TYPICAL DETAILS

– Green Streets –

Plan View

Swales

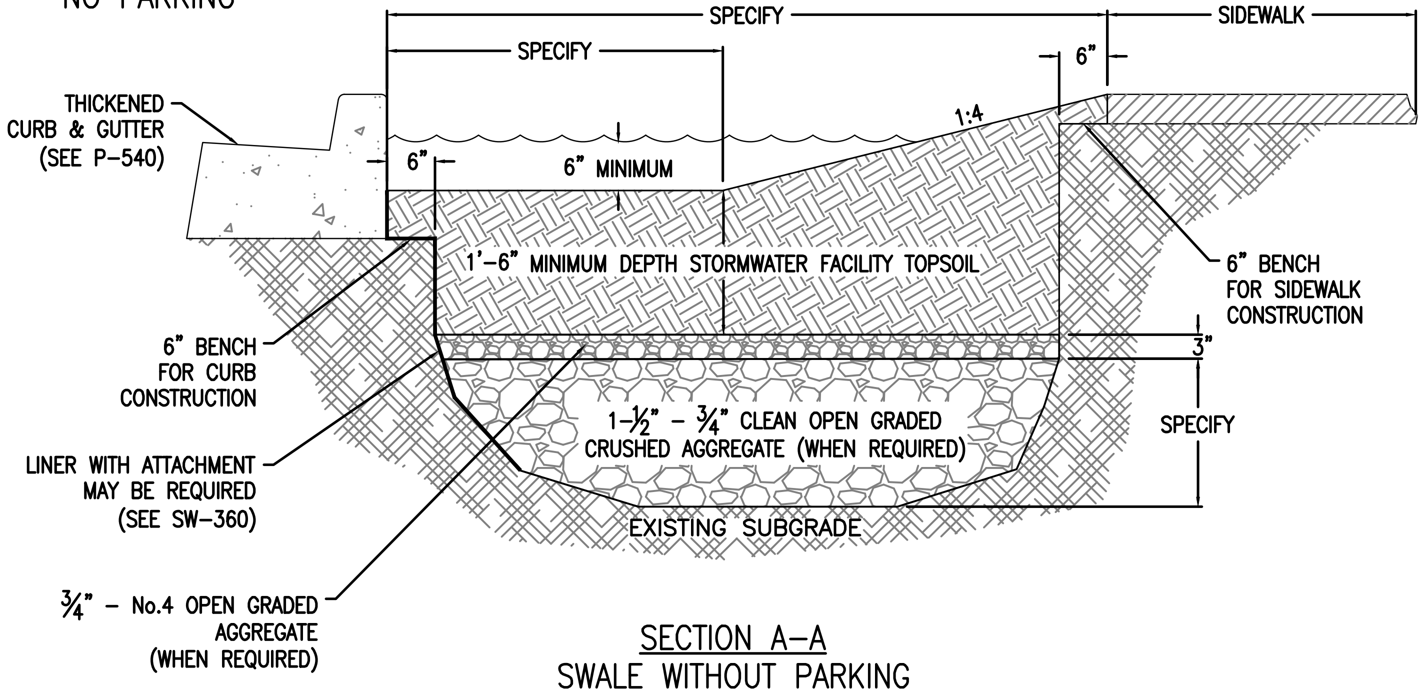
NUMBER

SW-300

Bureau of Environmental Services

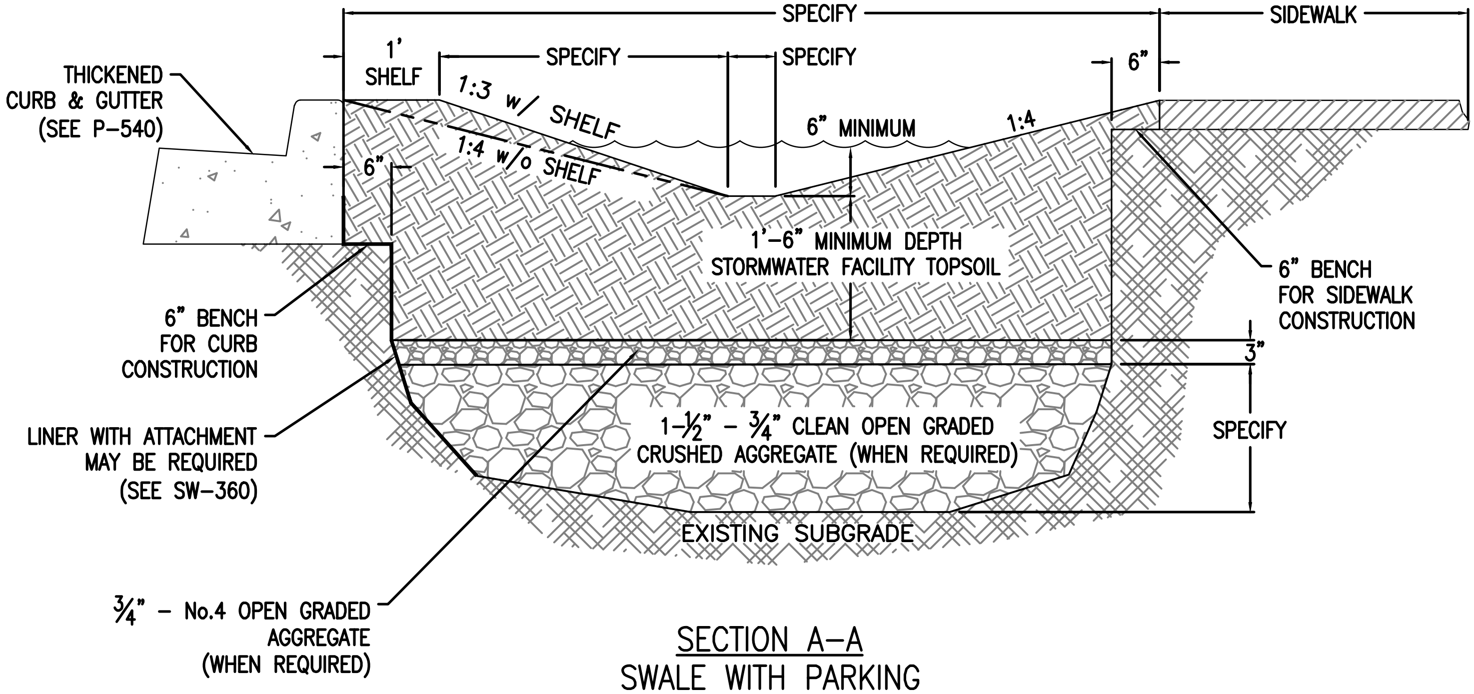
FIGURE 6

– NO PARKING –



SECTION A–A
SWALE WITHOUT PARKING

– PARKING –



SECTION A–A
SWALE WITH PARKING

DESIGNER INFORMATION:

See SW–300 for Inlet

CONSTRUCTION NOTE:

Scarify the native soil following the initial excavation and before installing topsoil or rock.

FOR PLAN VIEW
SEE SW–310

– DRAWING NOT TO SCALE –

STORMWATER MANAGEMENT MANUAL TYPICAL DETAILS

– Green Streets –
Section Views
Swales

Bureau of Environmental Services

NUMBER
SW–301

APPENDIX A

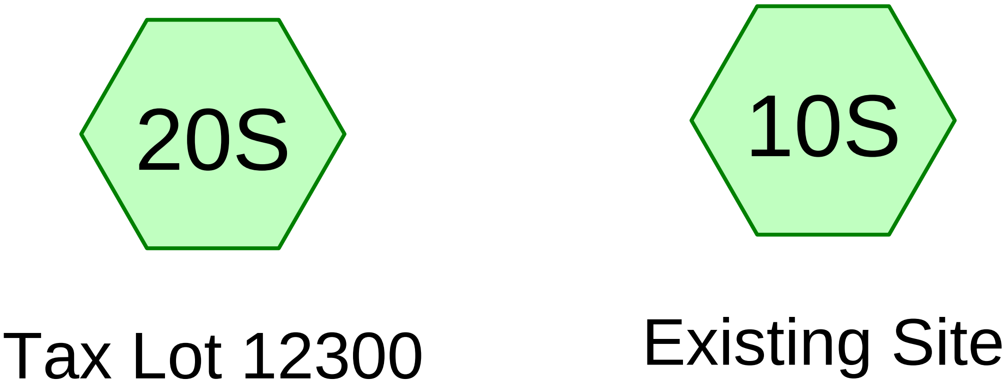
EXISTING TO POST-DEVELOPED SITE RUNOFF COMPARISON SUMMARY

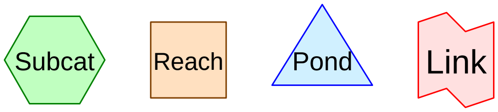
Runoff Comparison Summary				
Rainfall Event	Total Precipitation Depth (Inches)	Existing Site Peak Runoff (cfs)	Post Developed Site Peak Runoff (cfs)	Change in Peak Runoff (cfs)
2-Year	2.40	0.14	0.14	0.00
5-Year	2.90	0.29	0.21	-0.08
10-Year	3.40	0.47	0.27	-0.20
25-Year	3.90	0.67	0.51	-0.16
100-Year	4.40	0.89	0.89	0.00

APPENDIX B

EXISTING AND POST-DEVELOPED SITE 2, 5, 10, 25, AND 100-YEAR STORM EVENT ANALYSIS

EXISTING SITE





Drainage Diagram for 4757 TVFR 55 PreDev
Prepared by AKS Engineering & Forestry, Printed 8/8/2016
HydroCAD® 8.50 s/n 005096 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.969	74	>75% Grass cover, Good, HSG C (10S,20S)
0.178	98	Paved parking & roofs (20S)
3.147		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.969	HSG C	10S, 20S
0.000	HSG D	
0.178	Other	20S
3.147		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Existing Site Runoff Area=112,420 sf 0.00% Impervious Runoff Depth>0.55"
Flow Length=345' Tc=16.7 min CN=74/0 Runoff=0.14 cfs 0.117 af

Subcatchment 20S: Tax Lot 12300 Runoff Area=24,652 sf 31.42% Impervious Runoff Depth>1.06"
Flow Length=185' Slope=0.1200 '/' Tc=9.0 min CN=74/98 Runoff=0.12 cfs 0.050 af

Total Runoff Area = 3.147 ac Runoff Volume = 0.167 af Average Runoff Depth = 0.64"
94.35% Pervious = 2.969 ac 5.65% Impervious = 0.178 ac

Summary for Subcatchment 10S: Existing Site

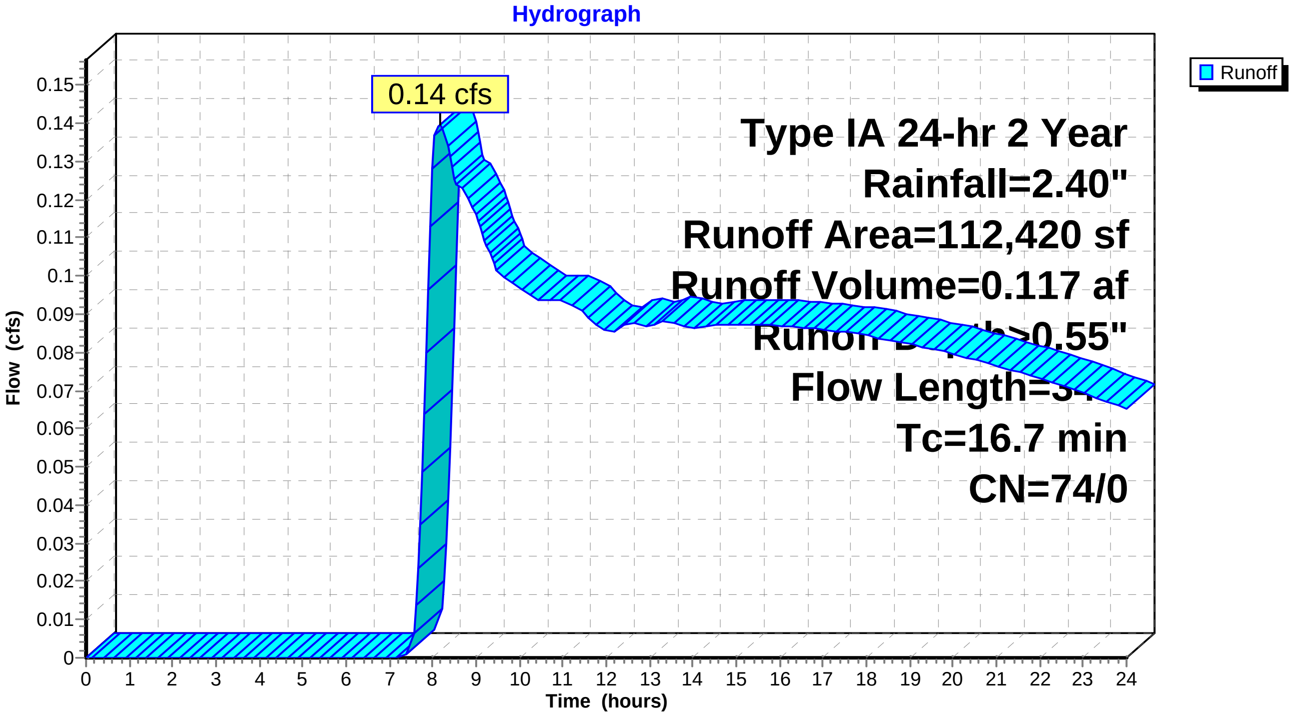
Runoff = 0.14 cfs @ 8.17 hrs, Volume= 0.117 af, Depth> 0.55"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 Year Rainfall=2.40"

Area (sf)	CN	Description
112,420	74	>75% Grass cover, Good, HSG C
112,420	74	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.1100	0.36		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
2.9	45	0.1200	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
16.7	345	Total			

Subcatchment 10S: Existing Site



Summary for Subcatchment 20S: Tax Lot 12300

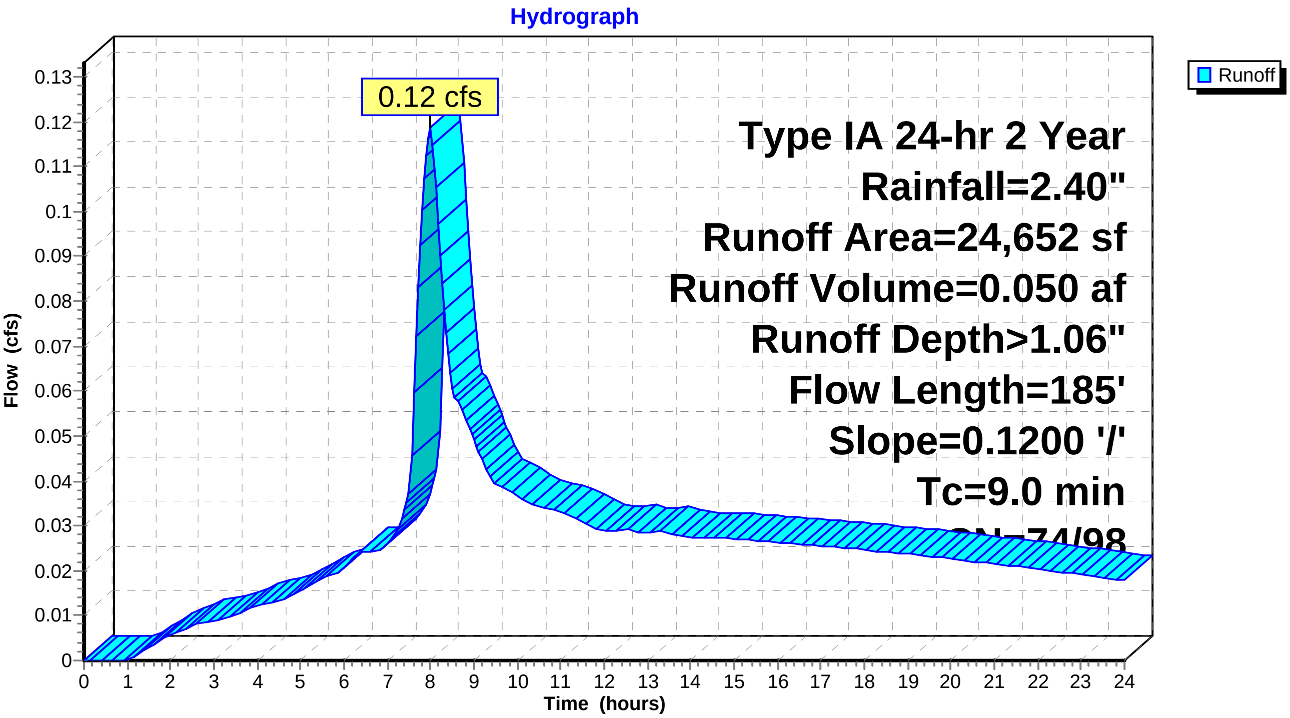
Runoff = 0.12 cfs @ 7.99 hrs, Volume= 0.050 af, Depth> 1.06"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 Year Rainfall=2.40"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

Subcatchment 20S: Tax Lot 12300



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                 Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
                  Runoff by SBUH method, Split Pervious/Imperv.
      Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Existing Site          Runoff Area=112,420 sf   0.00% Impervious   Runoff Depth>0.84"
                                    Flow Length=345'   Tc=16.7 min   CN=74/0   Runoff=0.29 cfs  0.180 af

Subcatchment 20S: Tax Lot 12300           Runoff Area=24,652 sf   31.42% Impervious   Runoff Depth>1.41"
                        Flow Length=185'   Slope=0.1200 '/'   Tc=9.0 min   CN=74/98   Runoff=0.17 cfs  0.067 af

             Total Runoff Area = 3.147 ac   Runoff Volume = 0.246 af   Average Runoff Depth = 0.94"
                                      94.35% Pervious = 2.969 ac     5.65% Impervious = 0.178 ac
```

Summary for Subcatchment 10S: Existing Site

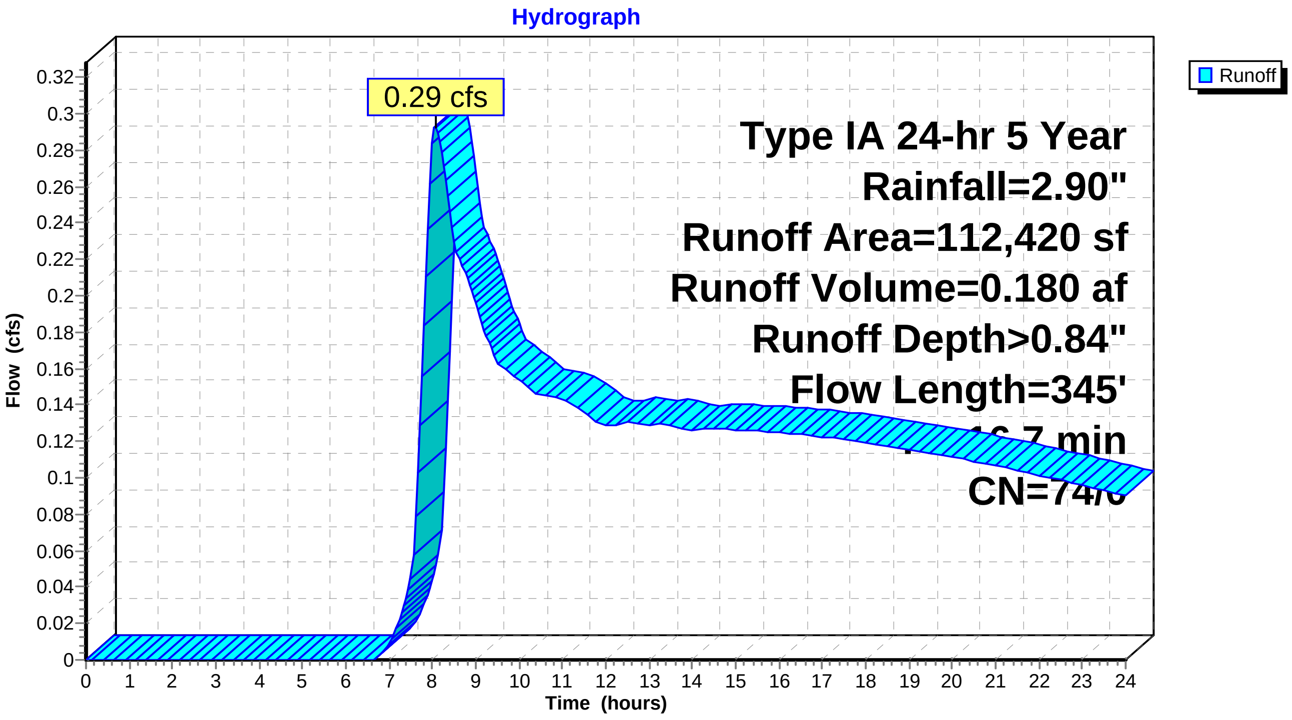
Runoff = 0.29 cfs @ 8.06 hrs, Volume= 0.180 af, Depth> 0.84"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 5 Year Rainfall=2.90"

Area (sf)	CN	Description
112,420	74	>75% Grass cover, Good, HSG C
112,420	74	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.1100	0.36		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
2.9	45	0.1200	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
16.7	345	Total			

Subcatchment 10S: Existing Site



Summary for Subcatchment 20S: Tax Lot 12300

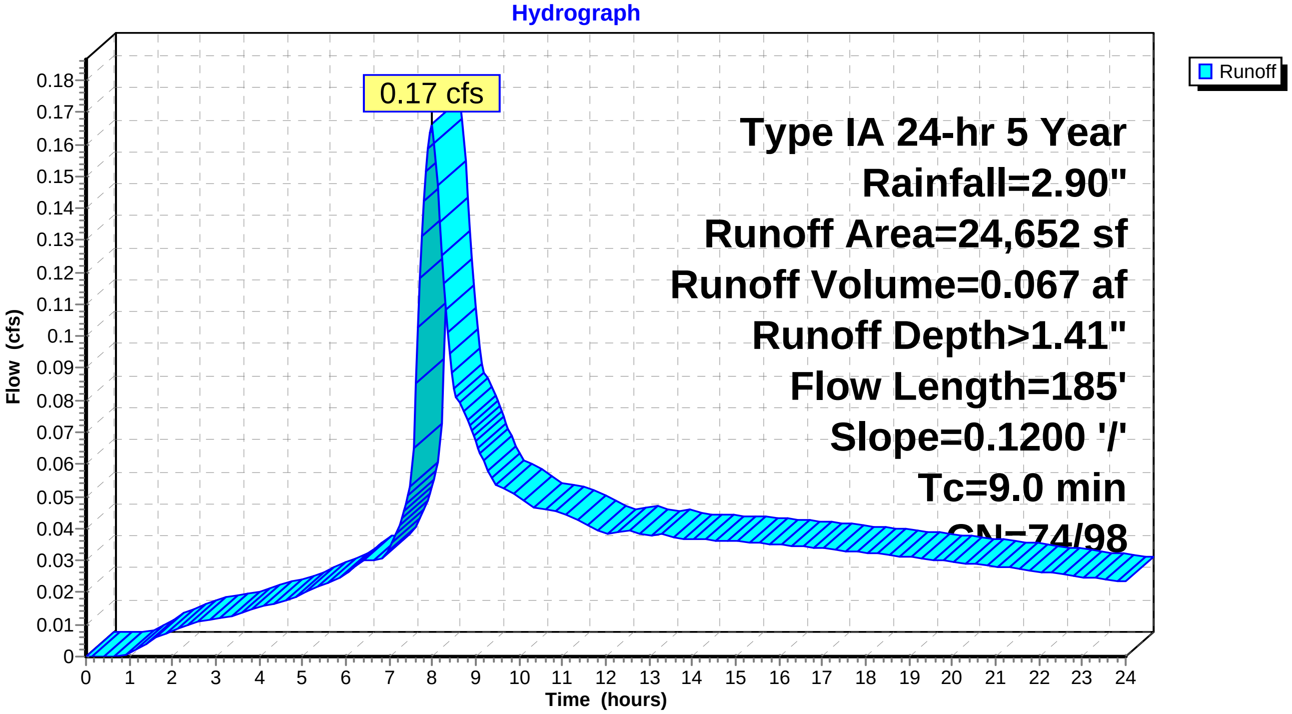
Runoff = 0.17 cfs @ 7.99 hrs, Volume= 0.067 af, Depth> 1.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 5 Year Rainfall=2.90"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

Subcatchment 20S: Tax Lot 12300



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                    Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
                      Runoff by SBUH method, Split Pervious/Imperv.
          Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment10S: Existing Site        Runoff Area=112,420 sf   0.00% Impervious   Runoff Depth>1.16"
                                    Flow Length=345'   Tc=16.7 min   CN=74/0   Runoff=0.47 cfs  0.249 af

Subcatchment20S: Tax Lot 12300         Runoff Area=24,652 sf   31.42% Impervious   Runoff Depth>1.79"
                           Flow Length=185'   Slope=0.1200 '/'   Tc=9.0 min   CN=74/98   Runoff=0.22 cfs  0.084 af

                Total Runoff Area = 3.147 ac   Runoff Volume = 0.334 af   Average Runoff Depth = 1.27"
                                          94.35% Pervious = 2.969 ac     5.65% Impervious = 0.178 ac
```

Summary for Subcatchment 10S: Existing Site

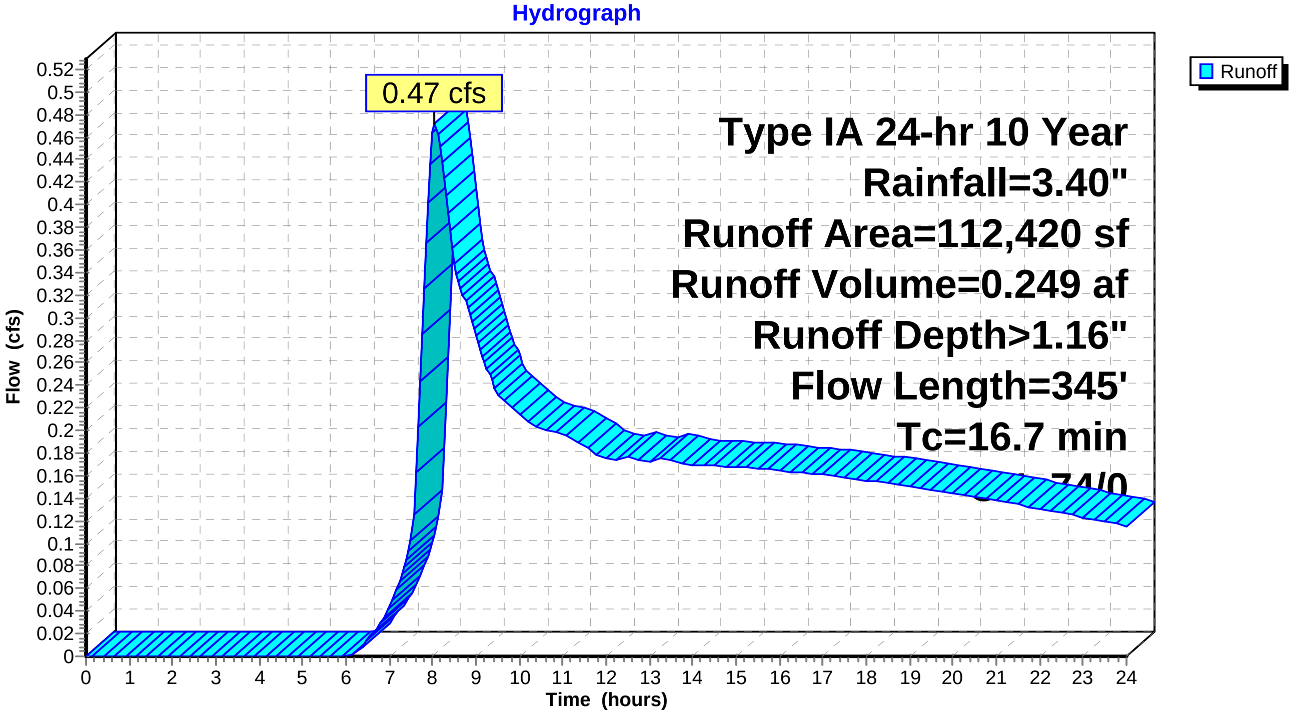
Runoff = 0.47 cfs @ 8.05 hrs, Volume= 0.249 af, Depth> 1.16"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=3.40"

Area (sf)	CN	Description
112,420	74	>75% Grass cover, Good, HSG C
112,420	74	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.1100	0.36		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
2.9	45	0.1200	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
16.7	345	Total			

Subcatchment 10S: Existing Site



Summary for Subcatchment 20S: Tax Lot 12300

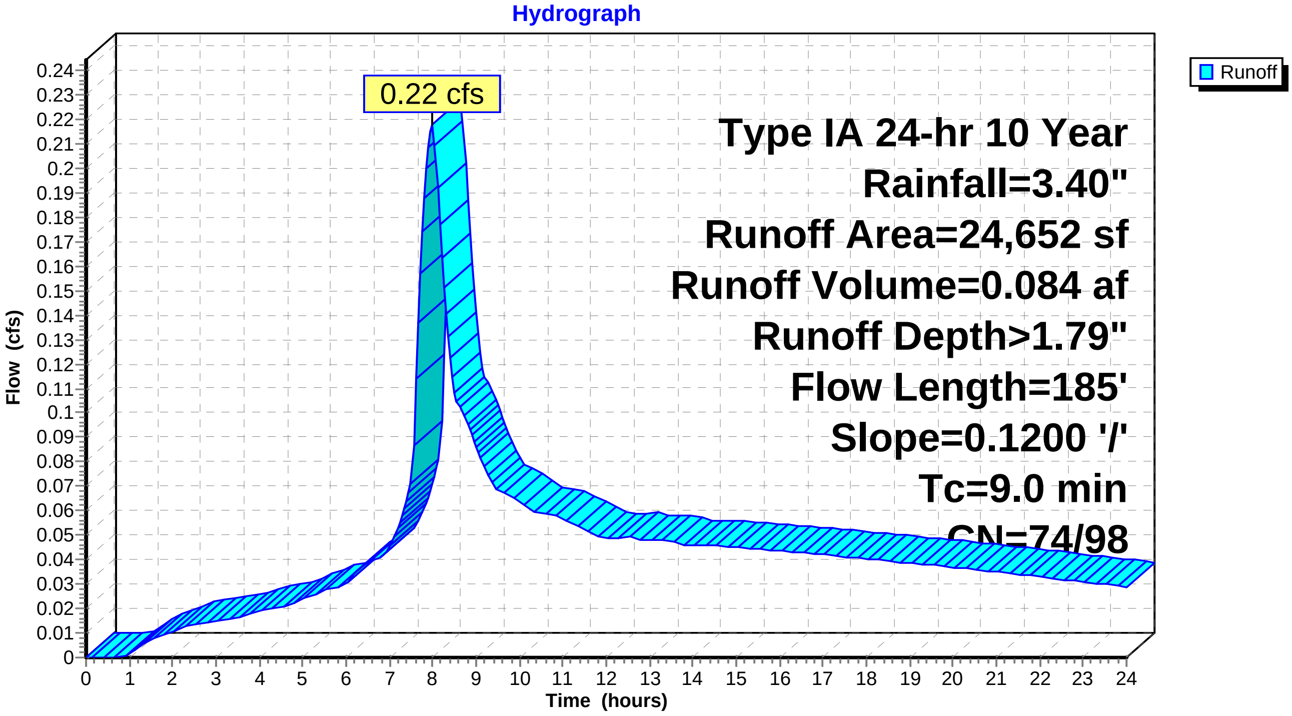
Runoff = 0.22 cfs @ 7.99 hrs, Volume= 0.084 af, Depth> 1.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=3.40"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

Subcatchment 20S: Tax Lot 12300



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Existing Site Runoff Area=112,420 sf 0.00% Impervious Runoff Depth>1.51"
Flow Length=345' Tc=16.7 min CN=74/0 Runoff=0.67 cfs 0.324 af

Subcatchment 20S: Tax Lot 12300 Runoff Area=24,652 sf 31.42% Impervious Runoff Depth>2.19"
Flow Length=185' Slope=0.1200 '/' Tc=9.0 min CN=74/98 Runoff=0.27 cfs 0.103 af

Total Runoff Area = 3.147 ac Runoff Volume = 0.428 af Average Runoff Depth = 1.63"
94.35% Pervious = 2.969 ac 5.65% Impervious = 0.178 ac

Summary for Subcatchment 10S: Existing Site

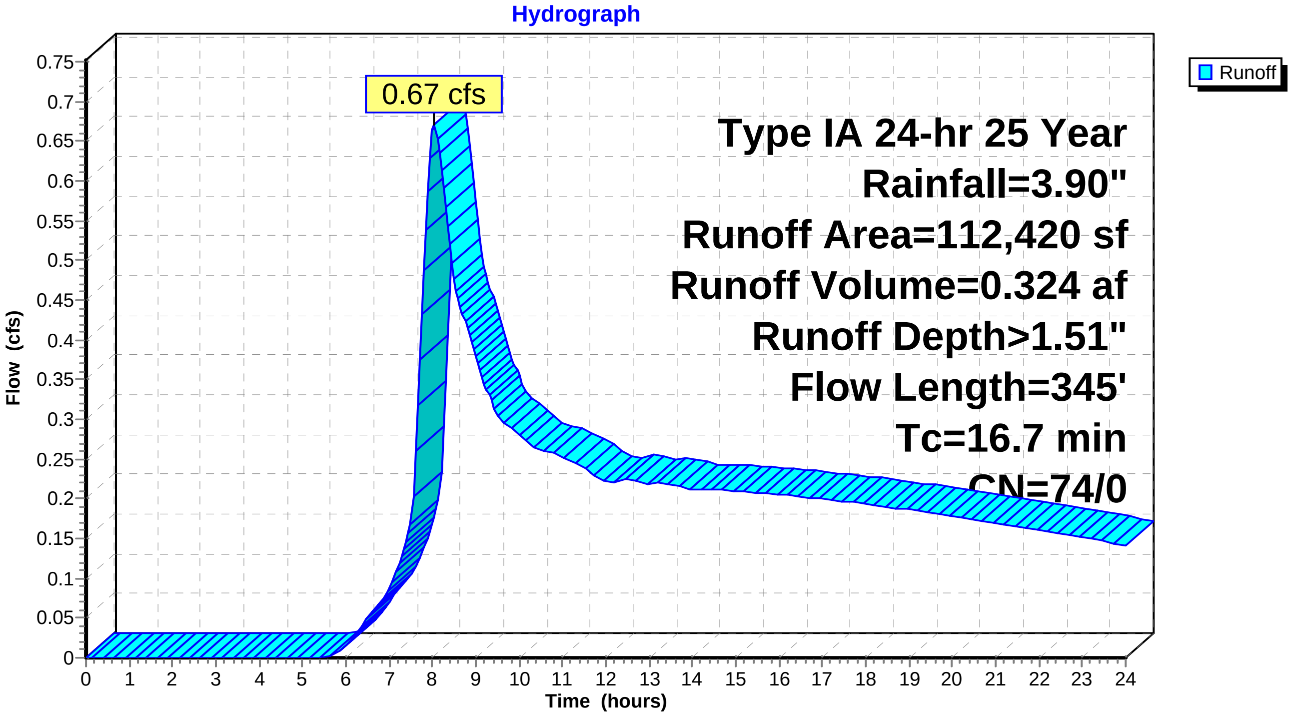
Runoff = 0.67 cfs @ 8.04 hrs, Volume= 0.324 af, Depth> 1.51"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 Year Rainfall=3.90"

Area (sf)	CN	Description
112,420	74	>75% Grass cover, Good, HSG C
112,420	74	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.1100	0.36		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
2.9	45	0.1200	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
16.7	345	Total			

Subcatchment 10S: Existing Site



Summary for Subcatchment 20S: Tax Lot 12300

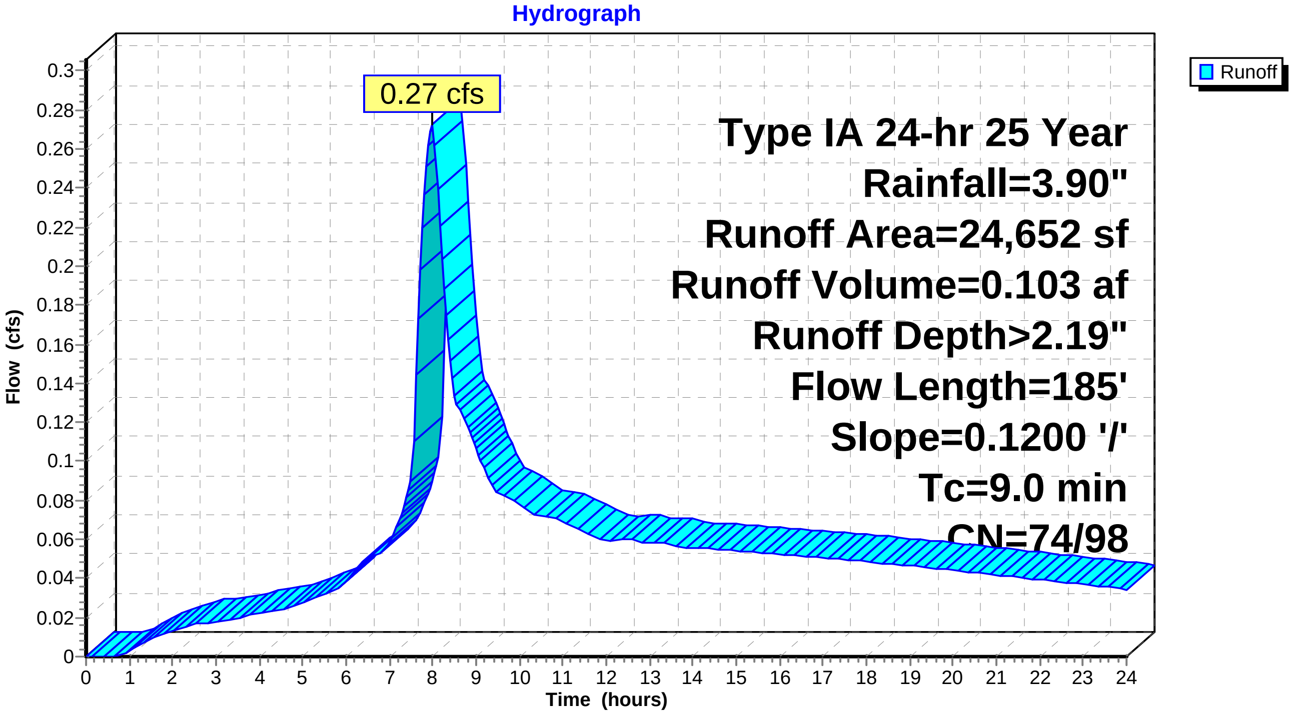
Runoff = 0.27 cfs @ 7.99 hrs, Volume= 0.103 af, Depth> 2.19"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 Year Rainfall=3.90"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

Subcatchment 20S: Tax Lot 12300



```
                 Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
                    Runoff by SBUH method, Split Pervious/Imperv.
          Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 10S: Existing Site        Runoff Area=112,420 sf   0.00% Impervious   Runoff Depth>1.88"
                                      Flow Length=345'   Tc=16.7 min   CN=74/0   Runoff=0.89 cfs  0.404 af

Subcatchment 20S: Tax Lot 12300         Runoff Area=24,652 sf   31.42% Impervious   Runoff Depth>2.60"
                          Flow Length=185'   Slope=0.1200 '/'   Tc=9.0 min   CN=74/98   Runoff=0.33 cfs  0.123 af
```

Total Runoff Area = 3.147 ac   Runoff Volume = 0.526 af   Average Runoff Depth = 2.01"
94.35% Pervious = 2.969 ac   5.65% Impervious = 0.178 ac

Summary for Subcatchment 10S: Existing Site

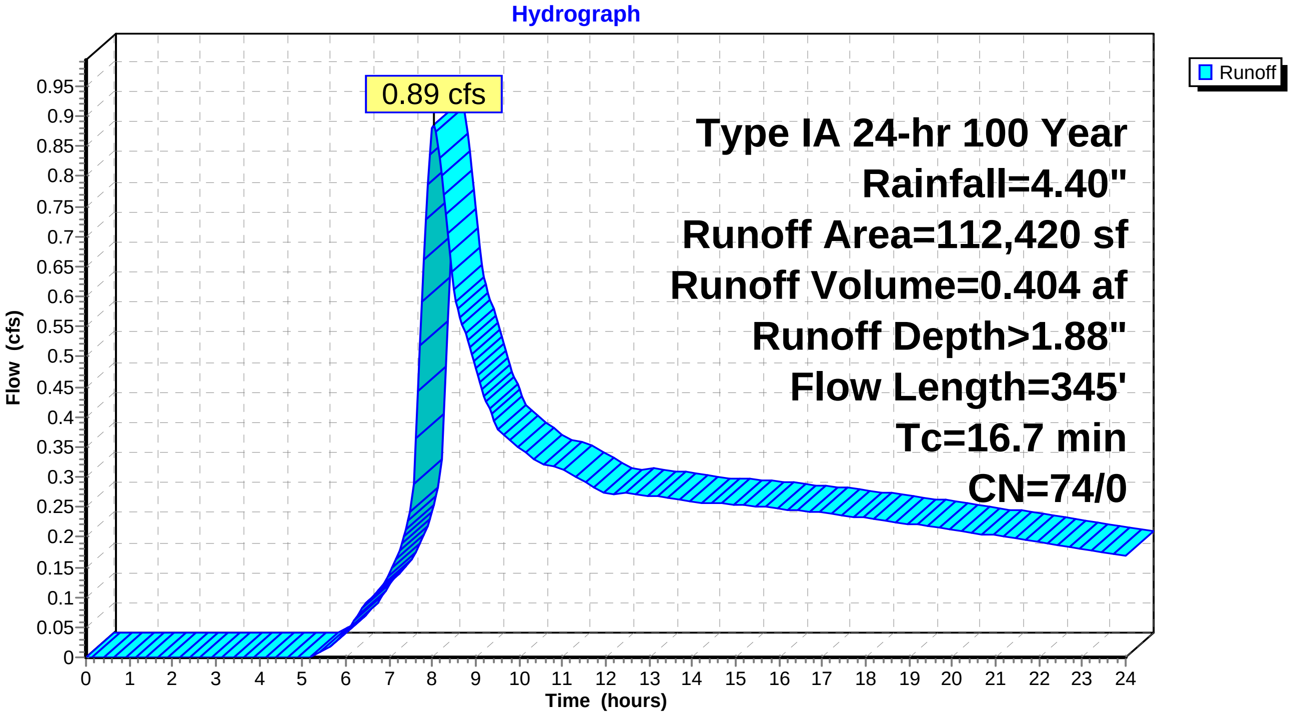
Runoff = 0.89 cfs @ 8.04 hrs, Volume= 0.404 af, Depth> 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=4.40"

Area (sf)	CN	Description
112,420	74	>75% Grass cover, Good, HSG C
112,420	74	Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	300	0.1100	0.36		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
2.9	45	0.1200	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"
16.7	345	Total			

Subcatchment 10S: Existing Site



Summary for Subcatchment 20S: Tax Lot 12300

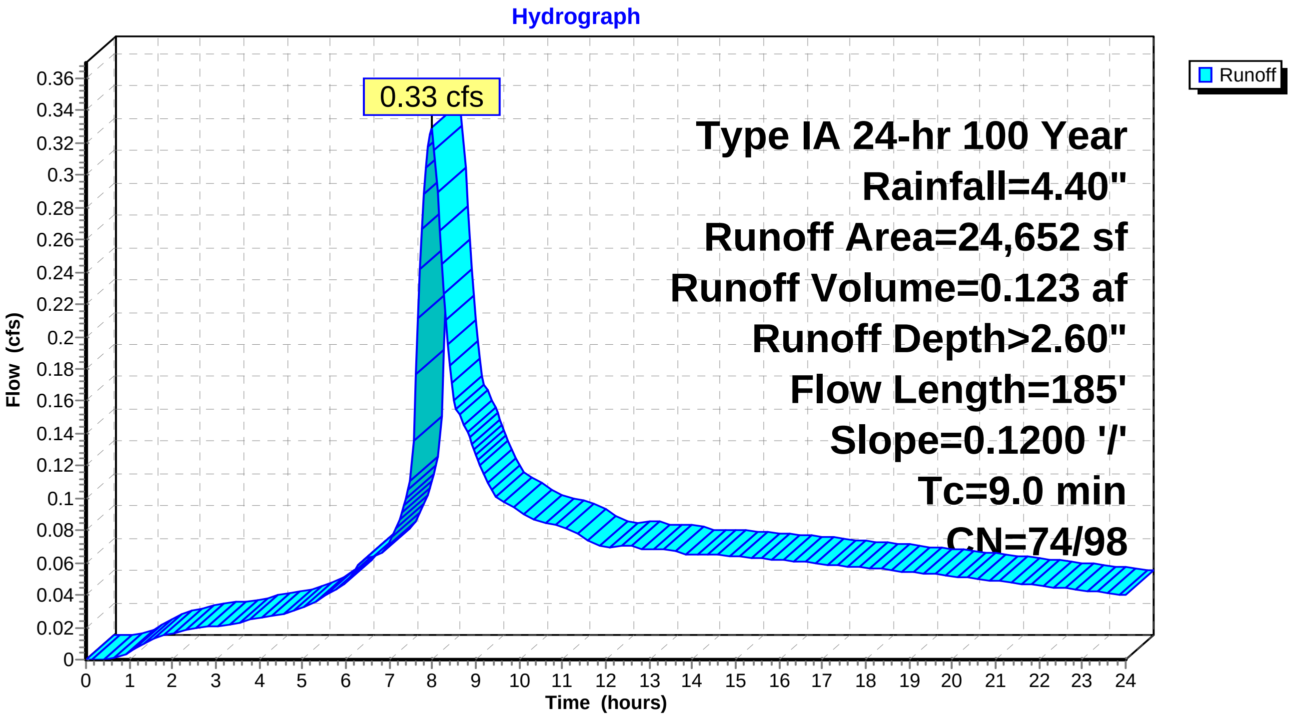
Runoff = 0.33 cfs @ 7.99 hrs, Volume= 0.123 af, Depth> 2.60"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=4.40"

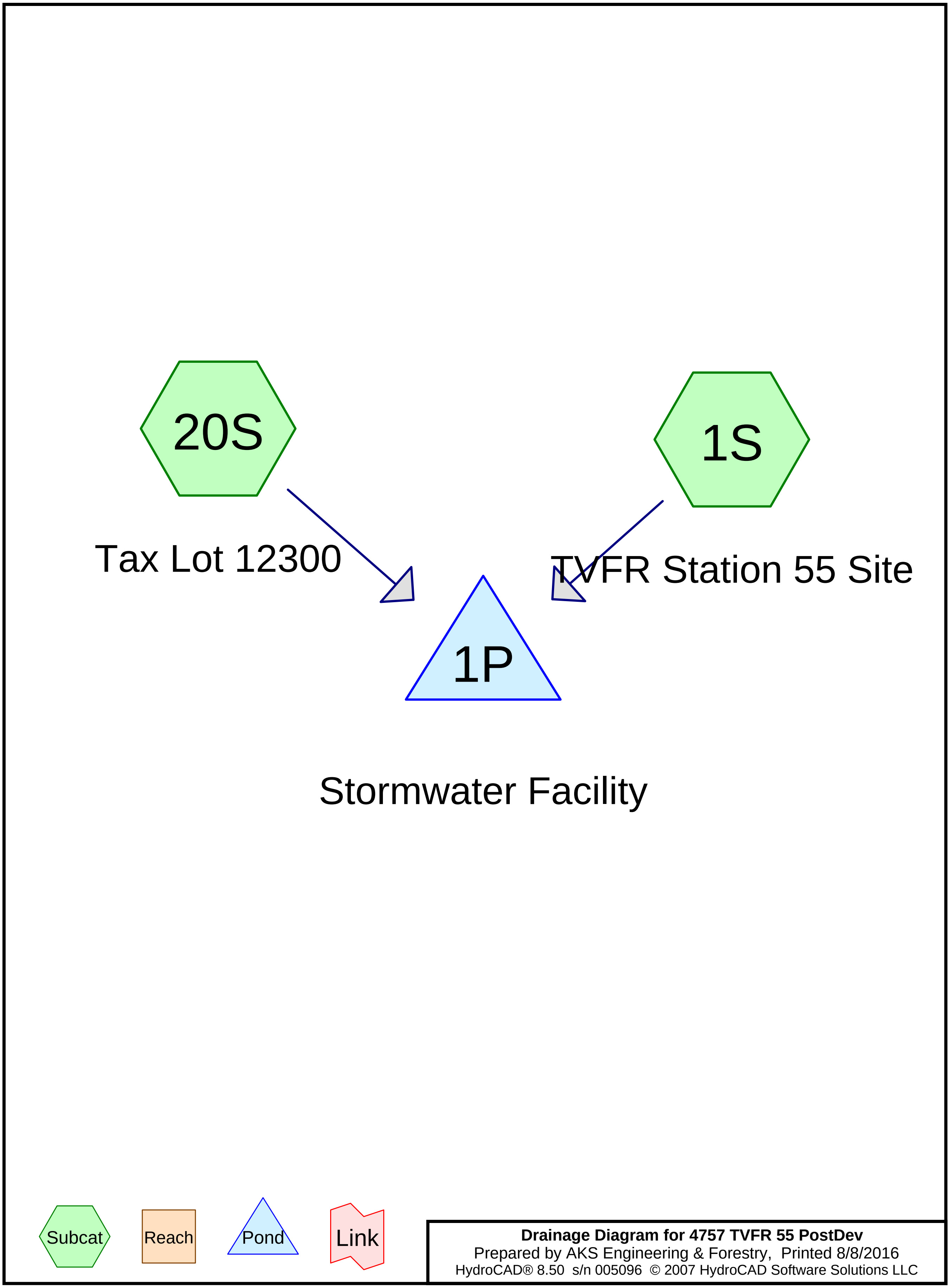
Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

Subcatchment 20S: Tax Lot 12300



POST-DEVELOPED SITE



Drainage Diagram for 4757 TVFR 55 PostDev
Prepared by AKS Engineering & Forestry, Printed 8/8/2016
HydroCAD® 8.50 s/n 005096 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.082	74	>75% Grass cover, Good, HSG C (1S,20S)
0.139	89	Gravel roads, HSG C (1S)
0.926	98	Paved parking & roofs (1S,20S)
3.147		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.221	HSG C	1S, 20S
0.000	HSG D	
0.926	Other	1S, 20S
3.147		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: TVFR Station 55 Site Runoff Area=112,420 sf 28.99% Impervious Runoff Depth>1.05"
Tc=5.0 min CN=75/98 Runoff=0.57 cfs 0.225 af

Subcatchment 20S: Tax Lot 12300 Runoff Area=24,652 sf 31.42% Impervious Runoff Depth>1.06"
Flow Length=185' Slope=0.1200 '/' Tc=9.0 min CN=74/98 Runoff=0.12 cfs 0.050 af

Pond 1P: Stormwater Facility Peak Elev=657.14' Storage=3,424 cf Inflow=0.68 cfs 0.275 af
Outflow=0.19 cfs 0.210 af

Total Runoff Area = 3.147 ac Runoff Volume = 0.275 af Average Runoff Depth = 1.05"
70.57% Pervious = 2.221 ac 29.43% Impervious = 0.926 ac

Summary for Subcatchment 1S: TVFR Station 55 Site

[49] Hint: Tc<2dt may require smaller dt

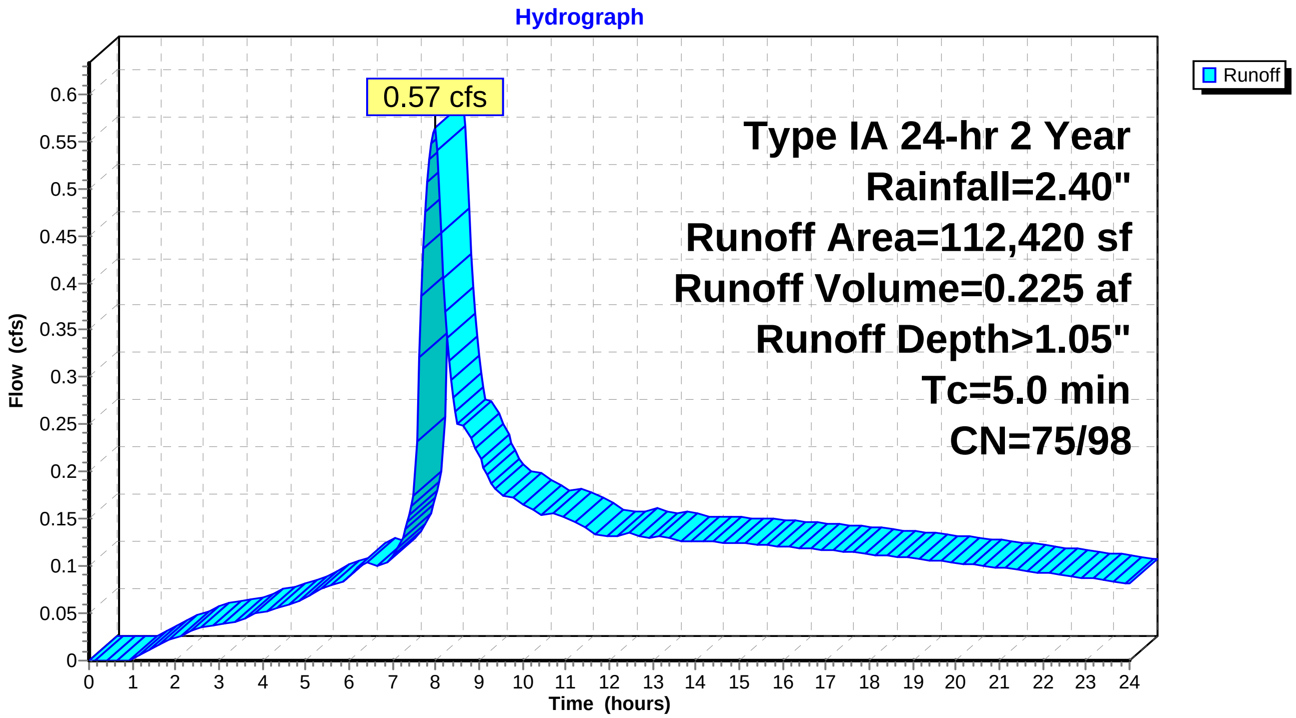
Runoff = 0.57 cfs @ 7.98 hrs, Volume= 0.225 af, Depth> 1.05"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 Year Rainfall=2.40"

Area (sf)	CN	Description
32,593	98	Paved parking & roofs
6,059	89	Gravel roads, HSG C
73,768	74	>75% Grass cover, Good, HSG C
112,420	82	Weighted Average
79,827	75	Pervious Area
32,593	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: TVFR Station 55 Site



Summary for Subcatchment 20S: Tax Lot 12300

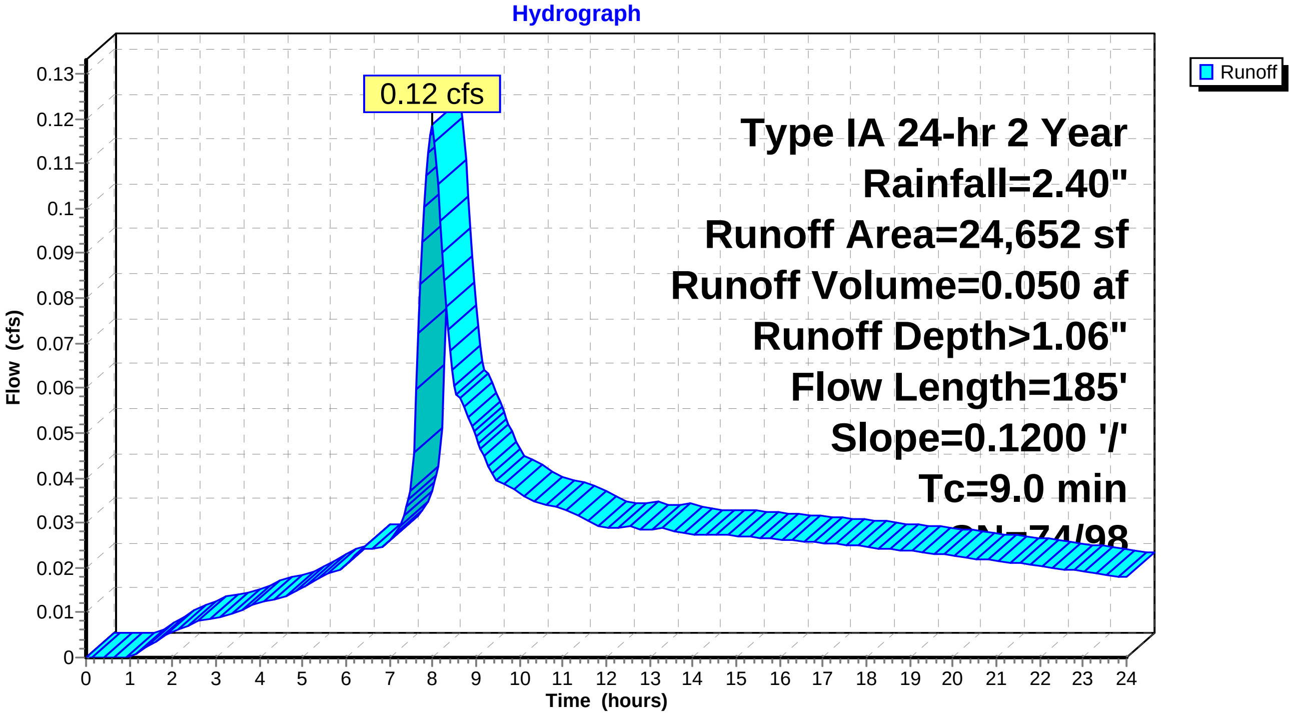
Runoff = 0.12 cfs @ 7.99 hrs, Volume= 0.050 af, Depth> 1.06"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 Year Rainfall=2.40"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

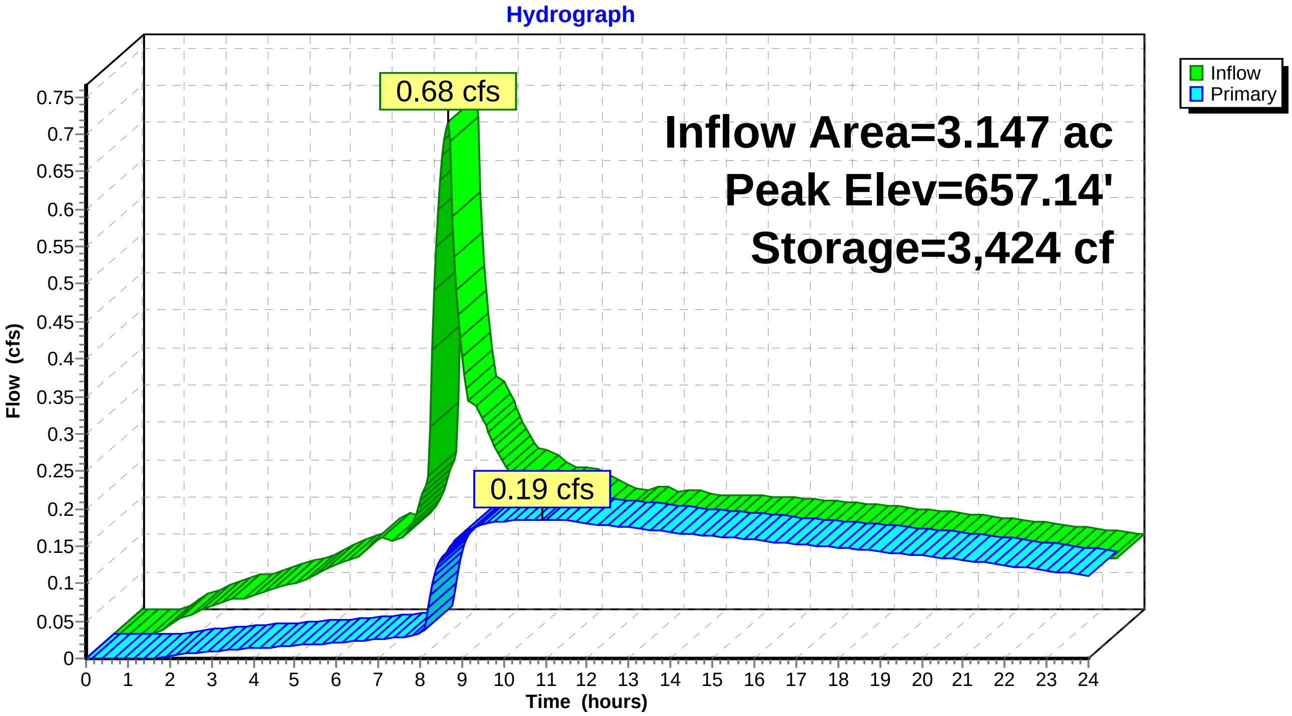
Subcatchment 20S: Tax Lot 12300



Summary for Pond 1P: Stormwater Facility

```
Inflow Area =      3.147 ac, 29.43% Impervious, Inflow Depth >  1.05"   for 2 Year event
Inflow     =      0.68 cfs @   7.98 hrs, Volume=         0.275 af
Outflow    =      0.19 cfs @  10.92 hrs, Volume=         0.210 af, Atten= 73%, Lag= 176.2 min
Primary    =      0.19 cfs @  10.92 hrs, Volume=         0.210 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 657.14' @ 10.92 hrs  Surf.Area= 2,152 sf  Storage= 3,424 cf
Flood Elev= 659.00'  Surf.Area= 3,283 sf  Storage= 8,467 cf

Plug-Flow detention time= 292.3 min calculated for 0.210 af (76% of inflow)
Center-of-Mass det. time= 144.9 min ( 908.0 - 763.1 )

Volume      Invert    Avail.Storage  Storage Description
   #1      655.00'        8,467 cf  Custom Stage Data (Prismatic)Listed below (Recalc)

Elevation       Surf.Area        Inc.Store        Cum.Store
   (feet)          (sq-ft)     (cubic-feet)     (cubic-feet)
   655.00           1,092                0                0
   656.00           1,555            1,324            1,324
   657.00           2,074            1,815            3,138
   658.00           2,650            2,362            5,500
   659.00           3,283            2,967            8,467

Device  Routing         Invert  Outlet Devices
   #1   Device 2       655.00'  2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
   #2   Device 5       655.00'  1.0" Vert. WQ Orifice  C= 0.620
   #3   Device 5       656.65'  3.0" Vert. Orifice/Grate  C= 0.620
   #4   Device 5       657.77'  2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
   #5   Primary        654.90'  12.0"  x 251.0' long Culvert  Ke= 0.500
                                Outlet Invert= 642.00'  S= 0.0514 '/'  Cc= 0.900  n= 0.013

Primary OutFlow  Max=0.19 cfs @ 10.92 hrs  HW=657.14'  (Free Discharge)
└─5=Culvert  (Passes 0.19 cfs of 4.98 cfs potential flow)
   ├─2=WQ Orifice  (Orifice Controls 0.04 cfs @ 7.20 fps)
   │  └─1=Broad-Crested Rectangular Weir (Passes 0.04 cfs of 20.62 cfs potential flow)
   ├─3=Orifice/Grate  (Orifice Controls 0.15 cfs @ 2.99 fps)
   └─4=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)
```

Pond 1P: Stormwater Facility



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: TVFR Station 55 Site Runoff Area=112,420 sf 28.99% Impervious Runoff Depth>1.41"
Tc=5.0 min CN=75/98 Runoff=0.80 cfs 0.303 af

Subcatchment 20S: Tax Lot 12300 Runoff Area=24,652 sf 31.42% Impervious Runoff Depth>1.41"
Flow Length=185' Slope=0.1200 '/' Tc=9.0 min CN=74/98 Runoff=0.17 cfs 0.067 af

Pond 1P: Stormwater Facility Peak Elev=657.57' Storage=4,403 cf Inflow=0.96 cfs 0.369 af
Outflow=0.26 cfs 0.297 af

Total Runoff Area = 3.147 ac Runoff Volume = 0.369 af Average Runoff Depth = 1.41"
70.57% Pervious = 2.221 ac 29.43% Impervious = 0.926 ac

Summary for Subcatchment 1S: TVFR Station 55 Site

[49] Hint: Tc<2dt may require smaller dt

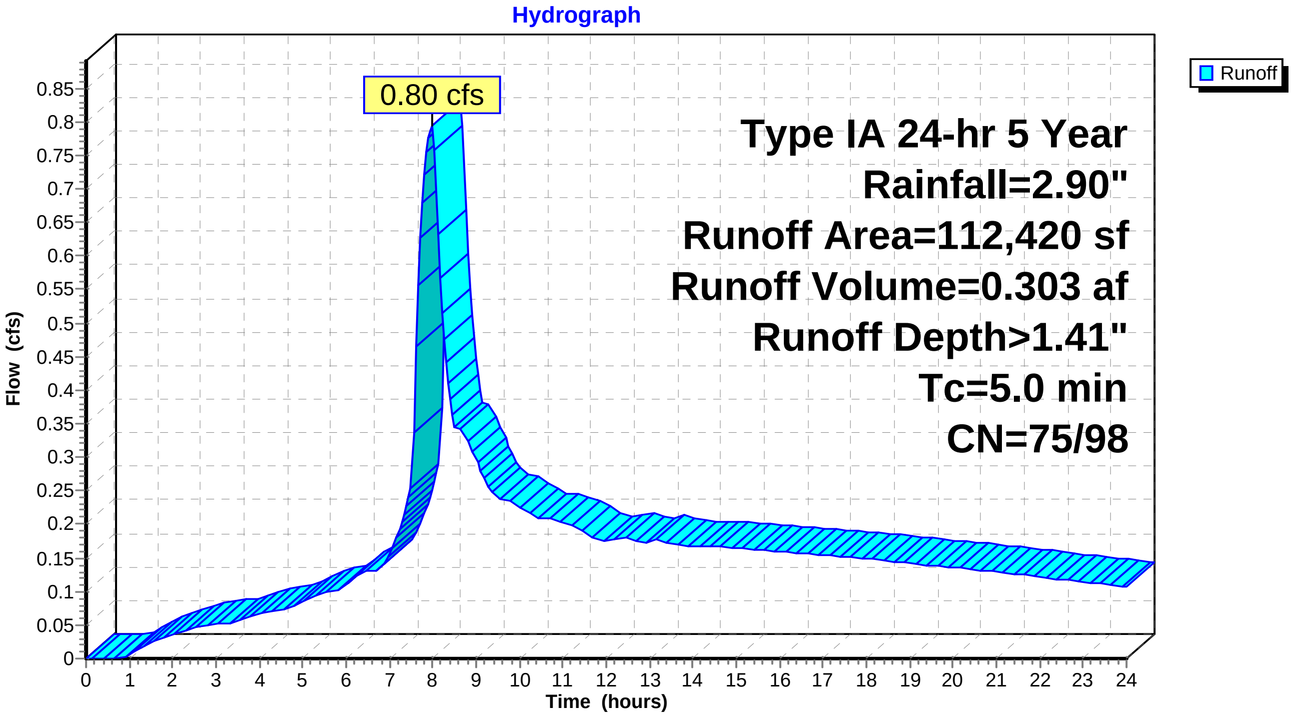
Runoff = 0.80 cfs @ 7.98 hrs, Volume= 0.303 af, Depth> 1.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 5 Year Rainfall=2.90"

Area (sf)	CN	Description
32,593	98	Paved parking & roofs
6,059	89	Gravel roads, HSG C
73,768	74	>75% Grass cover, Good, HSG C
112,420	82	Weighted Average
79,827	75	Pervious Area
32,593	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: TVFR Station 55 Site



Summary for Subcatchment 20S: Tax Lot 12300

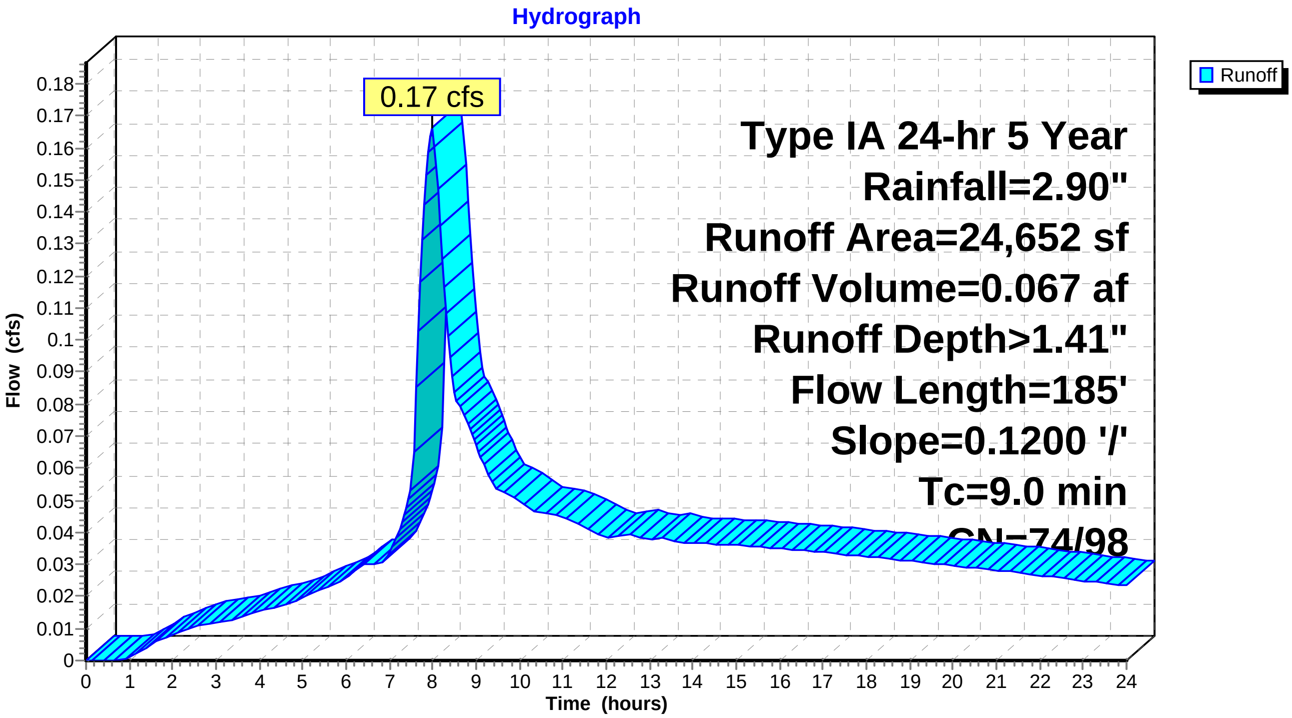
Runoff = 0.17 cfs @ 7.99 hrs, Volume= 0.067 af, Depth> 1.41"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 5 Year Rainfall=2.90"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

Subcatchment 20S: Tax Lot 12300



Summary for Pond 1P: Stormwater Facility

Inflow Area = 3.147 ac, 29.43% Impervious, Inflow Depth > 1.41" for 5 Year event
Inflow = 0.96 cfs @ 7.98 hrs, Volume= 0.369 af
Outflow = 0.26 cfs @ 10.29 hrs, Volume= 0.297 af, Atten= 73%, Lag= 139.0 min
Primary = 0.26 cfs @ 10.29 hrs, Volume= 0.297 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 657.57' @ 10.29 hrs Surf.Area= 2,400 sf Storage= 4,403 cf
Flood Elev= 659.00' Surf.Area= 3,283 sf Storage= 8,467 cf

Plug-Flow detention time= 265.1 min calculated for 0.297 af (81% of inflow)
Center-of-Mass det. time= 143.1 min (901.2 - 758.1)

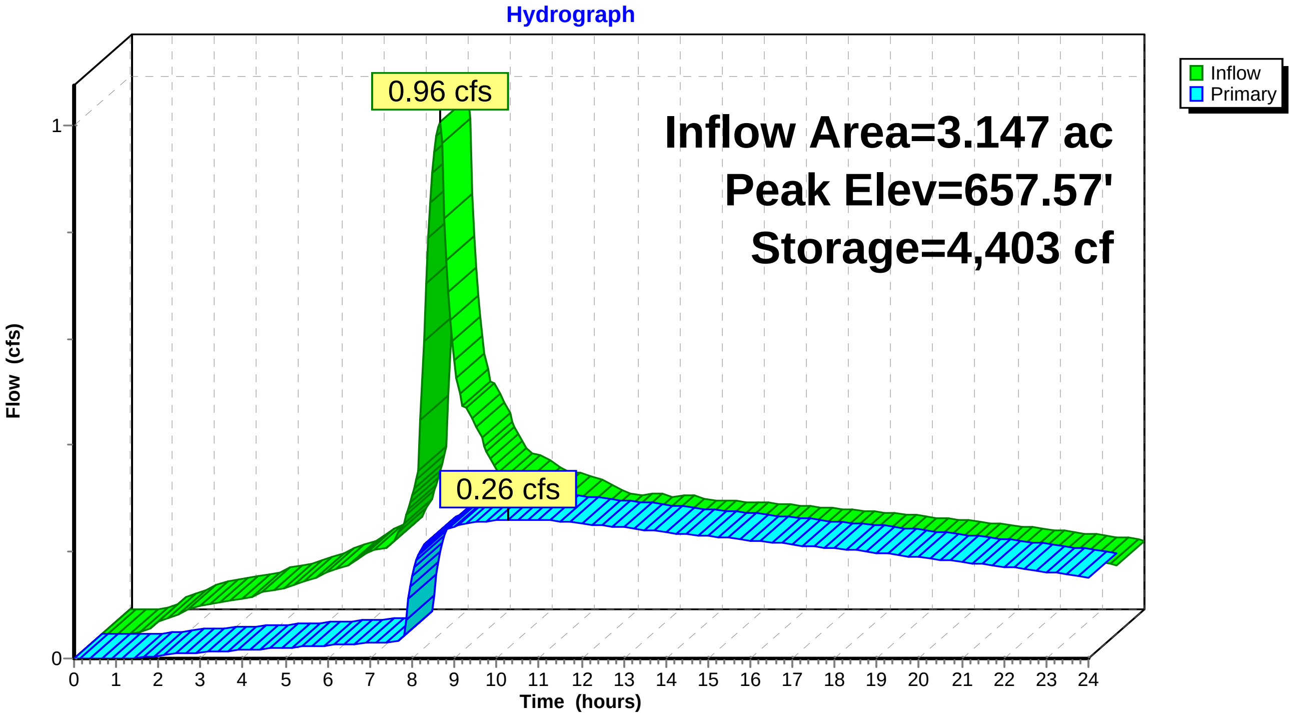
Volume	Invert	Avail.Storage	Storage Description
#1	655.00'	8,467 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
655.00	1,092	0	0
656.00	1,555	1,324	1,324
657.00	2,074	1,815	3,138
658.00	2,650	2,362	5,500
659.00	3,283	2,967	8,467

Device	Routing	Invert	Outlet Devices
#1	Device 2	655.00'	**2.0' long (Profile 17) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 1.97 2.46 2.95 Coef. (English) 2.84 3.13 3.26 3.30 3.31 3.31
#2	Device 5	655.00'	**1.0" Vert. WQ Orifice** C= 0.620
#3	Device 5	656.65'	**3.0" Vert. Orifice/Grate** C= 0.620
#4	Device 5	657.77'	**2.0' long (Profile 17) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 1.97 2.46 2.95 Coef. (English) 2.84 3.13 3.26 3.30 3.31 3.31
#5	Primary	654.90'	**12.0" x 251.0' long Culvert** Ke= 0.500 Outlet Invert= 642.00' S= 0.0514 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=0.26 cfs @ 10.29 hrs HW=657.57' (Free Discharge)
- **5=Culvert** (Passes 0.26 cfs of 5.56 cfs potential flow)
  - **2=WQ Orifice** (Orifice Controls 0.04 cfs @ 7.90 fps)
    - **1=Broad-Crested Rectangular Weir** (Passes 0.04 cfs of 27.20 cfs potential flow)
  - **3=Orifice/Grate** (Orifice Controls 0.22 cfs @ 4.42 fps)
  - **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Stormwater Facility



```
                  Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
                   Runoff by SBUH method, Split Pervious/Imperv.
     Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: TVFR Station 55 Site   Runoff Area=112,420 sf   28.99% Impervious   Runoff Depth>1.79"
                                                     Tc=5.0 min   CN=75/98   Runoff=1.04 cfs  0.385 af

Subcatchment 20S: Tax Lot 12300          Runoff Area=24,652 sf   31.42% Impervious   Runoff Depth>1.79"
                          Flow Length=185'   Slope=0.1200 '/'   Tc=9.0 min   CN=74/98   Runoff=0.22 cfs  0.084 af

Pond 1P: Stormwater Facility               Peak Elev=657.87'  Storage=5,162 cf   Inflow=1.26 cfs  0.469 af
                                                                                Outflow=0.48 cfs  0.387 af

         Total Runoff Area = 3.147 ac   Runoff Volume = 0.469 af   Average Runoff Depth = 1.79"
                                      70.57% Pervious = 2.221 ac     29.43% Impervious = 0.926 ac
```

Summary for Subcatchment 1S: TVFR Station 55 Site

[49] Hint: Tc<2dt may require smaller dt

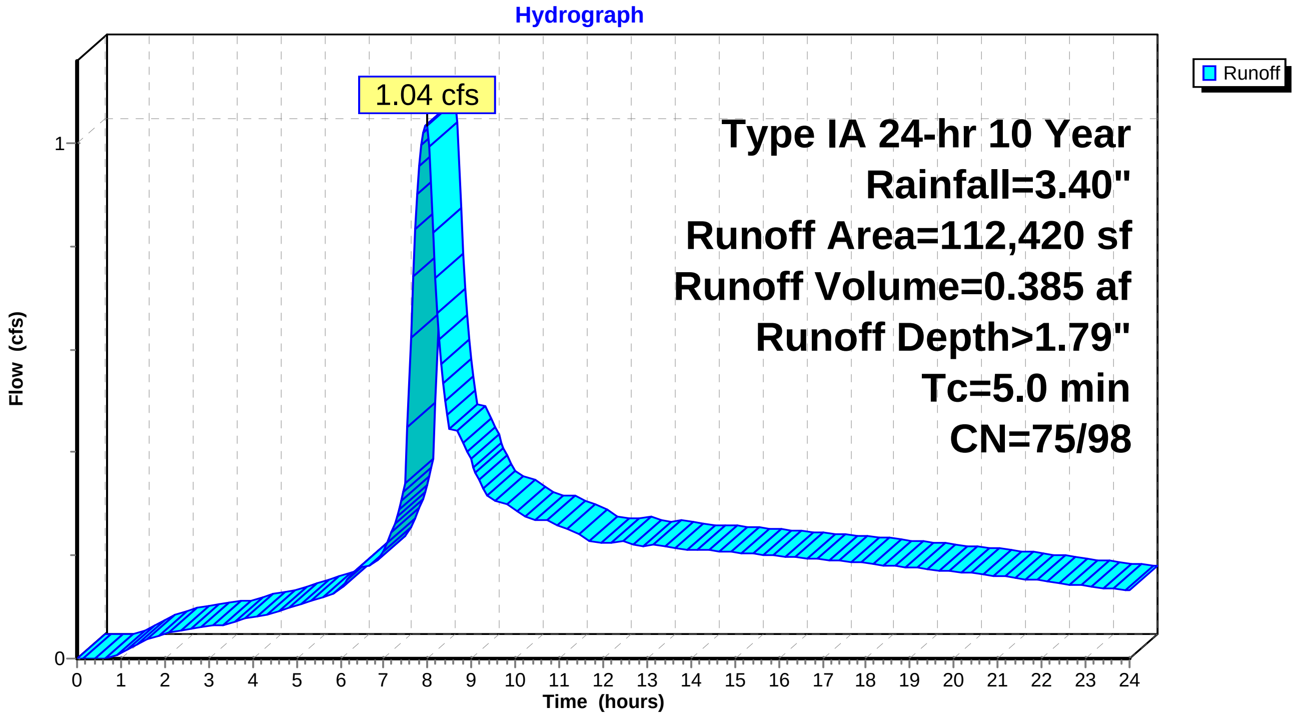
Runoff = 1.04 cfs @ 7.97 hrs, Volume= 0.385 af, Depth> 1.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=3.40"

Area (sf)	CN	Description
32,593	98	Paved parking & roofs
6,059	89	Gravel roads, HSG C
73,768	74	>75% Grass cover, Good, HSG C
112,420	82	Weighted Average
79,827	75	Pervious Area
32,593	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: TVFR Station 55 Site



Summary for Subcatchment 20S: Tax Lot 12300

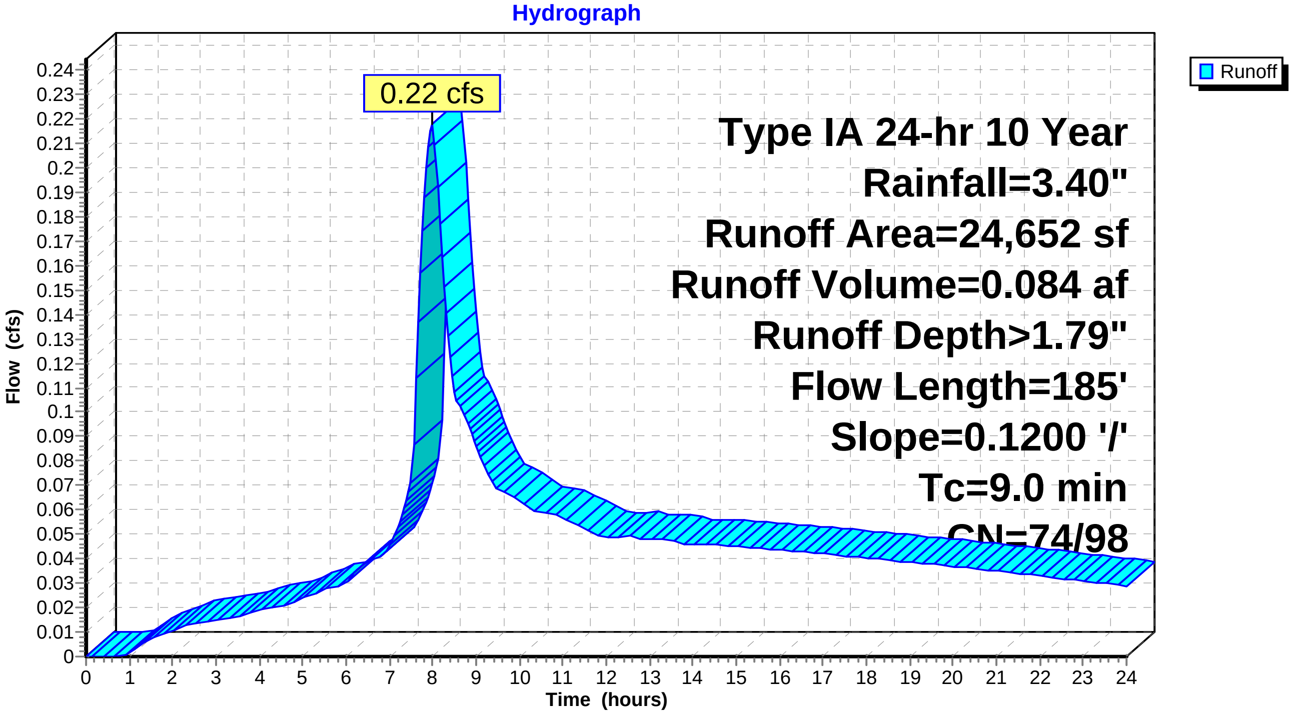
Runoff = 0.22 cfs @ 7.99 hrs, Volume= 0.084 af, Depth> 1.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=3.40"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

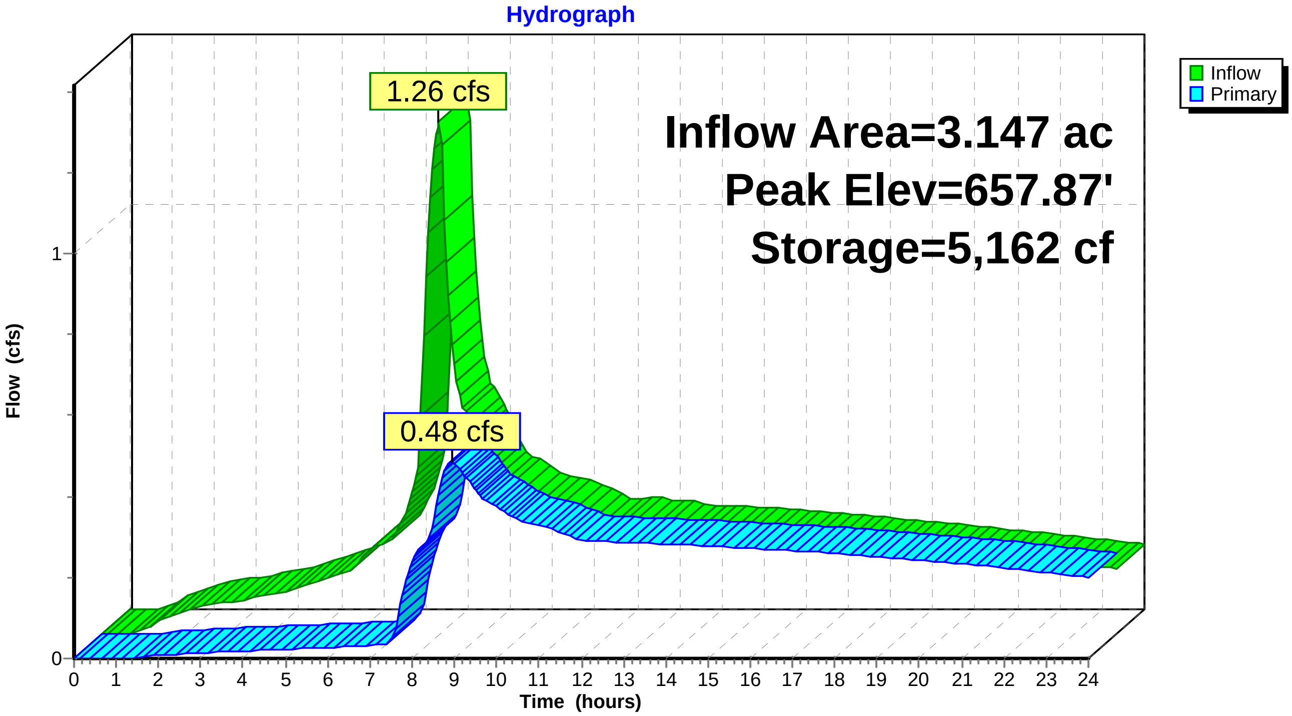
Subcatchment 20S: Tax Lot 12300



Summary for Pond 1P: Stormwater Facility

```
Inflow Area =       3.147 ac, 29.43% Impervious, Inflow Depth >  1.79"   for 10 Year event
Inflow      =      1.26 cfs @   7.98 hrs, Volume=        0.469 af
Outflow     =      0.48 cfs @   8.94 hrs, Volume=        0.387 af, Atten= 62%, Lag= 57.8 min
Primary     =      0.48 cfs @   8.94 hrs, Volume=        0.387 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 657.87' @ 8.94 hrs   Surf.Area= 2,576 sf   Storage= 5,162 cf
Flood Elev= 659.00'   Surf.Area= 3,283 sf   Storage= 8,467 cf

Plug-Flow detention time= 246.5 min calculated for 0.387 af (83% of inflow)
Center-of-Mass det. time= 135.8 min ( 888.6 - 752.8 )

Volume      Invert    Avail.Storage   Storage Description
  #1       655.00'         8,467 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

 Elevation      Surf.Area        Inc.Store       Cum.Store
    (feet)        (sq-ft)     (cubic-feet)    (cubic-feet)
    655.00          1,092                0               0
    656.00          1,555            1,324           1,324
    657.00          2,074            1,815           3,138
    658.00          2,650            2,362           5,500
    659.00          3,283            2,967           8,467

Device   Routing        Invert   Outlet Devices
  #1     Device 2      655.00'   2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                 Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                 Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
  #2     Device 5      655.00'   1.0" Vert. WQ Orifice  C= 0.620
  #3     Device 5      656.65'   3.0" Vert. Orifice/Grate  C= 0.620
  #4     Device 5      657.77'   2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                 Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                 Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
  #5     Primary       654.90'   12.0"  x 251.0' long Culvert  Ke= 0.500
                                 Outlet Invert= 642.00'   S= 0.0514 '/'   Cc= 0.900   n= 0.013

Primary OutFlow  Max=0.48 cfs @ 8.94 hrs  HW=657.87'   (Free Discharge)
↑
└─5=Culvert  (Passes 0.48 cfs of 5.94 cfs potential flow)
    ↑
    ├─2=WQ Orifice  (Orifice Controls 0.05 cfs @ 8.37 fps)
    │ ↑
    │ └─1=Broad-Crested Rectangular Weir (Passes 0.05 cfs of 32.20 cfs potential flow)
    ├─3=Orifice/Grate  (Orifice Controls 0.26 cfs @ 5.21 fps)
    └─4=Broad-Crested Rectangular Weir (Weir Controls 0.18 cfs @ 0.90 fps)
```

Pond 1P: Stormwater Facility



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: TVFR Station 55 Site Runoff Area=112,420 sf 28.99% Impervious Runoff Depth>2.19"
Tc=5.0 min CN=75/98 Runoff=1.30 cfs 0.471 af

Subcatchment 20S: Tax Lot 12300 Runoff Area=24,652 sf 31.42% Impervious Runoff Depth>2.19"
Flow Length=185' Slope=0.1200 '/' Tc=9.0 min CN=74/98 Runoff=0.27 cfs 0.103 af

Pond 1P: Stormwater Facility Peak Elev=657.99' Storage=5,469 cf Inflow=1.57 cfs 0.574 af
Outflow=0.89 cfs 0.480 af

Total Runoff Area = 3.147 ac Runoff Volume = 0.574 af Average Runoff Depth = 2.19"
70.57% Pervious = 2.221 ac 29.43% Impervious = 0.926 ac

Summary for Subcatchment 1S: TVFR Station 55 Site

[49] Hint: Tc<2dt may require smaller dt

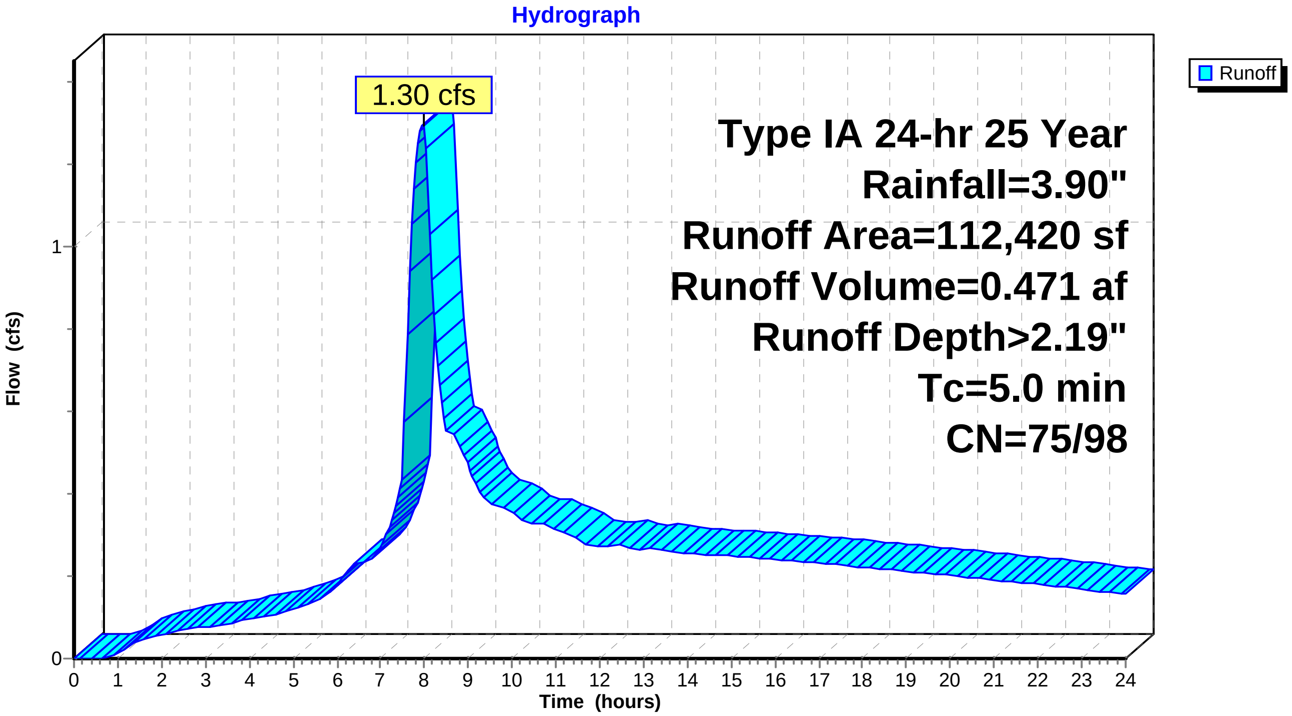
Runoff = 1.30 cfs @ 7.96 hrs, Volume= 0.471 af, Depth> 2.19"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 Year Rainfall=3.90"

Area (sf)	CN	Description
32,593	98	Paved parking & roofs
6,059	89	Gravel roads, HSG C
73,768	74	>75% Grass cover, Good, HSG C
112,420	82	Weighted Average
79,827	75	Pervious Area
32,593	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: TVFR Station 55 Site



Summary for Subcatchment 20S: Tax Lot 12300

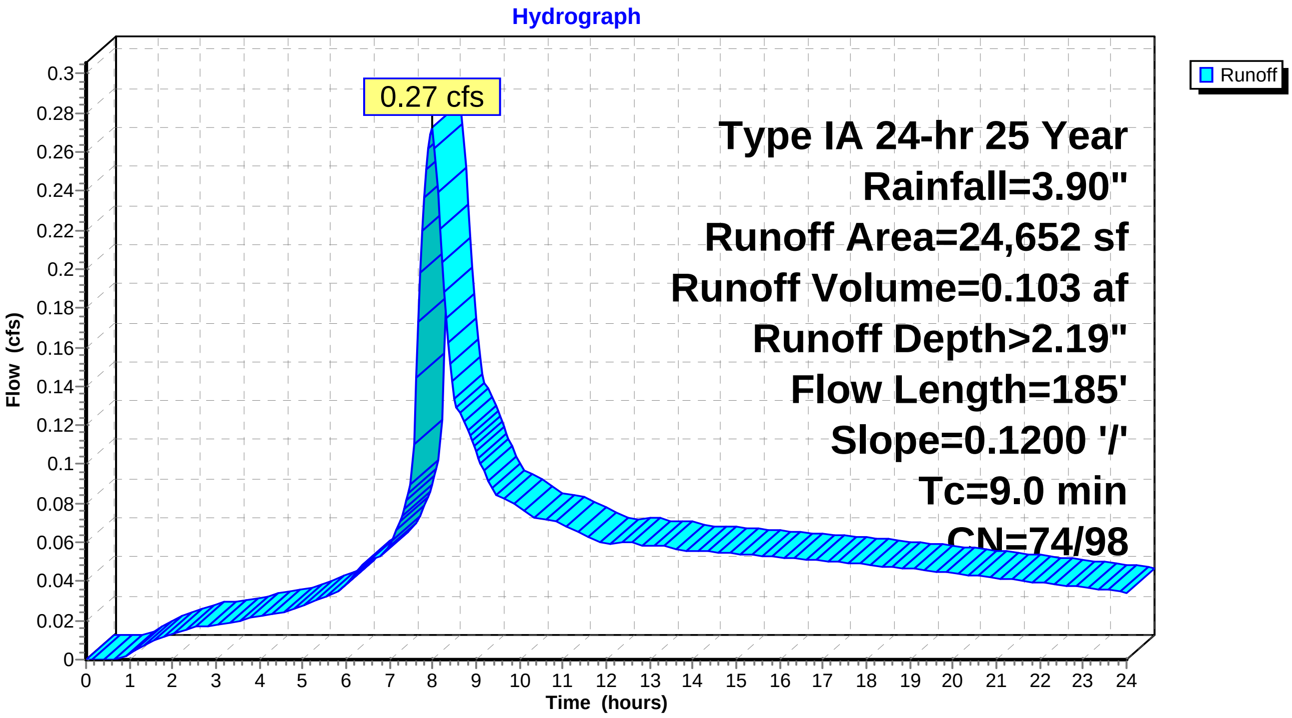
Runoff = 0.27 cfs @ 7.99 hrs, Volume= 0.103 af, Depth> 2.19"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 Year Rainfall=3.90"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

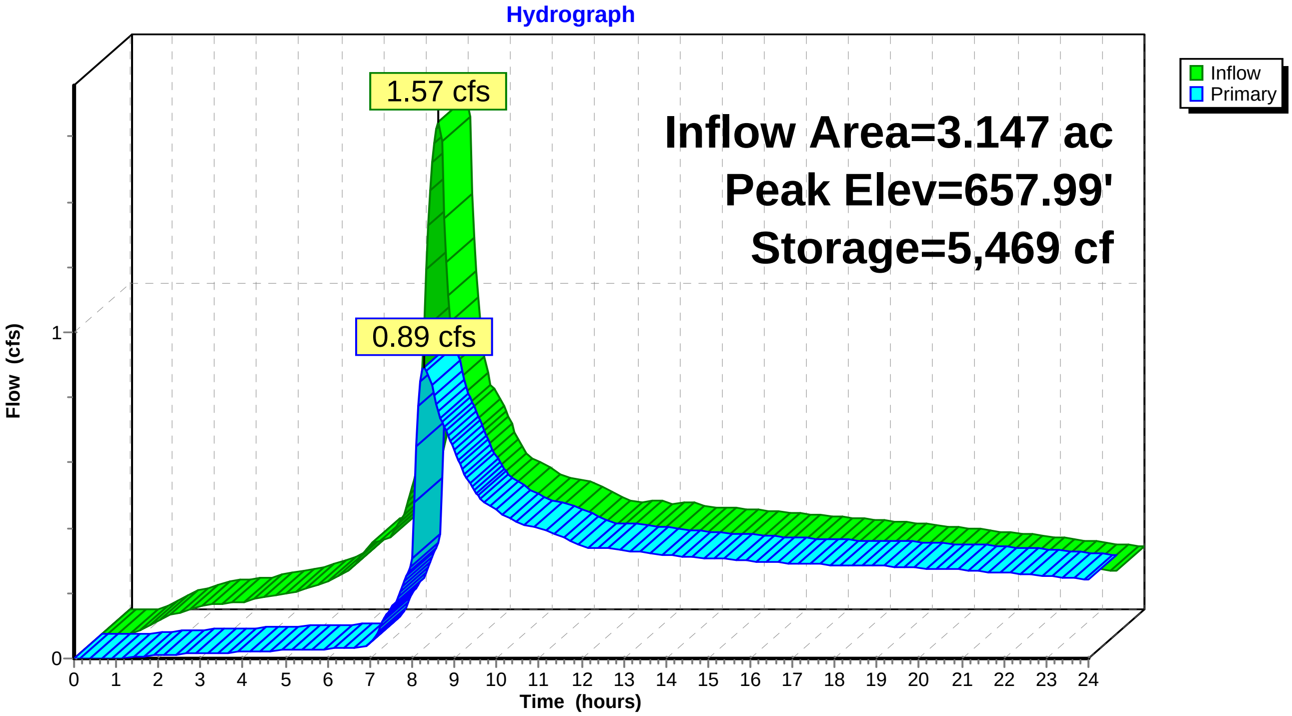
Subcatchment 20S: Tax Lot 12300



Summary for Pond 1P: Stormwater Facility

```
Inflow Area =      3.147 ac,  29.43% Impervious,  Inflow Depth >   2.19"    for  25 Year event
Inflow      =      1.57 cfs @    7.97 hrs,  Volume=        0.574 af
Outflow     =      0.89 cfs @    8.30 hrs,  Volume=        0.480 af,  Atten= 43%,  Lag= 19.5 min
Primary     =      0.89 cfs @    8.30 hrs,  Volume=        0.480 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 657.99' @ 8.30 hrs   Surf.Area= 2,643 sf   Storage= 5,469 cf
Flood Elev= 659.00'   Surf.Area= 3,283 sf   Storage= 8,467 cf

Plug-Flow detention time= 217.2 min calculated for 0.479 af (83% of inflow)
Center-of-Mass det. time= 112.5 min ( 860.2 - 747.7 )

Volume     Invert    Avail.Storage  Storage Description
------------------------------------------------------------------------------------
   #1     655.00'        8,467 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

Elevation      Surf.Area        Inc.Store        Cum.Store
   (feet)         (sq-ft)     (cubic-feet)     (cubic-feet)
----------------------------------------------------------
   655.00           1,092                0                0
   656.00           1,555            1,324            1,324
   657.00           2,074            1,815            3,138
   658.00           2,650            2,362            5,500
   659.00           3,283            2,967            8,467

Device   Routing        Invert   Outlet Devices
------------------------------------------------------------------------------------
   #1    Device 2      655.00'   2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                 Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                 Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
   #2    Device 5      655.00'   1.0" Vert. WQ Orifice  C= 0.620
   #3    Device 5      656.65'   3.0" Vert. Orifice/Grate  C= 0.620
   #4    Device 5      657.77'   2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                 Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                 Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
   #5    Primary       654.90'   12.0"  x 251.0' long Culvert  Ke= 0.500
                                 Outlet Invert= 642.00'   S= 0.0514 '/'   Cc= 0.900   n= 0.013

Primary OutFlow  Max=0.89 cfs @ 8.30 hrs  HW=657.99'   (Free Discharge)
↑
└─5=Culvert  (Passes 0.89 cfs of 6.08 cfs potential flow)
    ↑
    ├─2=WQ Orifice  (Orifice Controls 0.05 cfs @ 8.54 fps)
    │  ↑
    │  └─1=Broad-Crested Rectangular Weir (Passes 0.05 cfs of 34.19 cfs potential flow)
    ├─3=Orifice/Grate  (Orifice Controls 0.27 cfs @ 5.48 fps)
    └─4=Broad-Crested Rectangular Weir (Weir Controls 0.58 cfs @ 1.33 fps)
```

Pond 1P: Stormwater Facility



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: TVFR Station 55 Site Runoff Area=112,420 sf 28.99% Impervious Runoff Depth>2.60"
Tc=5.0 min CN=75/98 Runoff=1.57 cfs 0.560 af

Subcatchment 20S: Tax Lot 12300 Runoff Area=24,652 sf 31.42% Impervious Runoff Depth>2.60"
Flow Length=185' Slope=0.1200 '/' Tc=9.0 min CN=74/98 Runoff=0.33 cfs 0.123 af

Pond 1P: Stormwater Facility Peak Elev=658.11' Storage=5,789 cf Inflow=1.90 cfs 0.682 af
Outflow=1.44 cfs 0.578 af

Total Runoff Area = 3.147 ac Runoff Volume = 0.682 af Average Runoff Depth = 2.60"
70.57% Pervious = 2.221 ac 29.43% Impervious = 0.926 ac

Summary for Subcatchment 1S: TVFR Station 55 Site

[49] Hint: Tc<2dt may require smaller dt

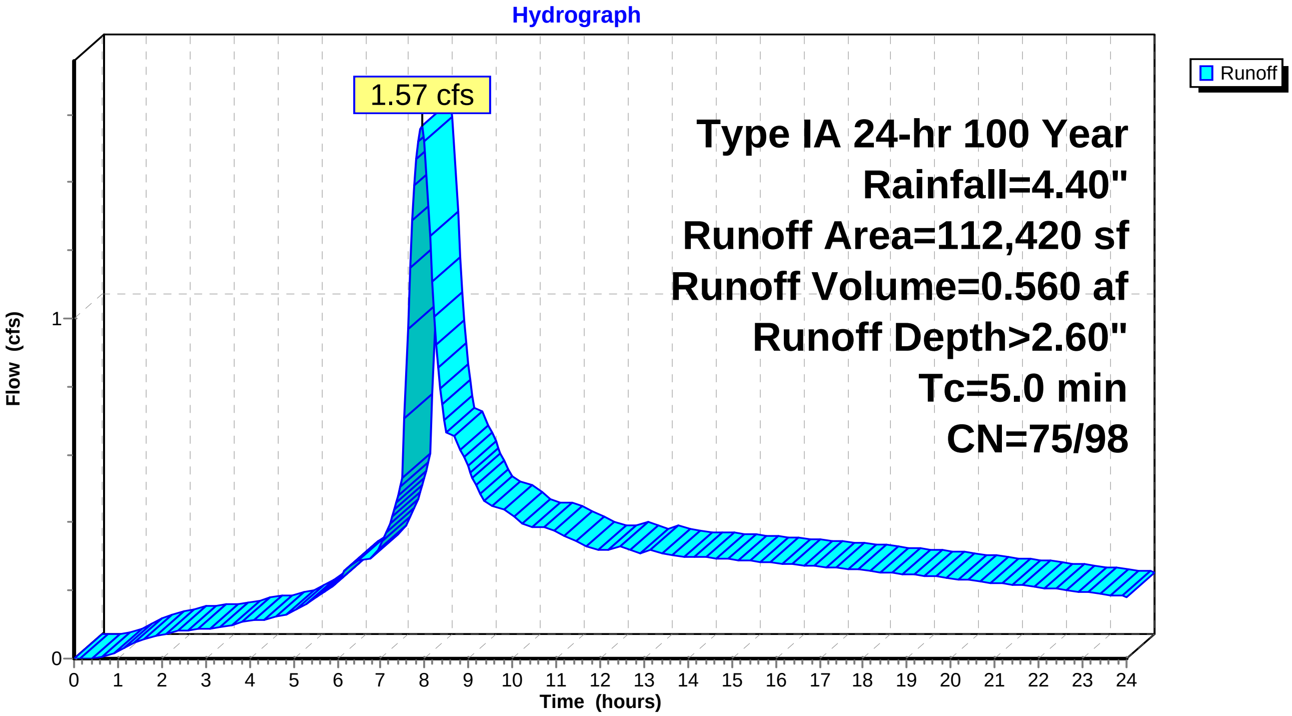
Runoff = 1.57 cfs @ 7.96 hrs, Volume= 0.560 af, Depth> 2.60"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=4.40"

Area (sf)	CN	Description
32,593	98	Paved parking & roofs
6,059	89	Gravel roads, HSG C
73,768	74	>75% Grass cover, Good, HSG C
112,420	82	Weighted Average
79,827	75	Pervious Area
32,593	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 1S: TVFR Station 55 Site



Summary for Subcatchment 20S: Tax Lot 12300

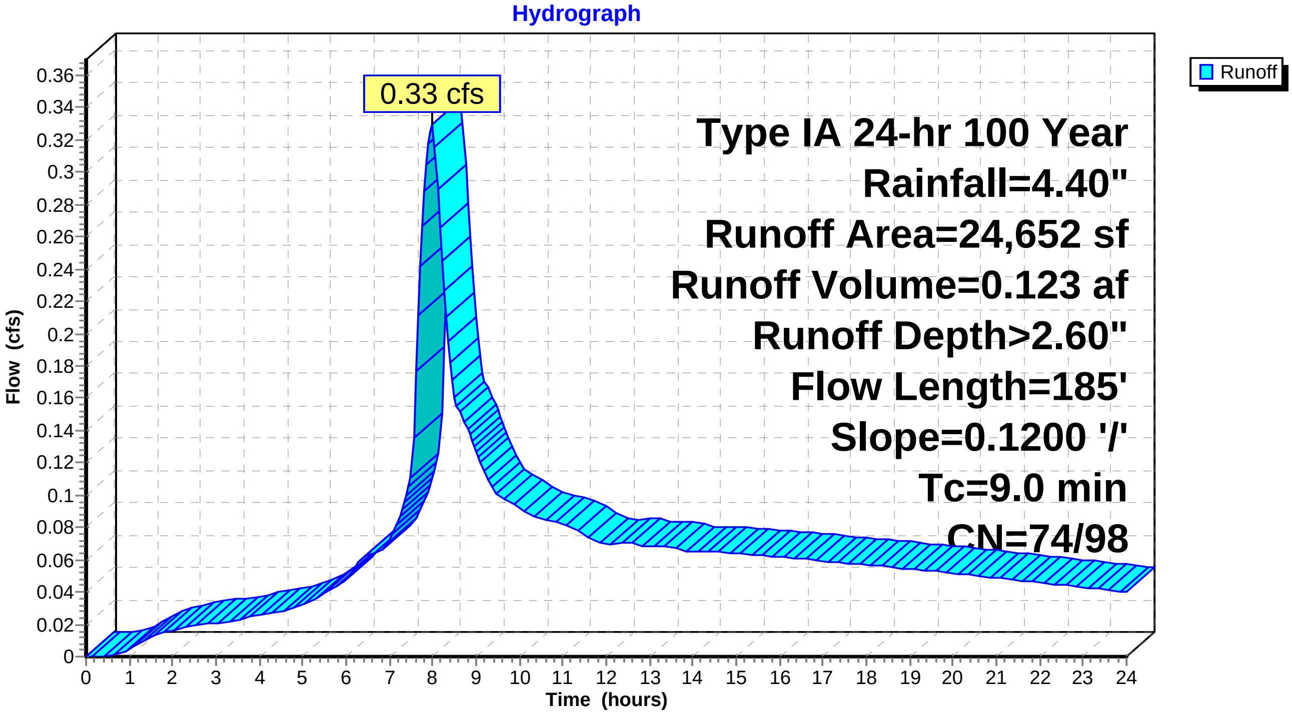
Runoff = 0.33 cfs @ 7.99 hrs, Volume= 0.123 af, Depth> 2.60"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=4.40"

Area (sf)	CN	Description
16,906	74	>75% Grass cover, Good, HSG C
7,746	98	Paved parking & roofs
24,652	82	Weighted Average
16,906	74	Pervious Area
7,746	98	Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.0	185	0.1200	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.40"

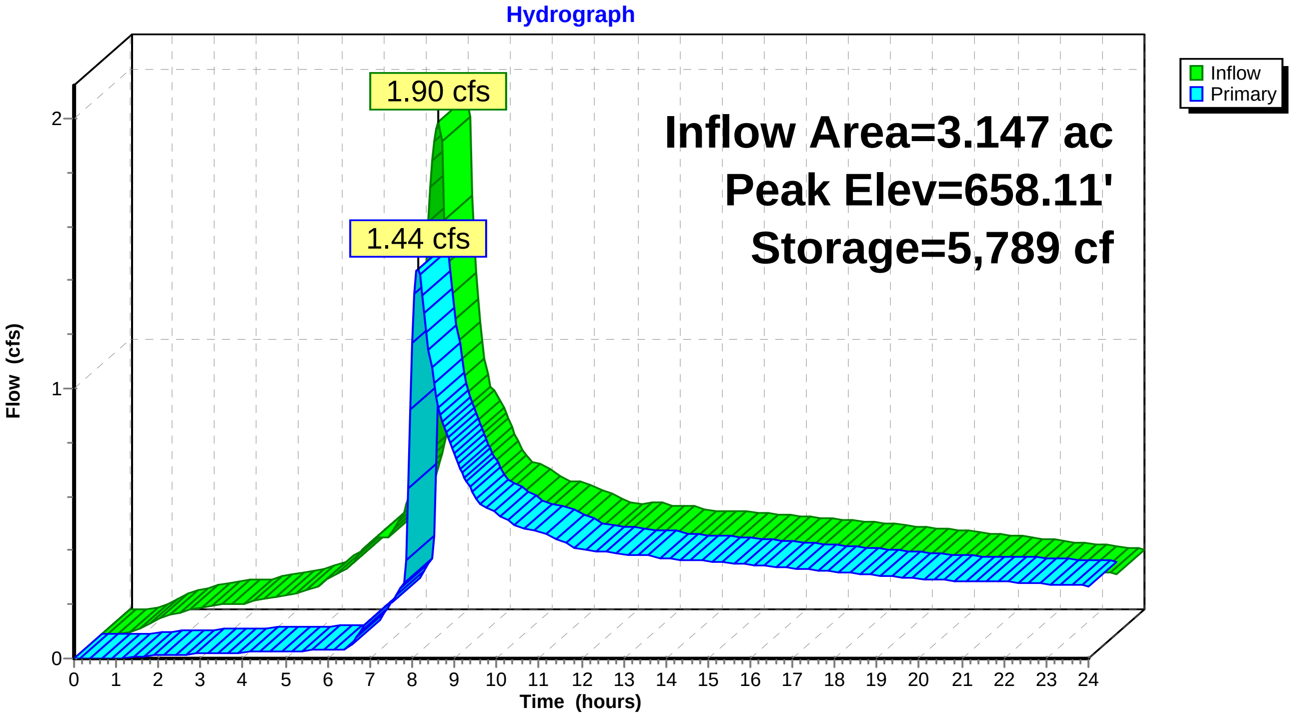
Subcatchment 20S: Tax Lot 12300



Summary for Pond 1P: Stormwater Facility

```
Inflow Area =        3.147 ac,  29.43% Impervious,  Inflow Depth >   2.60"    for  100 Year event
Inflow      =       1.90 cfs @     7.97 hrs,  Volume=           0.682 af
Outflow     =       1.44 cfs @     8.13 hrs,  Volume=           0.578 af,  Atten= 24%,  Lag= 9.8 min
Primary     =       1.44 cfs @     8.13 hrs,  Volume=           0.578 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 658.11' @ 8.13 hrs   Surf.Area= 2,718 sf   Storage= 5,789 cf
Flood Elev= 659.00'   Surf.Area= 3,283 sf   Storage= 8,467 cf

Plug-Flow detention time= 189.4 min calculated for 0.578 af (85% of inflow)
Center-of-Mass det. time= 90.8 min ( 833.7 - 742.8 )

Volume       Invert     Avail.Storage   Storage Description
   #1       655.00'          8,467 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

 Elevation          Surf.Area          Inc.Store          Cum.Store
    (feet)             (sq-ft)        (cubic-feet)       (cubic-feet)
  655.00              1,092                  0                  0
  656.00              1,555              1,324              1,324
  657.00              2,074              1,815              3,138
  658.00              2,650              2,362              5,500
  659.00              3,283              2,967              8,467

Device   Routing          Invert   Outlet Devices
   #1    Device 2        655.00'   2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                   Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                   Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
   #2    Device 5        655.00'   1.0" Vert. WQ Orifice  C= 0.620
   #3    Device 5        656.65'   3.0" Vert. Orifice/Grate  C= 0.620
   #4    Device 5        657.77'   2.0' long  (Profile 17) Broad-Crested Rectangular Weir
                                   Head (feet)  0.49  0.98  1.48  1.97  2.46  2.95
                                   Coef. (English)  2.84  3.13  3.26  3.30  3.31  3.31
   #5    Primary         654.90'   12.0"  x 251.0' long Culvert  Ke= 0.500
                                   Outlet Invert= 642.00'   S= 0.0514 '/'   Cc= 0.900   n= 0.013

Primary OutFlow  Max=1.44 cfs @ 8.13 hrs  HW=658.11'   (Free Discharge)
↑
└─5=Culvert  (Passes 1.44 cfs of 6.22 cfs potential flow)
   ↑
   ├─2=WQ Orifice  (Orifice Controls 0.05 cfs @ 8.71 fps)
   │  ↑
   │  └─1=Broad-Crested Rectangular Weir (Passes 0.05 cfs of 36.25 cfs potential flow)
   ├─3=Orifice/Grate  (Orifice Controls 0.28 cfs @ 5.74 fps)
   └─4=Broad-Crested Rectangular Weir (Weir Controls 1.11 cfs @ 1.65 fps)
```

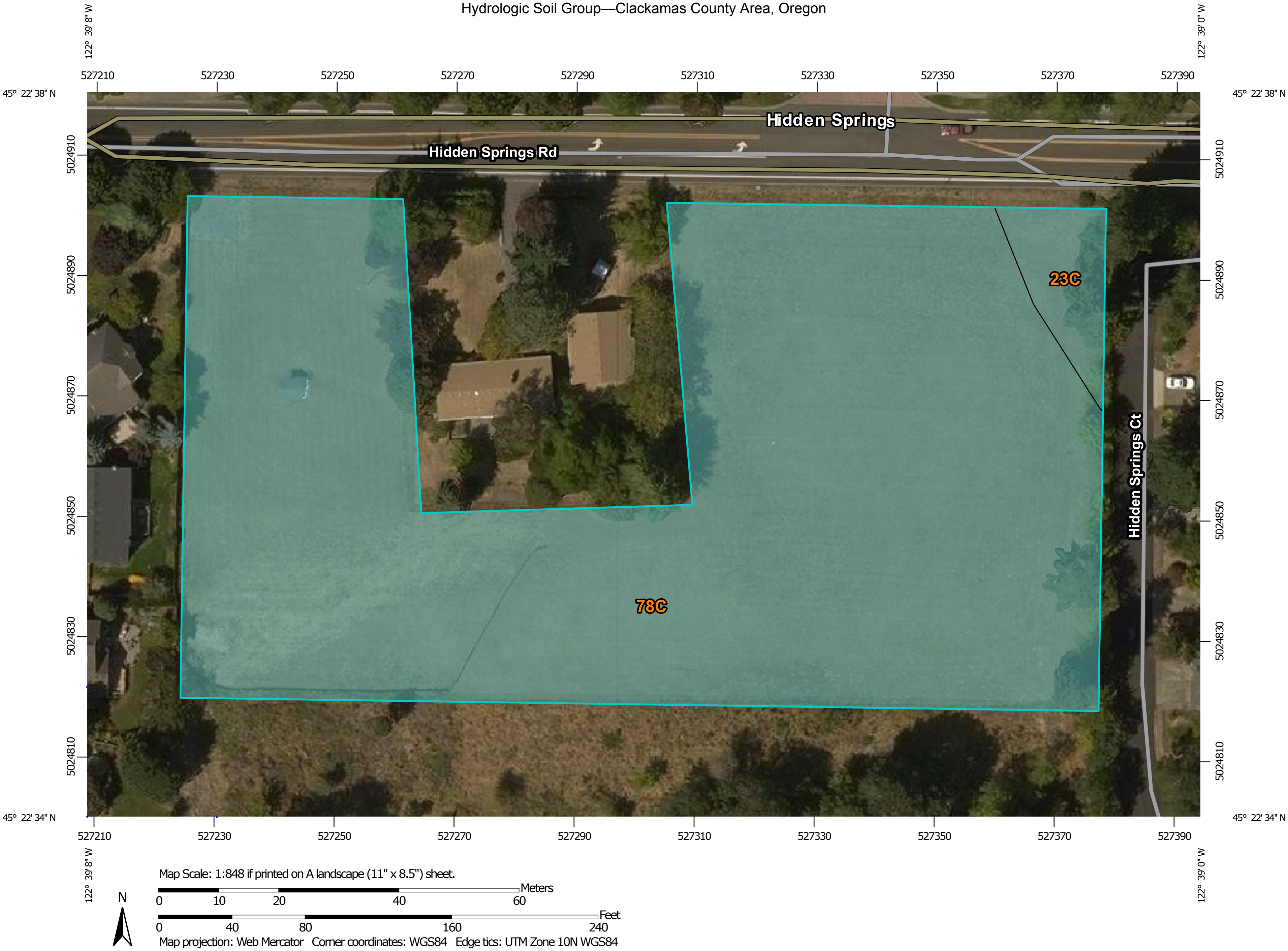
Pond 1P: Stormwater Facility



APPENDIX C

USDA-NRCS SOIL RESOURCE REPORT

Hydrologic Soil Group—Clackamas County Area, Oregon



Map Scale: 1:848 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

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: http://websoilsurvey.nrcs.usda.gov
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 10, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 26, 2014—Sep 5, 2014

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Clackamas County Area, Oregon (OR610)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
23C	Cornelius silt loam, 8 to 15 percent slopes	C	0.1	3.3%
78C	Saum silt loam, 8 to 15 percent slopes	C	2.5	96.7%
Totals for Area of Interest			**2.6**	**100.0%**

Description

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.

Rating Options

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

APPENDIX D

NRCS URBAN HYDROLOGY FOR SMALL WATERSHEDS

TR55 RUNOFF CURVE NUMBERS

TR55 RUNOFF CURVE NUMBERS

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
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 storm 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
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
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
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

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[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Section 4

Attachment E: TVF&R Station 55 Traffic Impact Study, Lancaster Engineering, August 9, 2016

TUALATIN VALLEY FIRE & RESCUE STATION #55
HIDDEN SPRINGS
TRAFFIC IMPACT STUDY

WEST LINN, OREGON

DATE:
August 9, 2016

PREPARED FOR:
Tualatin Valley Fire & Rescue

PREPARED BY:
Daniel Stumpf, EI
Todd Mobley, PE

REGISTERED PROFESSIONAL
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TODD E. MOBLEY

RENEWS: 12/31/2016

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ENGINEERING

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EXECUTIVE SUMMARY

1. The Tualatin Valley Fire & Rescue (TVF&R) Station #55 – Hidden Springs, has been proposed for development in West Linn, Oregon. The project site includes tax lot 12301, which encompasses an approximate total of 2.6 acres, and is located south of Hidden Springs Road opposite of Bay Meadows Drive. The site is currently vacant and upon development will include the construction of a fire station and three accesses onto Hidden Springs Road.

2. The trip generation calculations show that the proposed development is projected to generate twelve site trips during the morning peak hour, four site trips during the mid-day peak hour, four site trips during the evening peak hour, and a total of 54 weekday trips.

3. Based on the results of the operational analysis, all study intersections are currently operating acceptably per City of West Linn standards and are projected to continue operating acceptably through year 2018 either with or without the addition of site trips from the proposed development. No operational mitigation is necessary or recommended.

4. Based on the most recent five years of crash data, no significant safety hazards were identified at any of the study intersections and no mitigation is recommended.

5. Adequate sight distance is available for the proposed site accesses along Hidden Springs Road given that on-site and roadside foliage located at the northeastern and northwestern sections of the project site, respectively, are removed. No other sight distance mitigation is necessary or recommended.

6. Left-turn lane warrants are met for the southbound approach at the intersection of Rosemont Road at Hidden Springs Road under existing conditions during the mid-day and evening peak hours. This intersection was restriped by the City of West Linn in 2015, which provided additional width on the southbound approach and adequate space for left-turning traffic. Left-turn lane warrants are not projected to be met for any of the other study intersections under any of the year 2018 analysis scenarios.

7. Traffic signal warrants will not be met for any of the unsignalized study intersections under any analysis scenarios through year 2018.

PROJECT DESCRIPTION & LOCATION

INTRODUCTION

The Tualatin Valley Fire & Rescue (TVF&R) Station #55 – Hidden Springs has been proposed for development in West Linn, Oregon. The project site includes tax lot 12301, which encompasses an approximate total of 2.6 acres, and is located south of Hidden Springs Road opposite of Bay Meadows Drive. The site is currently vacant and upon development will include the construction of a firehouse and three accesses onto Hidden Springs Road.

This report addresses the transportation impacts of the proposed development on the nearby street system. Based on correspondence with Khoi Le, a Civil Engineer with the City of West Linn, analysis was required at the following intersections:

1. Rosemont Road at Hidden Springs Road;
2. Proposed west access at Hidden Springs Road;
3. Bay Meadow Drive at Hidden Springs Road (site access);
4. Proposed east access at Hidden Springs Road; and
5. Santa Anita Drive at Hidden Springs Road.

The purpose of this study is to determine whether the transportation system in 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

The project site is located south of Hidden Springs Road opposite of Bay Meadows Drive in West Linn, Oregon. The site is currently vacant and undeveloped.

The subject site is located in a predominantly residential area. More specifically, single-family detached homes are located to the north, east and west of the site and forested lands are located to the south. One notable development within a half-mile walking/biking distance from the project site includes Trillium Creek Primary School, which is located south of the site.

VICINITY STREETS

Hidden Springs Road is classified by the City of West Linn as a Minor Arterial. The roadway has a two-lane cross-section and has a posted speed of 25 mph. Curbs and bicycle lanes are provided along both sides of the roadway. Sidewalks are provided along the north side and are intermittent along the south side.

Rosemont Road is classified by the City of West Linn as a Minor Arterial. The roadway has a two-lane cross-section north of and a three-lane cross-section, with one travel lane in each direction and a center two-way left-turn lane, south of Hidden Springs Road. It has a posted speed of 40 mph within the site vicinity. A school speed zone is in effect during school hours between Hidden Springs Road and Bay Meadows Drive. Curbs, sidewalks, and a bicycle lane are provided along the east side of the roadway.

Bay Meadows Drive is classified by the City of West Linn as a Local Road. The roadway has a two-lane cross-section, without centerline striping delineating directional travel lanes, and has a posted speed of 25 mph. On-street parking is permitted along both sides of the roadway. Curbs and sidewalks are provided along both sides of the roadway.

Santa Anita Drive is classified by the City of West Linn as a Minor Arterial. The roadway has a three-lane cross-section, with one travel lane in each direction and a center raised median, and has a posted speed of 25 mph. Curbs, and bicycle lanes are provided along both sides of the roadway while sidewalks are only intermittently provided.

STUDY INTERSECTIONS

The intersection of Rosemont Road at Hidden Springs Road is a four-legged intersection that is stop-controlled for the eastbound approach of S Wisteria Road and the westbound approach of Hidden Springs Road. The southbound and eastbound approaches each have one shared lane for all turning movements. The northbound and westbound approaches each have one shared lane for all turning movements and a bicycle lane to the right of each standard travel lane. A crosswalk is marked across the eastern intersection leg.

The intersection of Bay Meadows Drive at Hidden Springs Road is currently a three-legged intersection that is stop-controlled for the southbound approach of Bay Meadows Drive. The southbound approach has one shared lane for all turning movements. The eastbound approach has one left-turn lane, one through lane, and one bicycle lane to the right of the outermost standard travel lane. The westbound approach has one shared lane for all turning movements and a bicycle lane to the right of the standard travel lane. One of the crosswalks is marked across the northern intersection leg. Upon development of the site the intersection will be converted to a four-legged intersection that will be stop-controlled for the northbound and southbound approaches. The northbound approach will serve outbound emergency response vehicles only.

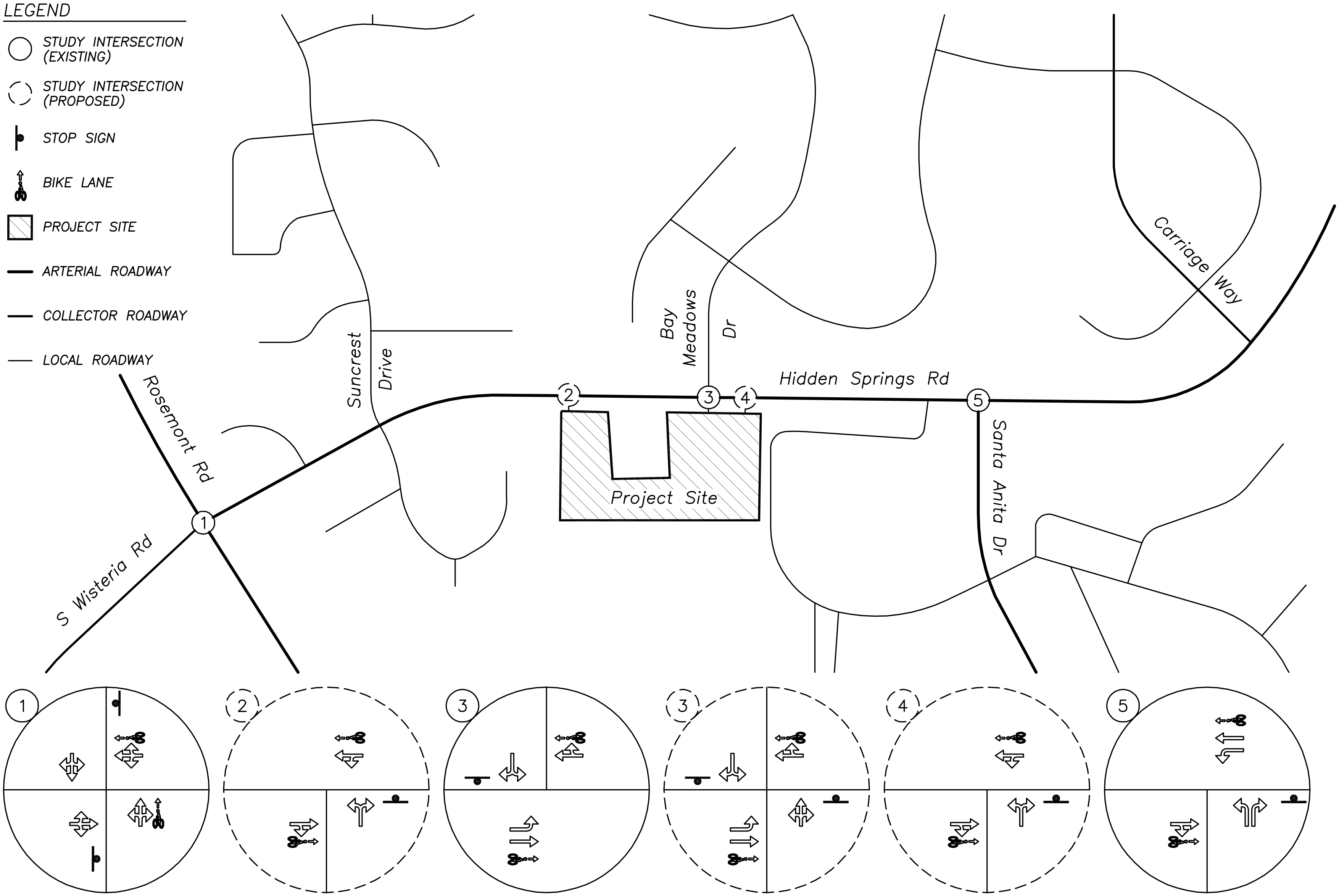
The intersection of Santa Anita Drive at Hidden Springs Road is a three-legged intersection that is stop-controlled for the northbound approach of Santa Anita Drive. The northbound approach has one left-turn lane and one right-turn lane. The eastbound approach has one shared lane for all turning movements and a bicycle lane to the right of the standard travel lane. The westbound approach has one left-turn lane, one through lane, and one bicycle lane to the right of the outermost standard travel lane. A crosswalk is marked across the western intersection leg.

A vicinity map displaying the project site, vicinity streets, and the study intersections with their associated lane configurations is shown in Figure 1 on page 7.

TRAFFIC COUNTS

Traffic counts were conducted at the study intersections on Tuesday, April 5th, 2016, from 7:00 AM to 9:00 AM, 1:30 PM to 3:30 PM, and 4:00 PM to 6:00 PM. Data was used from each intersection's respective morning, mid-day, and evening peak hours.

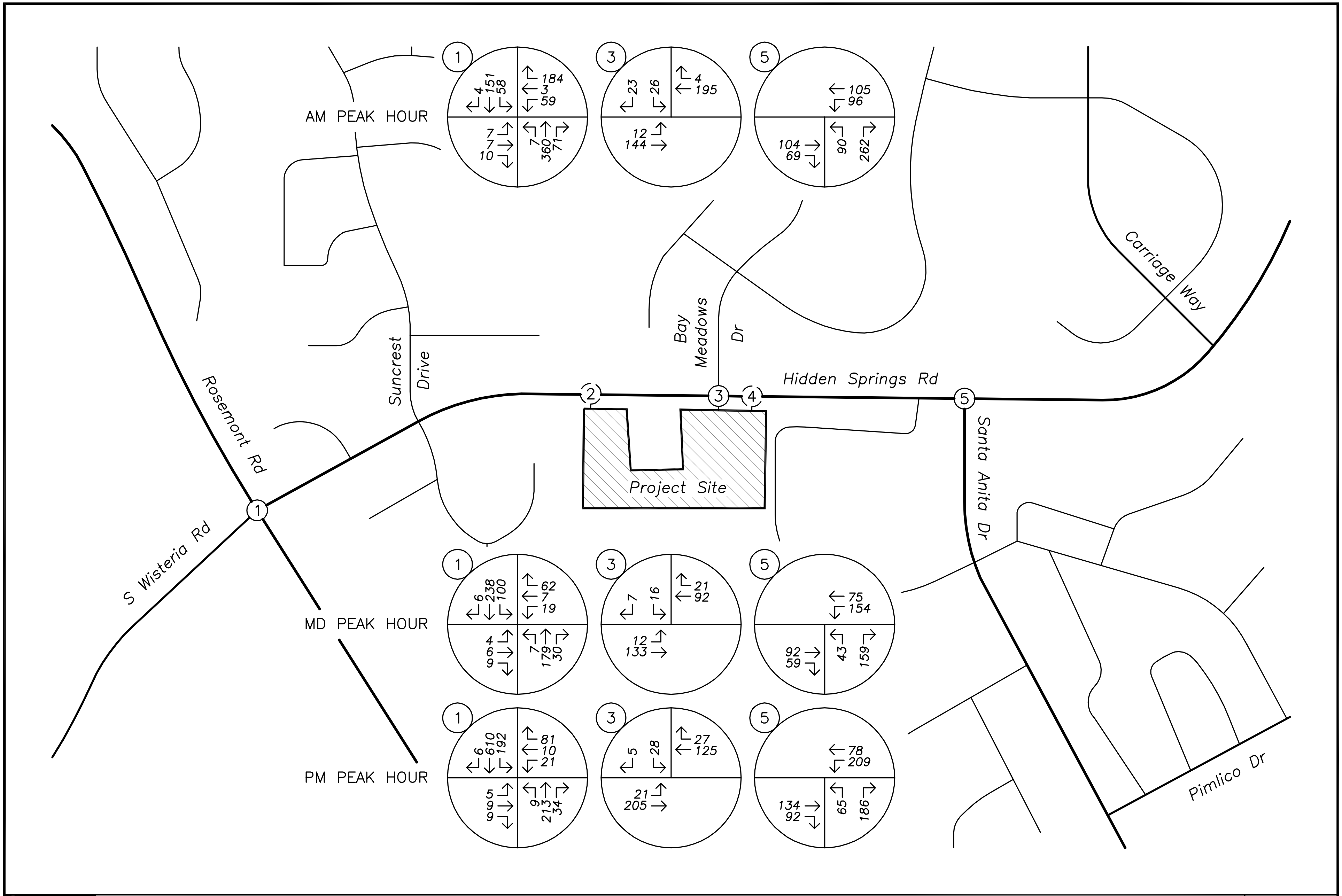
Figure 2 on page 8 shows the existing morning, mid-day, and evening peak hour traffic volumes at the study intersections.



VICINITY MAP

FIGURE 1

PAGE 7



TRAFFIC VOLUMES
Existing Conditions
AM, MD, PM Peak Hours

FIGURE
2

SITE TRIPS

TRIP GENERATION

No comparable land-use category exists in the *TRIP GENERATION MANUAL*[1] for fire stations; therefore, the size and operation of the facility was examined in order to best estimate the trip generation of the station. The trip generation calculations shown below are supported by trip data collected at other similar TVF&R stations. The proposed Station 55 is planned to have six full-time staff. Shifts for full-time staff are 24 hours in duration and shift changes will occur at 7:00 AM. The majority of site trips during the morning peak hour are typically from staff. Other trips will also be made, such as visitors, deliveries, and calls for emergency services.

It is estimated that the proposed station would generate a total of twelve trips during the morning peak hour, with six employees entering the site and six exiting. During the mid-day and evening peak hours, there are no trips expected to occur for the employees, although two trips entering and two trips exiting were included to account for visitors, deliveries, or other miscellaneous traffic. Usage of the Community Room is typically after the evening peak hour, so while this contributes to the daily trip total, it does not affect operation during the peak hour.

The trip generation calculations show that the proposed development is projected to generate twelve site trips during the morning peak hour, four site trips during the mid-day peak hour, four site trips during the evening peak hour, and a total of 54 weekday trips. The trip generation estimates are summarized in Table 1 and detailed trip generation calculations are included in the technical appendix to this report.

Table 1 - Trip Generation Summary

	Size	Morning Peak Hour			Mid-day Peak Hour			Evening Peak Hour			Weekday
		In	Out	Total	In	Out	Total	In	Out	Total	Total
Proposed TVF&R #55											
Employee Shift Change	6 Employees	6	6	12	0	0	0	0	0	0	12
Community Room	15 People	0	0	0	0	0	0	0	0	0	20
Emergency Calls	4 Events	0	0	0	0	0	0	0	0	0	8
Non-Emergency Calls,	2 Events	0	0	0	0	0	0	0	0	0	4
Visitors, Deliveries, etc.	5 People	0	0	0	2	2	4	2	2	4	10
Net New		6	6	12	2	2	4	2	2	4	54

TRIP DISTRIBUTION

TVF&R Station #55 – Hidden Springs will predominately serve residents in the surrounding areas of West Linn and unincorporated Clackamas County. It should be noted that the majority of peak-hour traffic to and from the station will not be from emergency response vehicles, but from employees, visitors, deliveries, etc. Detailed information about incident volume and response areas is included in the attached Technical Appendix. The directional distribution of peak hour site trips to/from the

---

[1] Institute of Transportation Engineers (ITE), *TRIP GENERATION MANUAL*, 9th Edition, 2012.

proposed development was estimated based on locations of likely trip destinations, locations of major transportation facilities in the site vicinity, and existing travel patterns at study intersections.

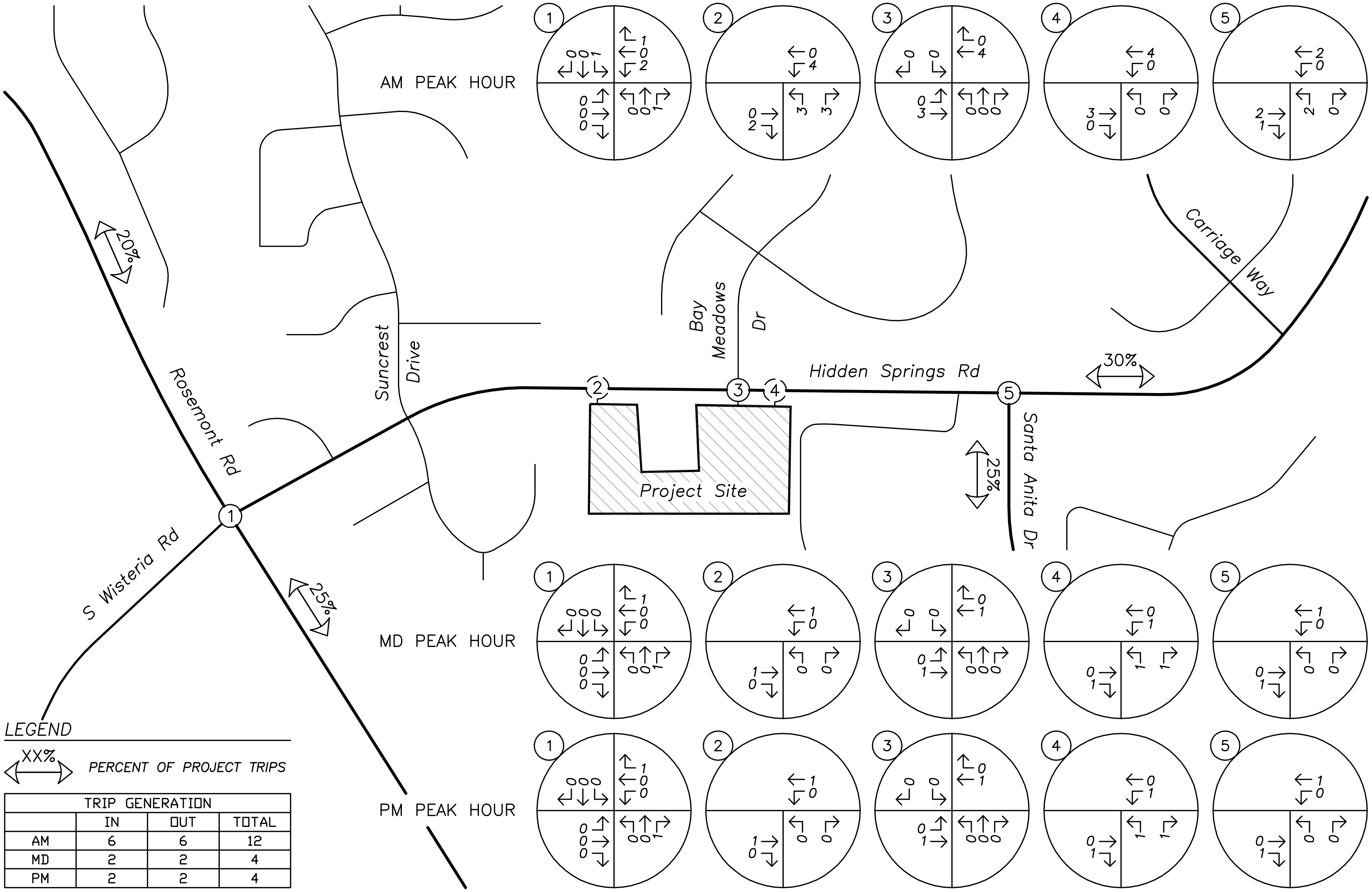
The following trip distribution was estimated and used for analysis:

- 30 percent of site trips will travel to/from the east along Hidden Springs Road;
- 25 percent of site trips will travel to/from the south along Santa Anita Drive;
- 25 percent of site trips will travel to/from the south along Rosemont Road; and
- 20 percent of site trips will travel to/from the north along Rosemond Road.

Trips to and from the proposed development are anticipated to utilize three site accesses. The west access will serve inbound emergency response vehicles and employees arriving to and departing from the site. The proposed access at the intersection of Bay Meadows Drive at Hidden Springs Road will serve outbound emergency response vehicles. The east access will serve the general public. Based on the site layout and access characteristics, site trips are anticipated to utilize site accesses accordingly.

- All morning peak hour trips will utilize the west access; and
- All mid-day and evening peak hour trips will utilize the east access.

The trip assignment for the site trips generated by the proposed development during the morning, mid-day, and evening peak hours is shown in Figure 3 on page 11.



TRIP GENERATION			
	IN	OUT	TOTAL
AM	6	6	12
MD	2	2	4
PM	2	2	4

PROPOSED DEVELOPMENT SITE
Site Trip Distribution and Assignment
AM, MD, PM Peak Hours

no scale

FIGURE 3

OPERATIONAL ANALYSIS

BACKGROUND VOLUMES

To provide analysis of the impact of the proposed development on the nearby transportation facilities, an estimate of future traffic volumes is required. In order to calculate the future traffic volumes, a compounded growth rate of two percent per year for an assumed build-out condition of two years was applied to the measured existing traffic volumes to approximate year 2018 background conditions.

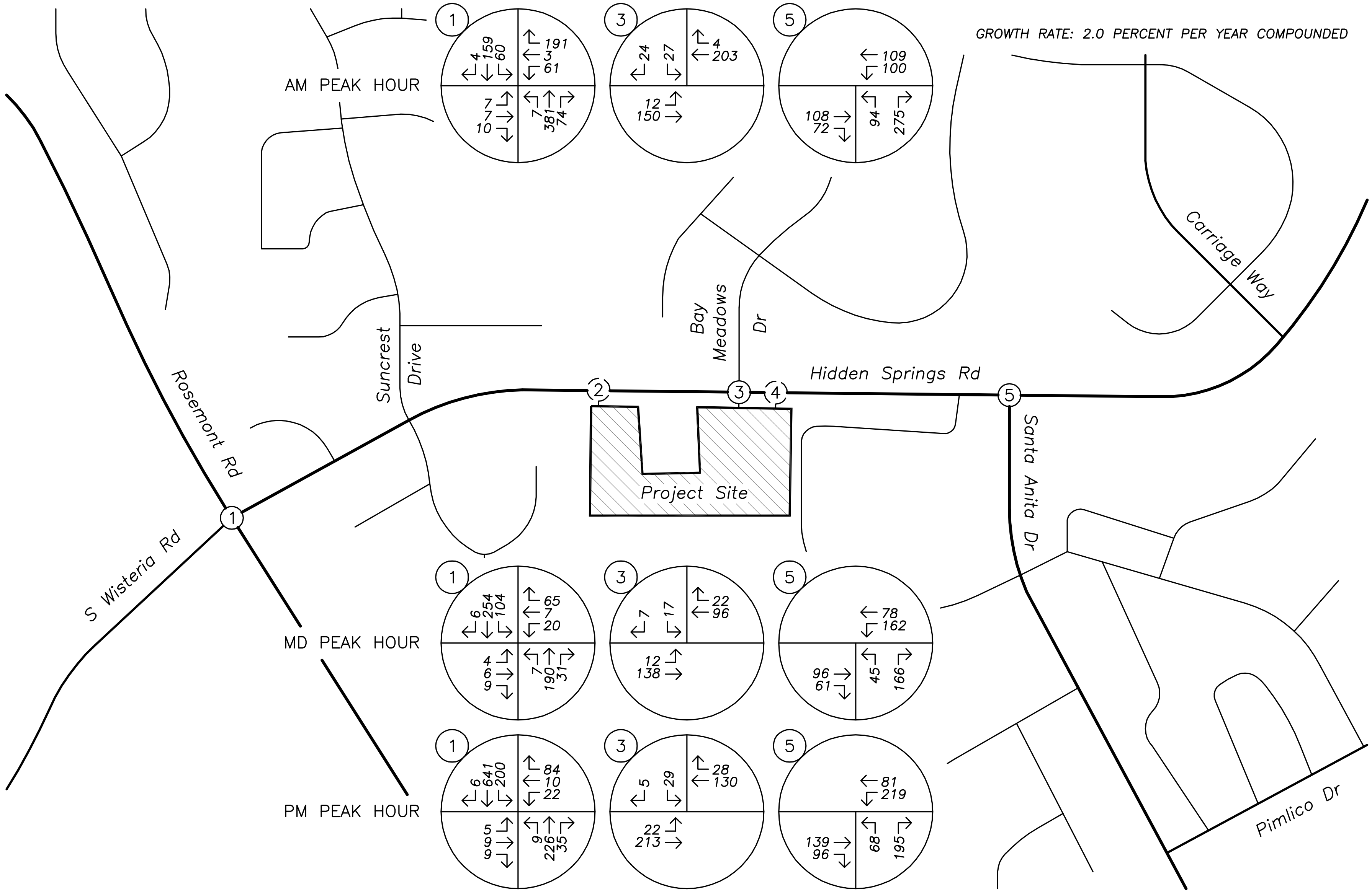
In addition to the traffic volume growth described above, there is one in-process development near the proposed project vicinity that is currently not contributing trips to the transportation system but is anticipated to by the 2018 build-out year of the proposed development. The Tanner Ridge at Rosemont Subdivision proposes the construction of 52 single-family detached homes. Based on the transportation impact study prepared for this development, additional in-process trips are included at applicable study intersections.

Figure 4 on page 13 shows the projected year 2018 background traffic volumes for the morning, mid-day, and evening peak hours at the study intersections.

BACKGROUND VOLUMES PLUS SITE TRIPS

Peak hour trips calculated to be generated from the proposed development, as described earlier within the Site Trips section, were added to the projected year 2018 background traffic volumes to obtain the expected year 2018 background volumes plus site trips.

Figure 5 on page 14 shows the projected year 2018 peak hour background traffic volumes plus proposed development site trips at the study intersections.



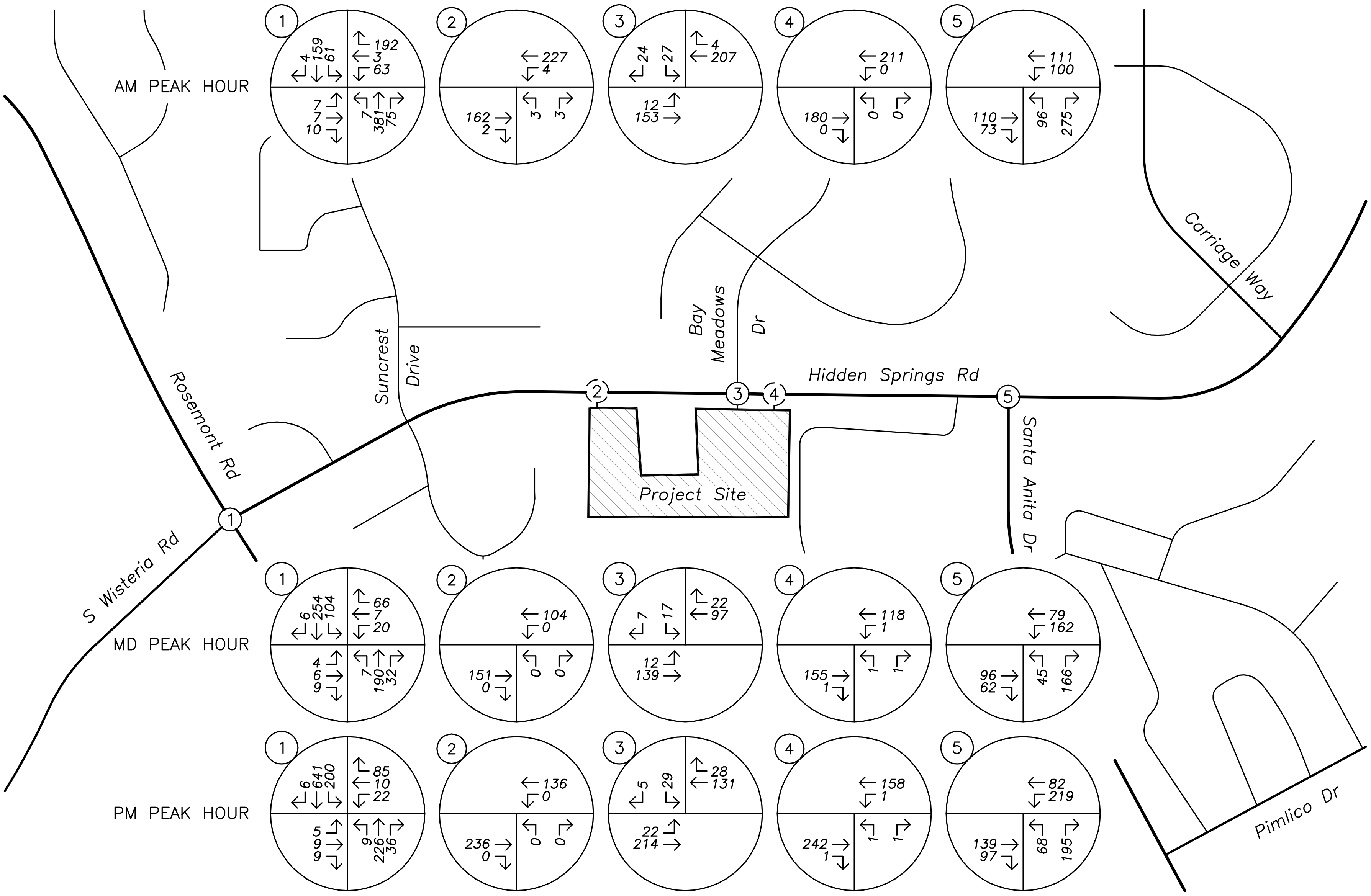
GROWTH RATE: 2.0 PERCENT PER YEAR COMPOUNDED

TRAFFIC VOLUMES
Year 2018 Background Conditions
AM, MD, PM Peak Hours

no scale

FIGURE 4

PAGE 13



TRAFFIC VOLUMES
Year 2018 Background plus Site Trips
AM, MD, PM Peak Hours

no scale

FIGURE
5

CAPACITY ANALYSIS

A capacity and delay analysis was conducted for each of the study intersections. The analysis was conducted according to the unsignalized intersection analysis methodologies in the *HIGHWAY CAPACITY MANUAL* (HCM) published by the Transportation Research Board. According to the City of West Linn's Transportation System Plan (TSP), intersections are required to operate at level-of-service (LOS) D or better, except principal arterial facilities which are required to operate at LOS E or better. The LOS of an intersection can range from A, which indicates very little or no delay experienced by vehicles, to F, which indicates a high degree of congestion and delay.

The intersection of Rosemont Road at Hidden Springs Road operates at LOS D during the morning peak hour, LOS C during the mid-day peak hour, and LOS D during the evening peak under all analysis scenarios through year 2018.

Upon build-out of the proposed development, the west access intersection at Hidden Springs Road is projected to operate at LOS B during the morning peak hour and at LOS A during the mid-day and evening peak hours.

The intersection of Bay Meadows Drive at Hidden Springs Road operates at LOS B during the morning, mid-day, and evening peak hours under all analysis scenarios through year 2018.

Upon build-out of the proposed development, the east access intersection at Hidden Springs Road is projected to operate at LOS A during the morning and mid-day peak hours and at LOS B during the evening peak hour.

The intersection of Santa Anita Drive at Hidden Springs Road operates at LOS C during the morning, mid-day, and evening peak hours under all analysis scenarios through year 2018, except under existing conditions during the mid-day peak hour where it currently operates at LOS B.

The v/c, delay, and LOS results of the capacity analysis are shown in Table 2 for the morning, mid-day, and evening peak hours. Detailed calculations as well as tables showing the relationship between delay and LOS are included in the appendix to this report.

Table 2 - Capacity Analysis Summary

	AM Peak Hour			MD Peak Hour			PM Peak Hour		
	LOS	Delay	V/C	LOS	Delay	V/C	LOS	Delay	V/C
Rosemont Rd at Hidden Springs Rd									
Existing Conditions	D	26	0.67	C	15	0.19	D	31	0.39
2018 Background Conditions	D	32	0.74	C	16	0.21	D	34	0.44
2018 Background plus Site Conditions	D	33	0.75	C	16	0.21	D	35	0.45
West Access at Hidden Springs Rd									
2018 Background plus Site Conditions	B	11	0.14	A	0	0.11	A	0	0.15
Bay Meadows Dr at Hidden Springs Rd									
Existing Conditions	B	13	0.17	B	11	0.10	B	12	0.13
2018 Background Conditions	B	13	0.18	B	11	0.10	B	12	0.14
2018 Background plus Site Conditions	B	13	0.18	B	11	0.10	B	12	0.14
East Access at Hidden Springs Rd									
2018 Background plus Site Conditions	A	0	0.15	A	10	0.11	B	11	0.16
Santa Anita Dr at Hidden Springs Rd									
Existing Conditions	C	16	0.38	B	15	0.20	C	19	0.23
2018 Background Conditions	C	17	0.40	C	15	0.21	C	20	0.24
2018 Background plus Site Conditions	C	17	0.40	C	15	0.21	C	20	0.24

Based on the results of the operational analysis, all study intersections are currently operating acceptably per City of West Linn standards and are projected to continue operating acceptably through year 2018 either with or without the addition of site trips from the proposed development. No operational mitigation is necessary or recommended.

SAFETY ANALYSIS

CRASH DATA ANALYSIS

Using data obtained from the Oregon Department of Transportation's (ODOT) Crash Analysis and Reporting Unit, a review of the most recent available five years of crash history (January 2010 to December 2014) at the study intersections was performed. 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 the intersection. Crash rates provide the ability to compare safety risks at different intersections by accounting for both the number of crashes that have occurred during the study period and the number of vehicles that typically travel through the intersection. Crash rates were calculated using the common assumption that traffic counted during the evening peak period represents ten percent of average daily traffic (ADT) at the intersection. Crash rates in excess of one to two crashes per million entering vehicles (CMEV) may be indicative of design deficiencies and therefore require a need for further investigation and possible mitigation.

The intersection of Rosemont Road at Hidden Springs Road had two reported crashes during the analysis period. The crashes consisted of one rear-end collision and one fixed-object collision where the driver of a passenger car was driving too fast for conditions and made a wide turn off the road. One of the reported crashes was classified as "Property Damage Only" (*PDO*) and the other was classified as "Non-Incapacitating Injury" (*Injury-B*). The crash rate at the intersection was calculated to be 0.09.

The intersection of Bay Meadows Drive at Hidden Springs Road had no reported crashes during the analysis period.

The intersection of Santa Anita Drive at Hidden Springs Road had four reported crashes during the analysis period. The crashes consisted of two turning-movement collisions, one rear-end collision, and one collision involving a bicyclist where the driver of a passenger car failed to yield right-of-way to an eastbound bicyclist while making a westbound left-turn. Of the crashes reported two were classified as *PDO*, one was classified as "Possible Injury – Complaint of Pain" (*Injury-C*), and one was classified as *Injury-B*.

Based on the most recent five years of crash data, no significant safety hazards were identified at any of the study intersections and no mitigation is recommended.

SIGHT DISTANCE

Intersection sight distance was examined for the proposed new driveways along Hidden Springs Road in accordance with the standards established in *A Policy on Geometric Design of Highways and Streets*[2]. According to AASHTO and the City of West Linn's *Design & Construction Standards Section 5 – Street Requirements* the driver's eye is assumed to be 15 feet from the near edge of the

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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.

nearest lane of the intersecting street and at a height of 3.5 feet above the approach street pavement. Vehicle/object height is assumed to be 3.5 feet above the cross-street pavement.

Based on the posted speed of 25 mph on Hidden Springs Road, a minimum intersection sight distance of 280 feet is required to the east and west of each proposed site access.

Sight distance at the proposed west access intersection with Hidden Springs Road was measured to be in excess of 500 feet to the east, limited by a crest in the vertical curvature of the roadway. A sight distance of 293 feet to the west, which would be limited by a crest in the vertical curvature of the roadway, may be attained if roadside foliage, located at the end of the sidewalk that stubs the western property line of the project site, is removed upon development.

Sight distance at the proposed access located at the intersection of Bay Meadows Drive at Hidden Springs Road was measured to be in excess of 400 feet to the east and west. In both cases sight distances were obstructed by crests in the vertical curvature of the roadway.

Sight distance at the proposed east access intersection with Hidden Springs Road was measured to be in excess of 500 feet to the west, limited by a crest in the vertical curvature of the roadway. Upon development of the site and removal of on-site foliage, adequate sight distance to the east may be achieved. Upon removal of on-site foliage sight distance would be in excess of 400 feet, limited by a crest in the vertical curvature of the roadway.

The two easternmost proposed site access are located along a segment of Hidden Springs Road where roadway grades are greater than three percent. According to AASHTO stopping sight distance must be evaluated at these locations to ensure safe operation between vehicles entering these intersections from the site accesses and through traffic along Hidden Springs Road. Stopping sight distance is the distance that allows an oncoming driver to see a hazard on the roadway, react, and come to a complete stop if necessary to avoid a collision. Conversely, intersection sight distance is an operational measure intended to provide sufficient line of sight along the major street so that a driver could turn onto the major street without impeding traffic flow.

Based on a measured 85th percentile speed of 31.3 mph and using a downhill grade of five percent to the east, a minimum of 225 feet of stopping sight distance is required for eastbound vehicles and 197 feet for westbound vehicles. Sight distances were measured to be well above these required stopping sight distances at each of the proposed site accesses. Accordingly, adequate stopping sight distances to ensure safe operation are provided at all proposed site access locations.

Based on the detailed analysis, adequate sight distance is available for the proposed site accesses along Hidden Springs Road given that on-site and roadside foliage located at the northeastern and northwestern sections of the project site, respectively, are removed. No other sight distance mitigation is necessary or recommended.

WARRANT ANALYSIS

Left-turn lane and traffic signal warrants were examined for the study intersections where such treatments would be applicable.

Left-Turn Lane Warrants

A left-turn refuge is primarily a safety consideration for the major street, removing left-turning vehicles from the through traffic stream. The left-turn lane warrants examined used the methodology outlined in the National Cooperative Highway Research Project's (NCHRP) Report 457. The left-turn lane warrants were evaluated based on the number of advancing and opposing vehicles as well as the number of turning vehicles and the travel speed of the roadway.

Left-turn lane warrants are met for the southbound approach at the intersection of Rosemont Road at Hidden Springs Road under existing conditions during the mid-day and evening peak hours. This intersection was restriped in 2015 by the City of West Linn and the southbound approach was widened considerably, allowing left-turning traffic to queue and providing room for through traffic to travel around the left-turning vehicles. While the striping is not that of a standard left-turn lane, it operates in the same manner.

Left-turn lane warrants are not projected to be met for any of the other study intersections under any of the year 2018 analysis scenarios. Accordingly, no other new turn lanes are recommended.

Traffic Signal Warrants

Traffic signal warrants were examined for all unsignalized study intersections to determine whether the installation of a new traffic signal will be warranted at the intersections upon completion of the proposed development. Due to insufficient main and side-street traffic volumes, traffic signal warrants will not be met for any of the unsignalized study intersections under any analysis scenarios through year 2018.

ACCESS SPACING & NUMBER OF ACCESSES

As explained previously, a total of three accesses are proposed. The eastern driveway serves the main parking area and will be utilized by passenger vehicles, the majority of site traffic, and emergency vehicles returning to the station. The center access will be opposite the intersection with Bay Meadows Drive and will serve only emergency vehicles exiting the site. The western access will not serve fire station activity, but will provide access to the stormwater facility and will be very lightly used. It is important to note that a curb cut for this access exists currently.

Access Spacing

Section 5.0070 of the West Linn Public Works Design Standards contains requirements for driveways and approaches. Section 5.0070.A states that spacing between driveways should be measured from the near-side top of the approach wing to the near-side top of the approach wing. Section 5.0070.D.4 states, *"There shall be a minimum distance between and two adjacent curb cuts on the same side of a public street* ***except for one-way entrances and exits****, as follows:"* (emphasis added). For an arterial street such as Hidden Springs Road, the spacing standard is 150 feet.

The spacing between the eastern and center driveways, as measured according to 5.0070.A, is approximately 50 feet and does not meet the spacing standard. However, the center access is one-way exit only, and is exempted from the spacing standard per 5.0070.D.4 as quoted above. Even so, this analysis in this report clearly shows that with the low trip generation of the site and the very low volume of emergency vehicle trips, there will not be any operational problems with the proposed driveway configuration. This is particularly true since when an emergency vehicle is exiting the station, all other traffic on the street system will stop and yield right-of-way.

The spacing between the western driveway serving the stormwater facility and the existing driveway serving the adjacent home is 151 feet, which meets the spacing standard.

Number of Accesses

Section 5.0070.B speaks to the number of driveways allowed. The code section allows that commercial developments with frontage greater than 250 feet may request additional access. The code sections also states: *"If additional driveways are approved by the City Engineer, a finding shall be made that no imminent traffic hazard would result and impacts on through traffic would be minimal".*

This study demonstrates that no imminent traffic hazard would result from the proposed driveway configuration. With the excellent driveway operation shown here (level of service A or B during the peak hours) there is not expected to be any impacts to through traffic on Hidden Springs Road. This code section is satisfied and it is recommended that the proposed accesses be approved.

CONCLUSIONS

Based on the results of the operational analysis, all study intersections are currently operating acceptably per City of West Linn standards and are projected to continue operating acceptably through year 2018 either with or without the addition of site trips from the proposed development. No operational mitigation is necessary or recommended.

Based on the most recent five years of crash data, no significant safety hazards were identified at any of the study intersections and no mitigation is recommended.

Based on the detailed analysis, adequate sight distance is available for the proposed site accesses along Hidden Springs Road given that on-site and roadside foliage located at the northeastern and northwestern sections of the project site, respectively, are removed. No other sight distance mitigation is necessary or recommended.

Left-turn lane warrants are triggered for the southbound approach at the intersection of Rosemont Road at Hidden Springs Road under existing conditions during the mid-day and evening peak hours. This intersection was restriped in 2015 by the City of West Linn, allowing adequate space for southbound left turns. Left-turn lane warrants are not projected to be met for any of the other study intersections under any of the year 2018 analysis scenarios. Accordingly, no other new turn lanes are recommended.

Due to insufficient main and side-street traffic volumes, traffic signal warrants will not be met for any of the unsignalized study intersections under any analysis scenarios through year 2018.

APPENDIX

Station 55 (Rosemont) Incident Analysis | 1/1/11 - 12/31/15

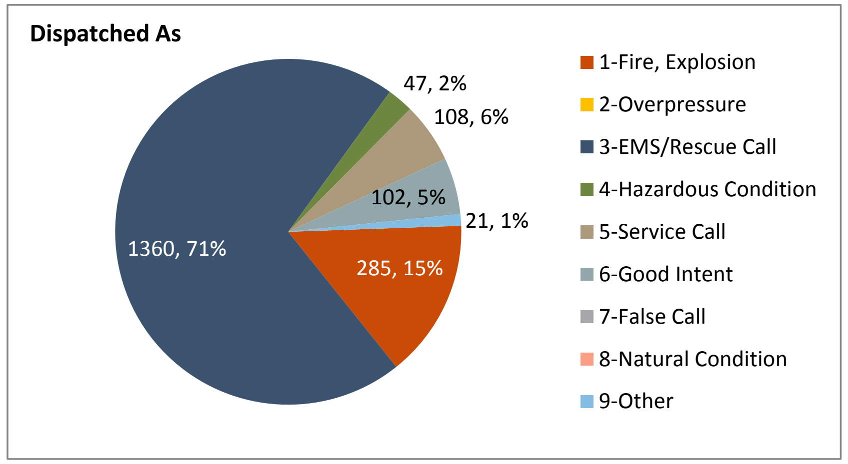
2016 data are estimates

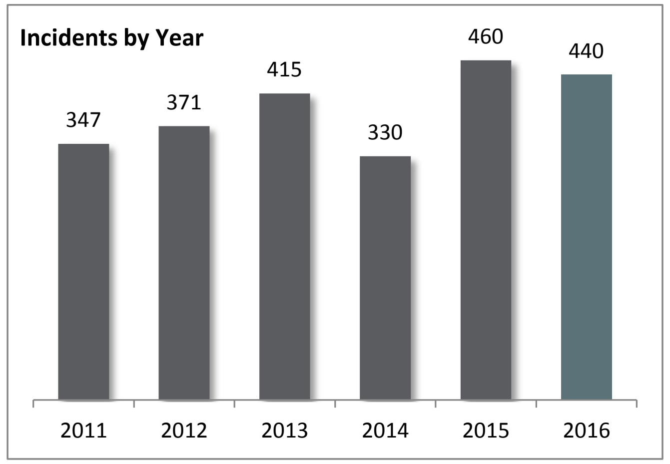
Tualatin Valley Fire & Rescue

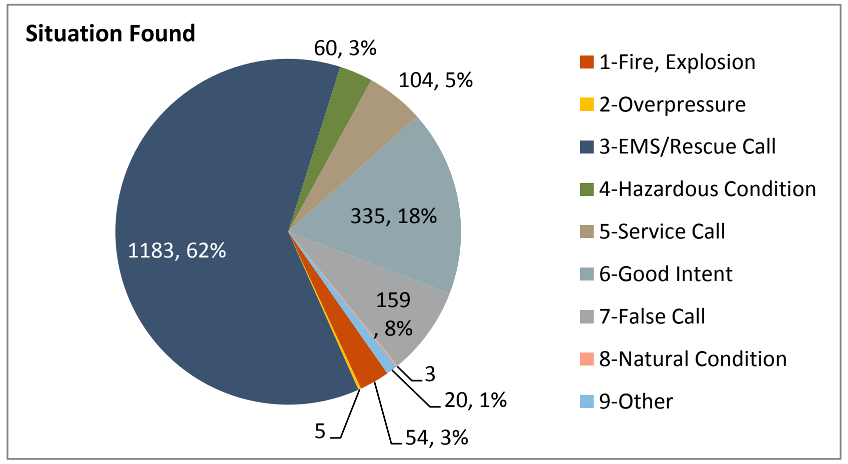
Total Incidents in Station 55 First Due Area*	1,923
63% of incidents had at least one unit dispatched as Code 3	
Total Responses (units dispatched)	2,437

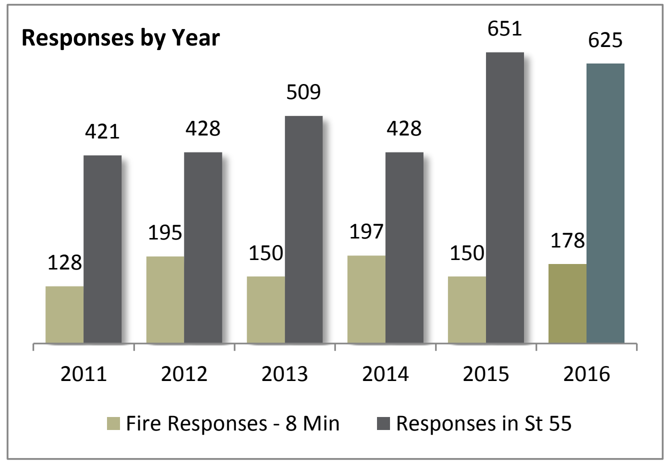
Approximate Incidents per Day: 1
Approximate Responses per Day: 1.3
[1,826 days in date range]

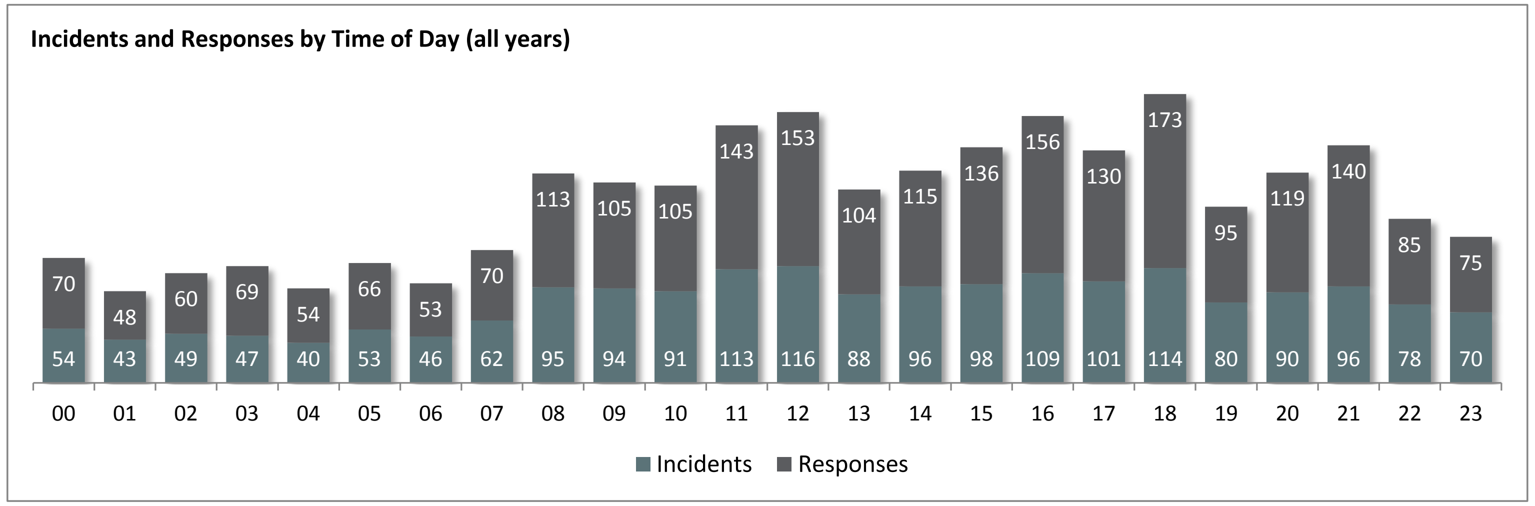
Incidents are a single count of a 9-1-1 call
Responses are a count of all units dispatched to an incident, and included cancelled en route

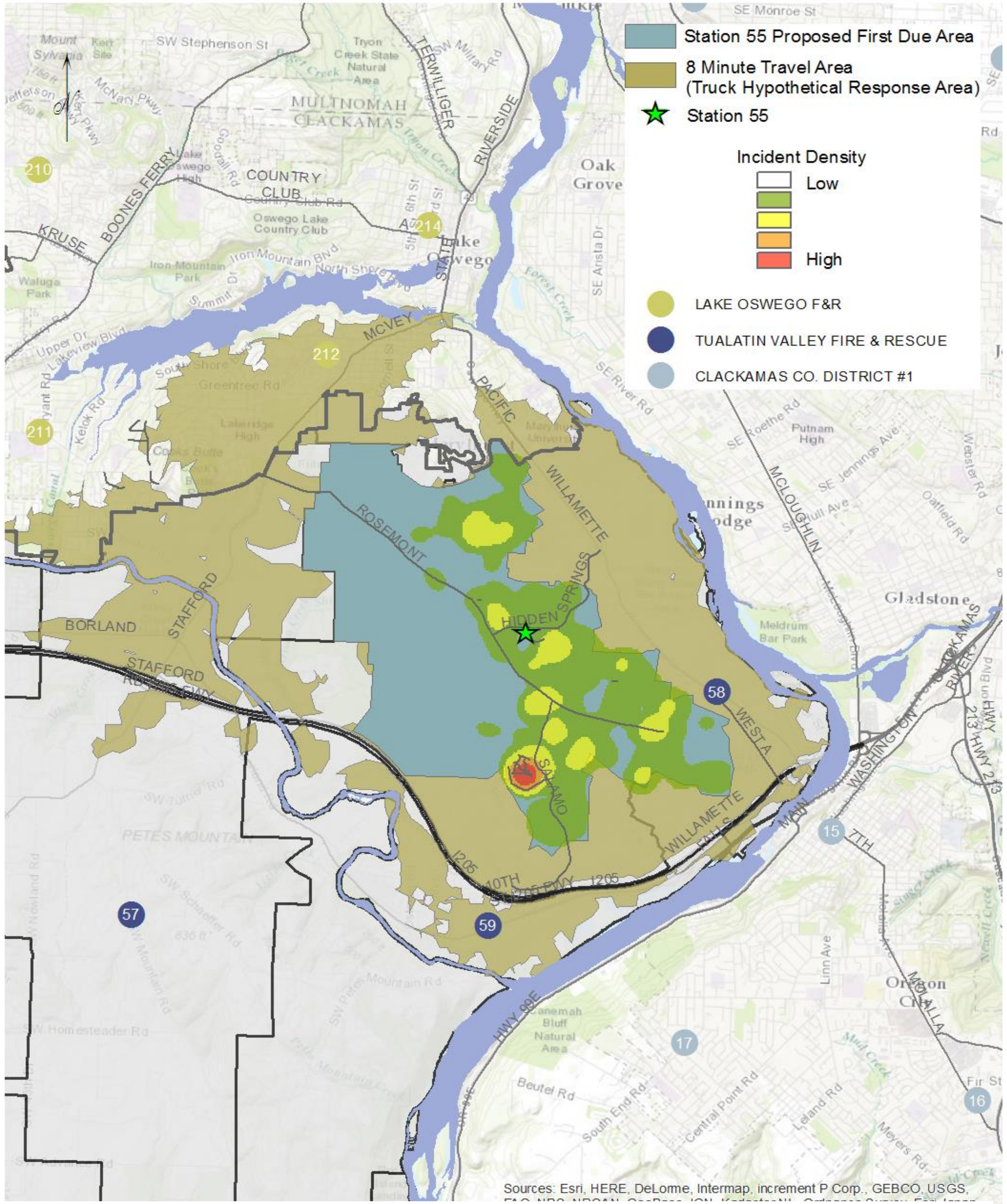

Dispatched As


Incidents by Year


Situation Found


Responses by Year


Incidents and Responses by Time of Day (all years)



* *First Due Area has not been finalized. This is a theoretical service area based on travel time, incident counts, street network, and surrounding stations. This service area may change after additional analysis is conducted.*

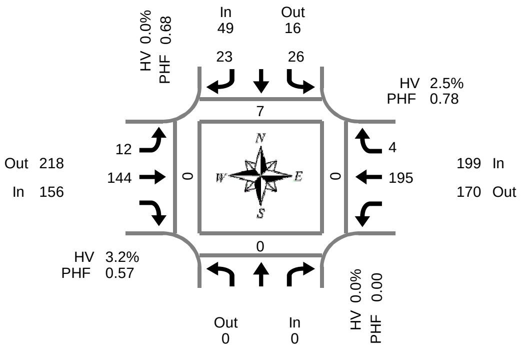
Non-TVF&R units are included in response count to indicate potential traffic effect.

Fire Responses by Year in graph above are units dispatched to fire incident types within the 8 minute travel area, to indicate potential truck responses to fires. This 8-minute area includes other TVF&R first due areas as well as Lake Oswego Fire District.

Mobile Health Care incidents excluded from total incident counts
Test incidents, move ups within boundary are excluded

Total Vehicle Summary

Clay Carney
(503) 833-2740



Bay Meadows Dr & Hidden Springs Rd

Tuesday, April 05, 2016
7:00 AM to 9:00 AM

Peak Hour Summary
7:25 AM to 8:25 AM

5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**
7:00 AM				0	3		1	0	0	2		0		8	0	0	14
7:05 AM				0	2		2	0	1	7		0		4	0	0	16
7:10 AM				0	2		1	0	0	4		0		13	2	0	22
7:15 AM				0	4		3	0	0	7		0		15	2	0	31
7:20 AM				0	3		1	0	1	7		0		7	0	0	19
7:25 AM				0	1		1	0	2	5		0		15	0	0	24
7:30 AM				0	7		3	0	0	5		0		19	0	0	34
7:35 AM				0	1		2	0	2	5		0		18	0	0	28
7:40 AM				0	1		4	0	1	15		0		20	0	0	41
7:45 AM				0	1		5	0	2	26		0		22	1	0	57
7:50 AM				0	1		2	0	0	25		0		20	1	0	49
7:55 AM				0	1		0	0	3	13		0		10	0	0	27
8:00 AM				0	1		1	0	0	10		0		12	0	0	24
8:05 AM				0	2		3	0	0	13		0		13	0	0	31
8:10 AM				0	4		0	0	2	8		0		20	0	0	34
8:15 AM				0	5		1	0	0	8		0		16	1	0	31
8:20 AM				0	1		1	0	0	11		0		10	1	0	24
8:25 AM				0	1		3	0	0	6		0		8	1	0	19
8:30 AM				0	2		5	0	0	10		0		15	2	0	34
8:35 AM				0	5		1	0	0	9		0		10	1	0	26
8:40 AM				0	1		2	0	1	10		0		11	0	0	25
8:45 AM				0	0		3	0	1	5		0		11	1	0	21
8:50 AM				0	3		1	0	0	7		0		10	0	0	21
8:55 AM				0	0		3	0	0	6		0		15	2	0	26
Total Survey				0	52		49	0	16	224		0		322	15	0	678

Pedestrians			
Crosswalk			
North	South	East	West
0	0	0	0
2	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
1	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
1	0	0	0
2	0	0	0
0	0	0	0
3	0	0	0
0	0	0	0
2	0	2	0
1	0	0	0
0	0	0	0
1	0	0	0
0	0	0	0
0	0	0	0
1	0	0	0
14	0	2	0

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**
7:00 AM				0	7		4	0	1	13		0		25	2	0	52
7:15 AM				0	8		5	0	3	19		0		37	2	0	74
7:30 AM				0	9		9	0	3	25		0		57	0	0	103
7:45 AM				0	3		7	0	5	64		0		52	2	0	133
8:00 AM				0	7		4	0	2	31		0		45	0	0	89
8:15 AM				0	7		5	0	0	25		0		34	3	0	74
8:30 AM				0	8		8	0	1	29		0		36	3	0	85
8:45 AM				0	3		7	0	1	18		0		36	3	0	68
Total Survey				0	52		49	0	16	224		0		322	15	0	678

Pedestrians			
Crosswalk			
North	South	East	West
2	0	0	0
0	0	0	0
1	0	0	0
0	0	0	0
3	0	0	0
5	0	2	0
2	0	0	0
1	0	0	0
14	0	2	0

Peak Hour Summary
7:25 AM to 8:25 AM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	0	0	0	0	49	16	65	0	156	218	374	0	199	170	369	0	404
%HV	0.0%				0.0%				3.2%				2.5%				2.5%
PHF	0.00				0.68				0.57				0.78				0.69

Pedestrians			
Crosswalk			
North	South	East	West
7	0	0	0

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	26		23	49	12	144		156		195	4	199	404
%HV	NA	NA	NA	0.0%	0.0%	NA	0.0%	0.0%	0.0%	3.5%	NA	3.2%	NA	2.6%	0.0%	2.5%	2.5%
PHF				0.00	0.59		0.52	0.68	0.60	0.55		0.57		0.79	0.50	0.78	0.69

Rolling Hour Summary
7:00 AM to 9:00 AM

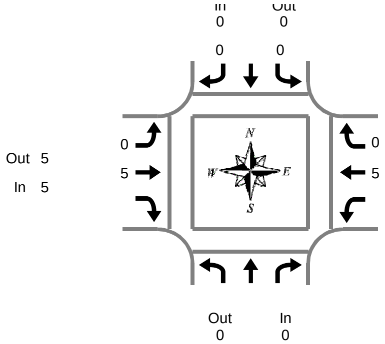
Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**
7:00 AM				0	27		25	0	12	121		0		171	6	0	362
7:15 AM				0	27		25	0	13	139		0		191	4	0	399
7:30 AM				0	26		25	0	10	145		0		188	5	0	399
7:45 AM				0	25		24	0	8	149		0		167	8	0	381
8:00 AM				0	25		24	0	4	103		0		151	9	0	316

Pedestrians			
Crosswalk			
North	South	East	West
3	0	0	0
4	0	0	0
9	0	2	0
10	0	2	0
11	0	2	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
7:25 AM to 8:25 AM

Bay Meadows Dr & Hidden Springs Rd

Tuesday, April 05, 2016
7:00 AM to 9:00 AM

Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time				Total	L		R	Total	L	T		Total		T	R	Total	Total
7:00 AM				0	0		0	0	0	0		0		0	0	0	0
7:05 AM				0	0		0	0	0	0		0		0	0	0	0
7:10 AM				0	0		0	0	0	0		0		0	0	0	0
7:15 AM				0	0		0	0	0	1		1		0	0	0	1
7:20 AM				0	0		0	0	0	0		0		0	0	0	0
7:25 AM				0	0		0	0	0	0		0		0	0	0	0
7:30 AM				0	0		0	0	0	1		1		1	0	1	2
7:35 AM				0	0		0	0	0	0		0		0	0	0	0
7:40 AM				0	0		0	0	0	0		0		0	0	0	0
7:45 AM				0	0		0	0	0	4		4		0	0	0	4
7:50 AM				0	0		0	0	0	0		0		2	0	2	2
7:55 AM				0	0		0	0	0	0		0		0	0	0	0
8:00 AM				0	0		0	0	0	0		0		0	0	0	0
8:05 AM				0	0		0	0	0	0		0		0	0	0	0
8:10 AM				0	0		0	0	0	0		0		1	0	1	1
8:15 AM				0	0		0	0	0	0		0		1	0	1	1
8:20 AM				0	0		0	0	0	0		0		0	0	0	0
8:25 AM				0	0		0	0	0	0		0		1	0	1	1
8:30 AM				0	0		0	0	0	0		0		0	0	0	0
8:35 AM				0	0		0	0	0	1		1		1	0	1	2
8:40 AM				0	0		0	0	0	0		0		0	0	0	0
8:45 AM				0	0		0	0	0	0		0		0	0	0	0
8:50 AM				0	0		0	0	0	0		0		0	0	0	0
8:55 AM				0	0		0	0	0	0		0		0	0	0	0
Total Survey				0	0		0	0	0	7		7		7	0	7	14

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time				Total	L		R	Total	L	T		Total		T	R	Total	Total
7:00 AM				0	0		0	0	0	0		0		0	0	0	0
7:15 AM				0	0		0	0	0	1		1		0	0	0	1
7:30 AM				0	0		0	0	0	1		1		1	0	1	2
7:45 AM				0	0		0	0	0	4		4		2	0	2	6
8:00 AM				0	0		0	0	0	0		0		1	0	1	1
8:15 AM				0	0		0	0	0	0		0		2	0	2	2
8:30 AM				0	0		0	0	0	1		1		1	0	1	2
8:45 AM				0	0		0	0	0	0		0		0	0	0	0
Total Survey				0	0		0	0	0	7		7		7	0	7	14

Heavy Vehicle Peak Hour Summary
7:25 AM to 8:25 AM

By	Northbound			Southbound			Eastbound			Westbound			
Approach	Bay Meadows Dr			Bay Meadows Dr			Hidden Springs Rd			Hidden Springs Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	0	0	0	0	0	5	5	10	5	5	10	10
PHF	0.00			0.00			0.31			0.63			0.42

By	Northbound				Southbound				Eastbound				Westbound				
Movement	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Total
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	0		0	0	0	5		5		5	0	5	10
PHF				0.00	0.00		0.00	0.00	0.00	0.31		0.31		0.63	0.00	0.63	0.42

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

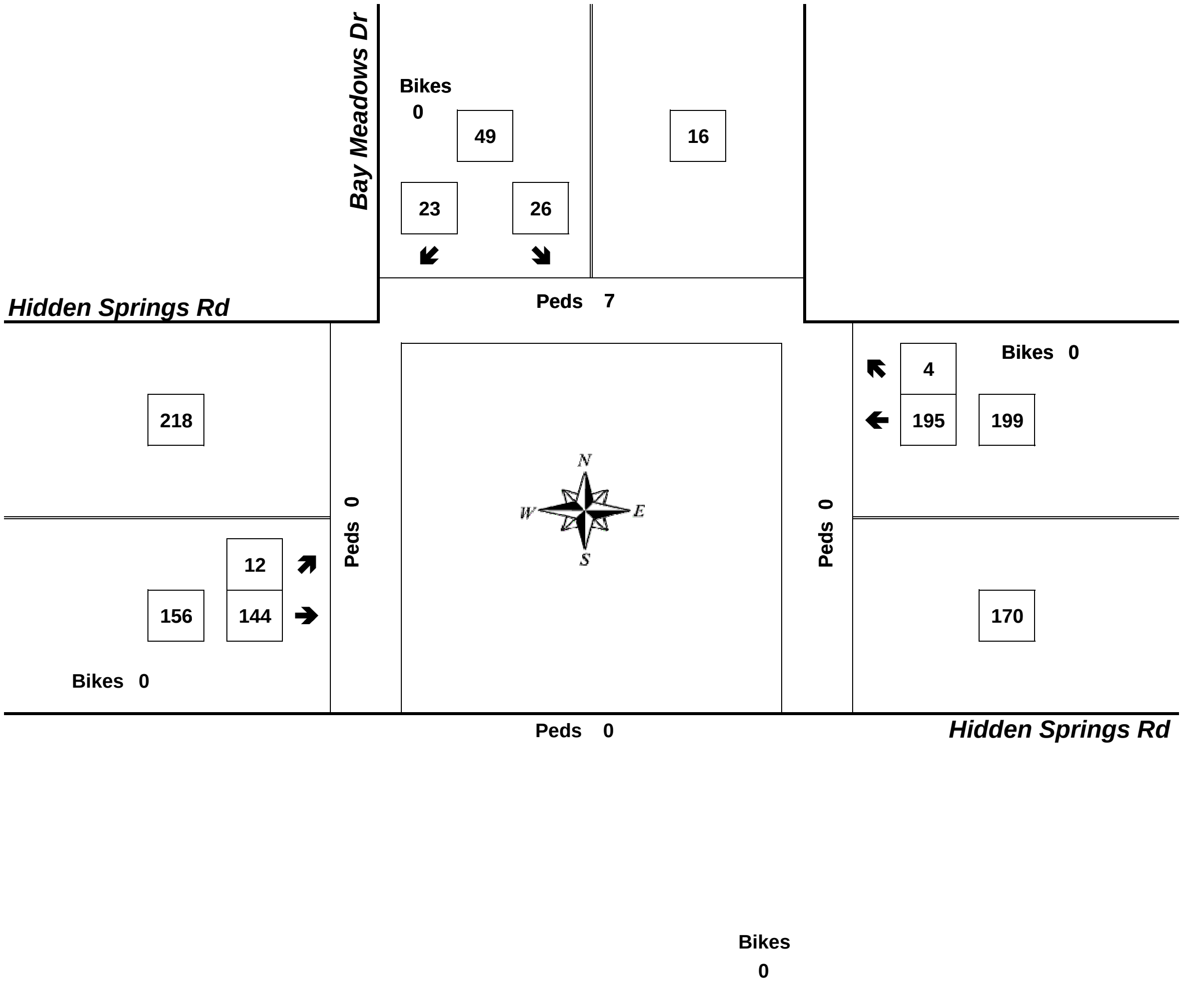
Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time				Total	L		R	Total	L	T		Total		T	R	Total	Total
7:00 AM				0	0		0	0	0	6		6		3	0	3	9
7:15 AM				0	0		0	0	0	6		6		4	0	4	10
7:30 AM				0	0		0	0	0	5		5		6	0	6	11
7:45 AM				0	0		0	0	0	5		5		6	0	6	11
8:00 AM				0	0		0	0	0	1		1		4	0	4	5

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

Bay Meadows Dr & Hidden Springs Rd

7:25 AM to 8:25 AM
Tuesday, April 05, 2016



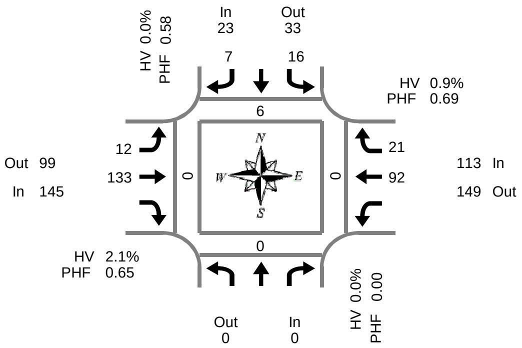
Approach	PHF	HV%	Volume
EB	0.57	3.2%	156
WB	0.78	2.5%	199
NB	0.00	0.0%	0
SB	0.68	0.0%	49
Intersection	0.69	2.5%	404

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
2:30 PM to 3:30 PM

Bay Meadows Dr & Hidden Springs Rd

Tuesday, April 05, 2016

1:30 PM to 3:30 PM

5-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**	North	South	East	West
1:30 PM				0	1		1	0	0	3		0		15	1	0	21	0	0	0	0
1:35 PM				0	0		1	0	0	8		0		6	2	0	17	0	0	0	0
1:40 PM				0	0		1	0	1	4		1		9	3	0	18	0	0	0	0
1:45 PM				0	1		1	0	1	8		0		9	0	0	20	0	0	0	0
1:50 PM				0	0		1	0	1	4		0		8	3	0	17	2	0	0	0
1:55 PM				0	3		1	0	0	5		0		8	0	0	17	0	0	0	0
2:00 PM				0	1		0	0	2	8		0		4	2	0	17	0	0	0	0
2:05 PM				0	0		4	0	0	10		0		11	1	0	26	0	0	0	0
2:10 PM				0	1		3	1	0	9		0		10	0	0	23	0	0	0	0
2:15 PM				0	1		0	0	1	16		0		7	0	0	25	0	0	0	0
2:20 PM				0	0		0	0	4	17		0		4	5	0	30	0	0	0	0
2:25 PM				0	1		0	0	0	10		0		4	0	0	15	0	0	0	0
2:30 PM				0	1		0	0	1	10		0		5	0	0	17	2	0	0	0
2:35 PM				0	1		0	0	0	7		0		6	1	0	15	0	0	0	0
2:40 PM				0	1		0	0	1	9		0		6	0	0	17	0	0	0	0
2:45 PM				0	0		0	0	2	9		0		7	1	0	19	1	0	0	0
2:50 PM				0	3		1	0	0	11		0		8	2	0	25	0	0	0	0
2:55 PM				0	1		0	0	2	19		0		4	1	0	27	0	0	0	0
3:00 PM				0	3		1	0	1	13		0		8	2	0	28	0	0	0	0
3:05 PM				0	1		0	0	1	20		0		8	3	0	33	1	0	0	0
3:10 PM				0	2		3	0	0	7		0		9	1	0	22	0	0	0	0
3:15 PM				0	1		1	0	0	8		0		10	3	0	23	2	0	0	0
3:20 PM				0	1		1	0	2	12		0		12	3	1	31	0	0	0	0
3:25 PM				0	1		0	0	2	8		0		9	4	0	24	0	0	0	0
Total Survey				0	25		20	1	22	235		1		187	38	1	527	8	0	0	0

15-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**	North	South	East	West
1:30 PM				0	1		3	0	1	15		1		30	6	0	56	0	0	0	0
1:45 PM				0	4		3	0	2	17		0		25	3	0	54	2	0	0	0
2:00 PM				0	2		7	1	2	27		0		25	3	0	66	0	0	0	0
2:15 PM				0	2		0	0	5	43		0		15	5	0	70	0	0	0	0
2:30 PM				0	3		0	0	2	26		0		17	1	0	49	2	0	0	0
2:45 PM				0	4		1	0	4	39		0		19	4	0	71	1	0	0	0
3:00 PM				0	6		4	0	2	40		0		25	6	0	83	1	0	0	0
3:15 PM				0	3		2	0	4	28		0		31	10	1	78	2	0	0	0
Total Survey				0	25		20	1	22	235		1		187	38	1	527	8	0	0	0

Peak Hour Summary
2:30 PM to 3:30 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**	**Pedestrians**			
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	0	0	0	0	23	33	56	0	145	99	244	0	113	149	262	1	281	6	0	0	0
%HV	0.0%				0.0%				2.1%				0.9%				1.4%				
PHF	0.00				0.58				0.65				0.69				0.80				

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	16		7	23	12	133		145		92	21	113	281
%HV	NA	NA	NA	0.0%	0.0%	NA	0.0%	0.0%	0.0%	2.3%	NA	2.1%	NA	1.1%	0.0%	0.9%	1.4%
PHF				0.00	0.57		0.35	0.58	0.75	0.64		0.65		0.74	0.53	0.69	0.80

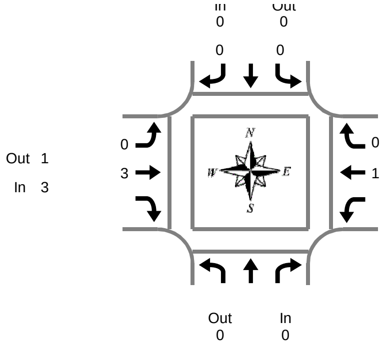
Rolling Hour Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**	North	South	East	West
1:30 PM				0	9		13	1	10	102		1		95	17	0	246	2	0	0	0
1:45 PM				0	11		10	1	11	113		0		82	12	0	239	4	0	0	0
2:00 PM				0	11		8	1	13	135		0		76	13	0	256	3	0	0	0
2:15 PM				0	15		5	0	13	148		0		76	16	0	273	4	0	0	0
2:30 PM				0	16		7	0	12	133		0		92	21	1	281	6	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
2:30 PM   to   3:30 PM

Bay Meadows Dr & Hidden Springs Rd

Tuesday, April 05, 2016
1:30 PM   to   3:30 PM

Heavy Vehicle   5-Minute Interval Summary
1:30 PM   to   3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time				Total	L		R	Total	L	T		Total		T	R	Total	**Total**
1:30 PM				0	0		0	0	0	0		0		0	0	0	0
1:35 PM				0	0		0	0	0	0		0		0	0	0	0
1:40 PM				0	0		0	0	0	1		1		0	0	0	1
1:45 PM				0	0		0	0	0	0		0		0	0	0	0
1:50 PM				0	0		0	0	0	0		0		0	0	0	0
1:55 PM				0	0		0	0	0	0		0		1	0	1	1
2:00 PM				0	1		0	1	0	0		0		0	0	0	1
2:05 PM				0	0		0	0	0	1		1		1	0	1	2
2:10 PM				0	0		0	0	0	0		0		0	0	0	0
2:15 PM				0	0		0	0	0	3		3		0	0	0	3
2:20 PM				0	0		0	0	0	0		0		0	0	0	0
2:25 PM				0	0		0	0	0	1		1		0	0	0	1
2:30 PM				0	0		0	0	0	0		0		0	0	0	0
2:35 PM				0	0		0	0	0	0		0		0	0	0	0
2:40 PM				0	0		0	0	0	1		1		0	0	0	1
2:45 PM				0	0		0	0	0	0		0		0	0	0	0
2:50 PM				0	0		0	0	0	0		0		1	0	1	1
2:55 PM				0	0		0	0	0	0		0		0	0	0	0
3:00 PM				0	0		0	0	0	0		0		0	0	0	0
3:05 PM				0	0		0	0	0	2		2		0	0	0	2
3:10 PM				0	0		0	0	0	0		0		0	0	0	0
3:15 PM				0	0		0	0	0	0		0		0	0	0	0
3:20 PM				0	0		0	0	0	0		0		0	0	0	0
3:25 PM				0	0		0	0	0	0		0		0	0	0	0
Total Survey				0	1		0	1	0	9		9		3	0	3	13

Heavy Vehicle   15-Minute Interval Summary
1:30 PM   to   3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time				Total	L		R	Total	L	T		Total		T	R	Total	**Total**
1:30 PM				0	0		0	0	0	1		1		0	0	0	1
1:45 PM				0	0		0	0	0	0		0		1	0	1	1
2:00 PM				0	1		0	1	0	1		1		1	0	1	3
2:15 PM				0	0		0	0	0	4		4		0	0	0	4
2:30 PM				0	0		0	0	0	1		1		0	0	0	1
2:45 PM				0	0		0	0	0	0		0		1	0	1	1
3:00 PM				0	0		0	0	0	2		2		0	0	0	2
3:15 PM				0	0		0	0	0	0		0		0	0	0	0
Total Survey				0	1		0	1	0	9		9		3	0	3	13

Heavy Vehicle   Peak Hour Summary
2:30 PM   to   3:30 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	0	0	0		0	0	0		3	1	4		1	3	4		4
PHF	0.00				0.00				0.38				0.25				0.50

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	0		0	0	0	3		3		1	0	1	4
PHF				0.00	0.00		0.00	0.00	0.00	0.38		0.38		0.25	0.00	0.25	0.50

Heavy Vehicle   Rolling Hour Summary
1:30 PM   to   3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time				Total	L		R	Total	L	T		Total		T	R	Total	**Total**
1:30 PM				0	1		0	1	0	6		6		2	0	2	9
1:45 PM				0	1		0	1	0	6		6		2	0	2	9
2:00 PM				0	1		0	1	0	6		6		2	0	2	9
2:15 PM				0	0		0	0	0	7		7		1	0	1	8
2:30 PM				0	0		0	0	0	3		3		1	0	1	4

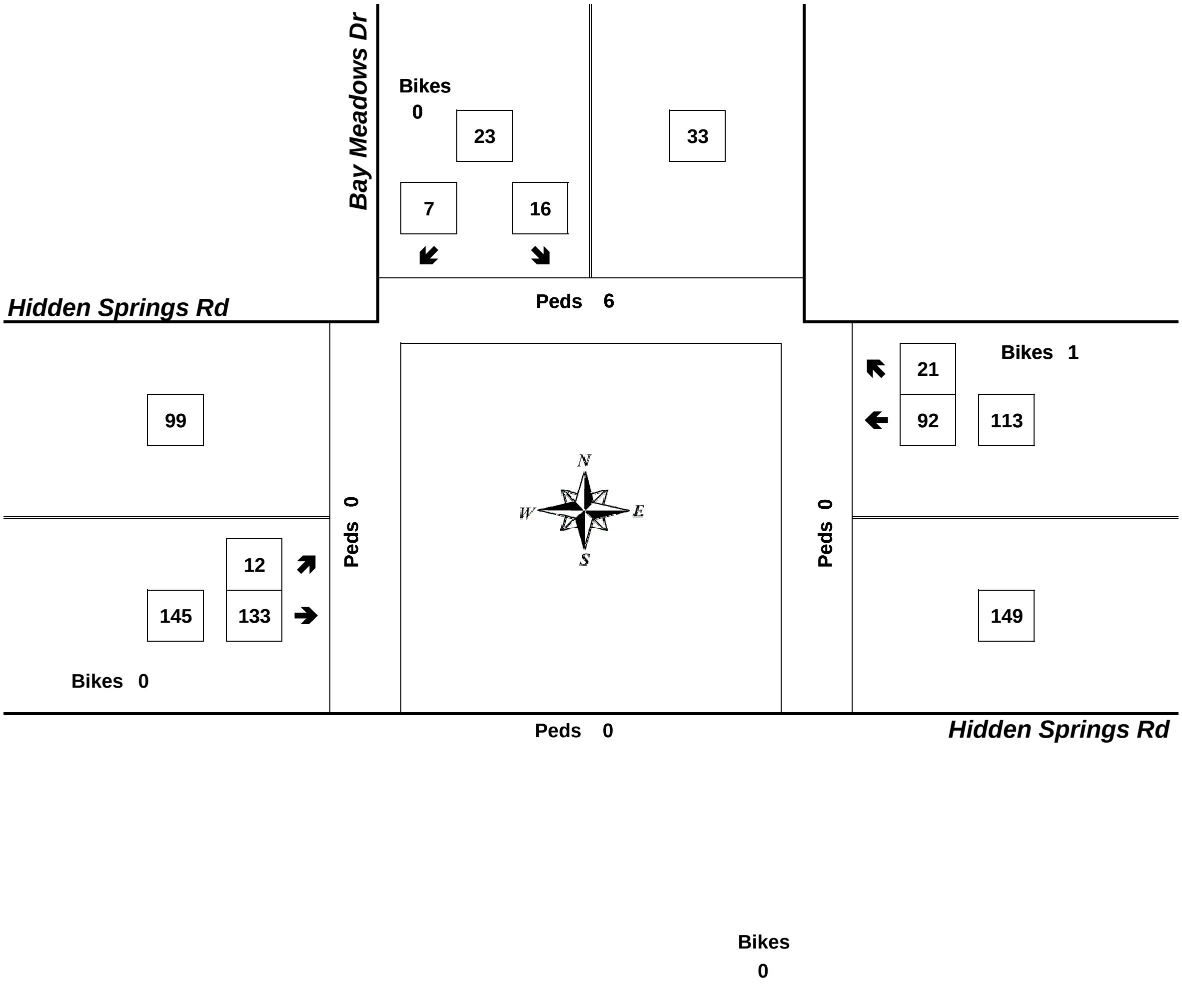
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Bay Meadows Dr & Hidden Springs Rd

2:30 PM to 3:30 PM
Tuesday, April 05, 2016



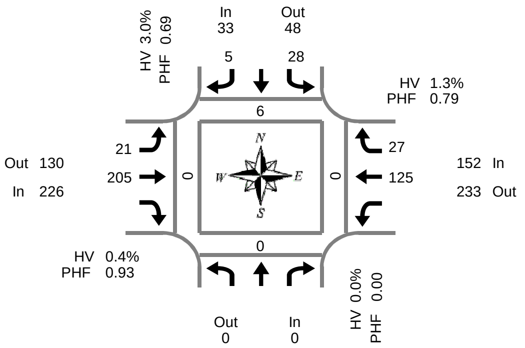
Approach	PHF	HV%	Volume
EB	0.65	2.1%	145
WB	0.69	0.9%	113
NB	0.00	0.0%	0
SB	0.58	0.0%	23
Intersection	0.80	1.4%	281

Count Period: 1:30 PM to 3:30 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
5:00 PM to 6:00 PM

Bay Meadows Dr & Hidden Springs Rd

Tuesday, April 05, 2016
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**	North	South	East	West
4:00 PM				0	1		1	0	0	13		0		12	3	0	30	1	0	0	0
4:05 PM				0	1		0	0	0	8		0		12	1	0	22	2	0	0	0
4:10 PM				0	0		0	0	3	12		0		8	1	0	24	0	0	0	0
4:15 PM				0	2		1	0	0	9		0		4	6	0	22	0	0	0	0
4:20 PM				0	3		1	0	1	11		1		12	1	0	29	0	0	0	0
4:25 PM				0	1		0	0	2	15		1		11	1	0	30	0	0	0	0
4:30 PM				0	1		1	0	3	14		0		10	2	0	31	0	0	0	0
4:35 PM				0	0		0	0	1	20		0		14	3	0	38	0	0	0	0
4:40 PM				0	2		0	0	2	21		0		6	4	0	35	1	0	0	0
4:45 PM				0	5		2	0	2	14		0		10	1	0	34	2	0	0	0
4:50 PM				0	1		0	0	0	15		0		13	3	0	32	0	0	0	0
4:55 PM				0	2		1	0	0	15		0		8	0	0	26	0	0	0	0
5:00 PM				0	0		0	0	2	14		0		8	2	0	26	0	0	0	0
5:05 PM				0	1		2	0	0	14		0		7	3	0	27	1	0	0	0
5:10 PM				0	1		0	0	2	21		0		9	1	0	34	0	0	0	0
5:15 PM				0	6		0	0	3	14		0		16	1	0	40	1	0	0	0
5:20 PM				0	2		0	0	1	18		0		12	2	0	35	0	0	0	0
5:25 PM				0	3		1	0	0	17		0		14	3	0	38	1	0	0	0
5:30 PM				0	2		1	0	1	21		0		10	3	0	38	1	0	0	0
5:35 PM				0	2		0	0	5	15		0		7	4	0	33	1	0	0	0
5:40 PM				0	2		0	0	0	17		1		10	2	0	31	0	0	0	0
5:45 PM				0	4		0	0	2	18		0		8	3	0	35	0	0	0	0
5:50 PM				0	4		1	0	1	18		0		16	1	0	41	0	0	0	0
5:55 PM				0	1		0	0	4	18		0		8	2	0	33	1	0	0	0
Total Survey				0	47		12	0	35	372		3		245	53	0	764	12	0	0	0

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**	North	South	East	West
4:00 PM				0	2		1	0	3	33		0		32	5	0	76	3	0	0	0
4:15 PM				0	6		2	0	3	35		2		27	8	0	81	0	0	0	0
4:30 PM				0	3		1	0	6	55		0		30	9	0	104	1	0	0	0
4:45 PM				0	8		3	0	2	44		0		31	4	0	92	2	0	0	0
5:00 PM				0	2		2	0	4	49		0		24	6	0	87	1	0	0	0
5:15 PM				0	11		1	0	4	49		0		42	6	0	113	2	0	0	0
5:30 PM				0	6		1	0	6	53		1		27	9	0	102	2	0	0	0
5:45 PM				0	9		1	0	7	54		0		32	6	0	109	1	0	0	0
Total Survey				0	47		12	0	35	372		3		245	53	0	764	12	0	0	0

Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	0	0	0	0	33	48	81	0	226	130	356	1	152	233	385	0	411
%HV	0.0%				3.0%				0.4%				1.3%				1.0%
PHF	0.00				0.69				0.93				0.79				0.91

Pedestrians			
Crosswalk			
North	South	East	West
6	0	0	0

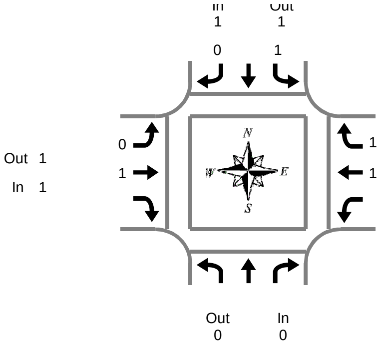
By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	28		5	33	21	205		226		125	27	152	411
%HV	NA	NA	NA	0.0%	3.6%	NA	0.0%	3.0%	0.0%	0.5%	NA	0.4%	NA	0.8%	3.7%	1.3%	1.0%
PHF				0.00	0.64		0.63	0.69	0.75	0.92		0.93		0.74	0.68	0.79	0.91

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time				Bikes	L		R	Bikes	L	T		Bikes		T	R	Bikes	**Total**	North	South	East	West
4:00 PM				0	19		7	0	14	167		2		120	26	0	353	6	0	0	0
4:15 PM				0	19		8	0	15	183		2		112	27	0	364	4	0	0	0
4:30 PM				0	24		7	0	16	197		0		127	25	0	396	6	0	0	0
4:45 PM				0	27		7	0	16	195		1		124	25	0	394	7	0	0	0
5:00 PM				0	28		5	0	21	205		1		125	27	0	411	6	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



Peak Hour Summary
5:00 PM to 6:00 PM

Bay Meadows Dr & Hidden Springs Rd

Tuesday, April 05, 2016
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time				Total	L		R	Total	L	T		Total		T	R	Total	Total
4:00 PM				0	0		0	0	0	1		1		1	0	1	2
4:05 PM				0	1		0	1	0	0		0		0	0	0	1
4:10 PM				0	0		0	0	0	0		0		0	0	0	0
4:15 PM				0	1		0	1	0	0		0		0	0	0	1
4:20 PM				0	0		0	0	0	0		0		3	0	3	3
4:25 PM				0	0		0	0	0	0		0		0	0	0	0
4:30 PM				0	0		0	0	0	2		2		0	0	0	2
4:35 PM				0	0		0	0	0	0		0		0	1	1	1
4:40 PM				0	0		0	0	0	0		0		0	0	0	0
4:45 PM				0	0		0	0	0	0		0		0	0	0	0
4:50 PM				0	0		0	0	0	0		0		0	0	0	0
4:55 PM				0	0		0	0	0	0		0		0	0	0	0
5:00 PM				0	0		0	0	0	0		0		0	0	0	0
5:05 PM				0	0		0	0	0	0		0		0	0	0	0
5:10 PM				0	0		0	0	0	1		1		0	0	0	1
5:15 PM				0	0		0	0	0	0		0		0	0	0	0
5:20 PM				0	0		0	0	0	0		0		0	1	1	1
5:25 PM				0	0		0	0	0	0		0		1	0	1	1
5:30 PM				0	0		0	0	0	0		0		0	0	0	0
5:35 PM				0	0		0	0	0	0		0		0	0	0	0
5:40 PM				0	0		0	0	0	0		0		0	0	0	0
5:45 PM				0	0		0	0	0	0		0		0	0	0	0
5:50 PM				0	1		0	1	0	0		0		0	0	0	1
5:55 PM				0	0		0	0	0	0		0		0	0	0	0
Total Survey				0	3		0	3	0	4		4		5	2	7	14

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time				Total	L		R	Total	L	T		Total		T	R	Total	Total
4:00 PM				0	1		0	1	0	1		1		1	0	1	3
4:15 PM				0	1		0	1	0	0		0		3	0	3	4
4:30 PM				0	0		0	0	0	2		2		0	1	1	3
4:45 PM				0	0		0	0	0	0		0		0	0	0	0
5:00 PM				0	0		0	0	0	1		1		0	0	0	1
5:15 PM				0	0		0	0	0	0		0		1	1	2	2
5:30 PM				0	0		0	0	0	0		0		0	0	0	0
5:45 PM				0	1		0	1	0	0		0		0	0	0	1
Total Survey				0	3		0	3	0	4		4		5	2	7	14

Heavy Vehicle Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	Northbound			Southbound			Eastbound			Westbound			Total
	Bay Meadows Dr			Bay Meadows Dr			Hidden Springs Rd			Hidden Springs Rd			
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	0	0	1	1	2	1	1	2	2	2	4	4
PHF	0.00			0.25			0.25			0.25			0.50

By Movement	Northbound				Southbound				Eastbound				Westbound				Total
	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				
				Total	L		R	Total	L	T		Total		T	R	Total	
Volume				0	1		0	1	0	1		1		1	1	2	4
PHF				0.00	0.25		0.00	0.25	0.00	0.25		0.25		0.25	0.25	0.25	0.50

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

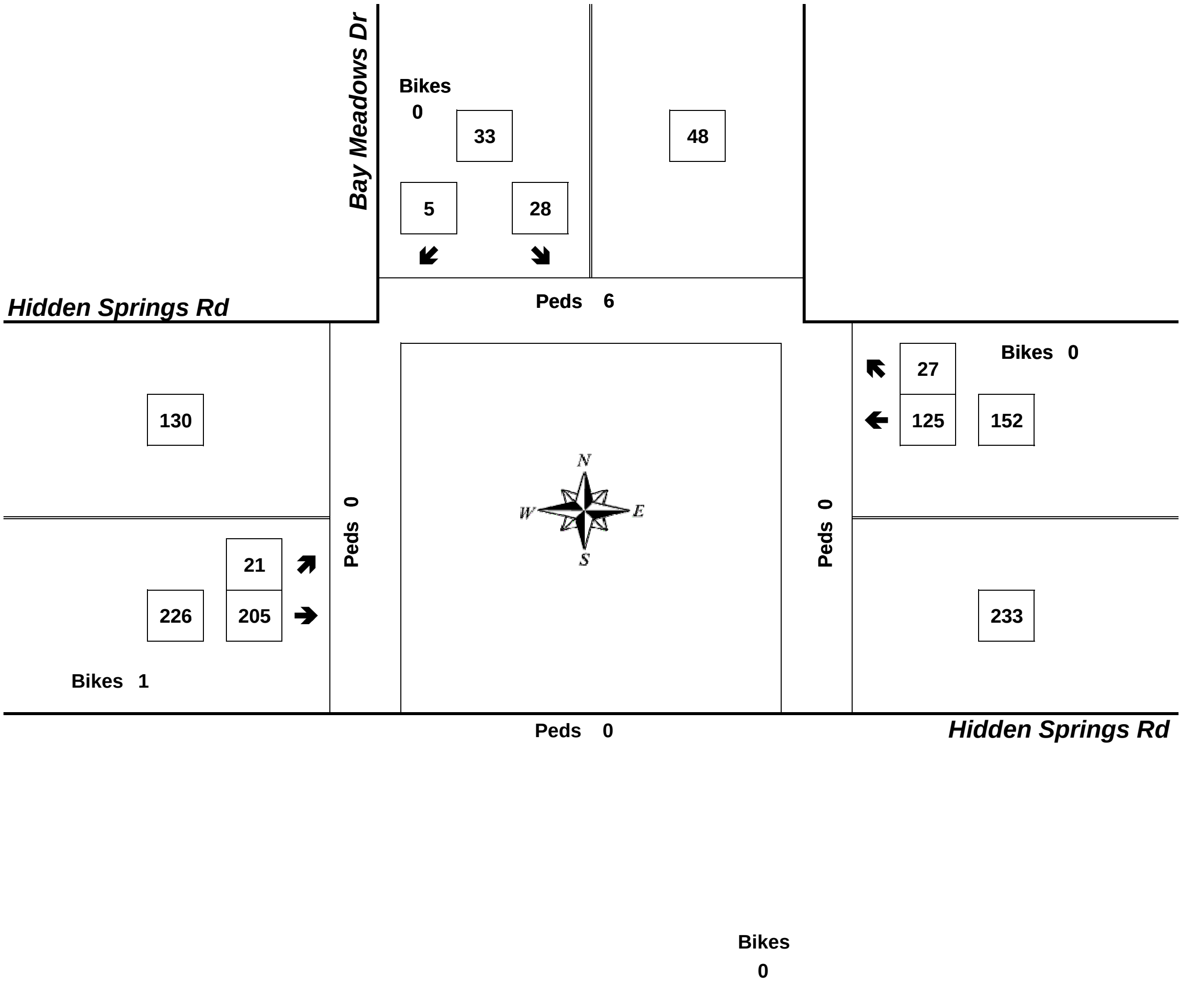
Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Bay Meadows Dr				Bay Meadows Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time				Total	L		R	Total	L	T		Total		T	R	Total	Total
4:00 PM				0	2		0	2	0	3		3		4	1	5	10
4:15 PM				0	1		0	1	0	3		3		3	1	4	8
4:30 PM				0	0		0	0	0	3		3		1	2	3	6
4:45 PM				0	0		0	0	0	1		1		1	1	2	3
5:00 PM				0	1		0	1	0	1		1		1	1	2	4

Peak Hour Summary

Clay Carney
(503) 833-2740

Bay Meadows Dr & Hidden Springs Rd

5:00 PM to 6:00 PM
Tuesday, April 05, 2016

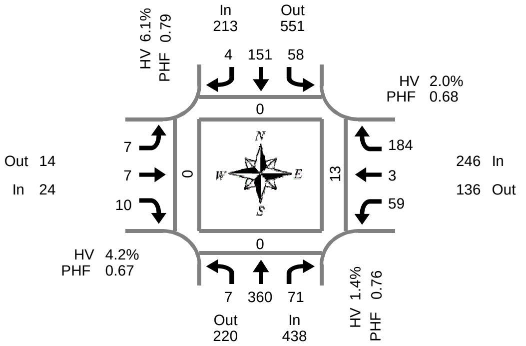


Approach	PHF	HV%	Volume
EB	0.93	0.4%	226
WB	0.79	1.3%	152
NB	0.00	0.0%	0
SB	0.69	3.0%	33
Intersection	0.91	1.0%	411

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
7:20 AM to 8:20 AM

Rosemont Rd & Hidden Springs Rd

Tuesday, April 05, 2016
7:00 AM to 9:00 AM

5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound				Southbound				Eastbound				Westbound				Interval Total	Pedestrians			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	0	25	0	0	1	11	0	0	0	0	0	0	3	0	6	0	46	0	0	0	0
7:05 AM	0	24	0	0	4	6	0	0	1	0	0	0	1	0	8	0	44	0	0	2	0
7:10 AM	0	30	0	0	2	5	0	0	0	1	1	0	0	0	16	0	55	0	0	0	0
7:15 AM	0	32	1	0	4	6	0	0	1	1	0	0	0	0	16	0	61	0	0	0	0
7:20 AM	0	33	1	0	5	9	0	0	1	0	0	0	1	1	12	0	63	0	0	0	0
7:25 AM	2	26	3	0	3	7	0	0	1	0	0	0	3	0	16	0	61	0	0	1	0
7:30 AM	1	26	0	0	5	10	0	0	2	1	1	0	3	0	18	0	67	0	0	0	0
7:35 AM	0	32	4	0	2	14	0	0	0	0	0	0	8	0	14	0	74	0	0	2	0
7:40 AM	0	31	12	0	2	16	0	0	0	0	1	0	14	0	18	0	94	0	0	2	0
7:45 AM	1	29	17	0	10	15	1	0	1	0	1	0	12	1	18	0	106	0	0	3	0
7:50 AM	0	35	17	0	8	13	2	0	0	0	3	0	7	0	21	0	106	0	0	1	0
7:55 AM	0	35	10	0	6	11	0	0	0	1	1	0	4	0	7	0	75	0	0	1	0
8:00 AM	0	33	1	0	5	10	1	0	0	0	1	1	1	0	12	0	64	0	0	2	0
8:05 AM	2	25	1	0	4	22	0	0	2	1	1	0	1	0	13	0	72	0	0	0	0
8:10 AM	1	27	1	0	5	10	0	0	0	2	0	0	4	1	19	0	70	0	0	1	0
8:15 AM	0	28	4	0	3	14	0	0	0	2	1	0	1	0	16	0	69	0	0	0	0
8:20 AM	0	31	1	0	4	8	0	0	0	0	0	0	1	1	9	0	55	0	0	1	0
8:25 AM	2	20	0	0	1	9	0	0	2	0	2	0	2	0	11	0	49	0	0	2	0
8:30 AM	0	26	4	0	5	11	2	0	0	1	1	0	4	0	16	0	70	0	0	1	0
8:35 AM	1	25	0	0	1	5	0	0	0	0	1	0	2	1	9	0	45	0	0	0	0
8:40 AM	0	19	3	0	7	6	0	0	1	3	0	0	0	0	14	0	53	0	0	1	0
8:45 AM	0	18	3	0	3	9	0	0	0	0	0	0	2	0	13	0	48	0	0	0	0
8:50 AM	1	25	0	0	4	13	1	0	0	1	1	0	1	1	11	0	59	0	0	2	0
8:55 AM	1	18	1	0	4	11	0	0	0	0	0	0	4	1	15	0	55	0	0	0	0
Total Survey	12	653	84	0	98	251	7	0	12	14	16	1	79	7	328	0	1,561	0	0	22	0

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound				Southbound				Eastbound				Westbound				Interval Total	Pedestrians			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	0	79	0	0	7	22	0	0	1	1	1	0	4	0	30	0	145	0	0	2	0
7:15 AM	2	91	5	0	12	22	0	0	3	1	0	0	4	1	44	0	185	0	0	1	0
7:30 AM	1	89	16	0	9	40	0	0	2	1	2	0	25	0	50	0	235	0	0	4	0
7:45 AM	1	99	44	0	24	39	3	0	1	1	5	0	23	1	46	0	287	0	0	5	0
8:00 AM	3	85	3	0	14	42	1	0	2	3	2	1	6	1	44	0	206	0	0	3	0
8:15 AM	2	79	5	0	8	31	0	0	2	2	3	0	4	1	36	0	173	0	0	3	0
8:30 AM	1	70	7	0	13	22	2	0	1	4	2	0	6	1	39	0	168	0	0	2	0
8:45 AM	2	61	4	0	11	33	1	0	0	1	1	0	7	2	39	0	162	0	0	2	0
Total Survey	12	653	84	0	98	251	7	0	12	14	16	1	79	7	328	0	1,561	0	0	22	0

Peak Hour Summary
7:20 AM to 8:20 AM

By Approach	Northbound				Southbound				Eastbound				Westbound				Total	Pedestrians			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	438	220	658	0	213	551	764	0	24	14	38	1	246	136	382	0	921	0	0	13	0
%HV	1.4%				6.1%				4.2%				2.0%				2.7%				
PHF	0.76				0.79				0.67				0.68				0.75				

By Movement	Northbound				Southbound				Eastbound				Westbound				Total
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	7	360	71	438	58	151	4	213	7	7	10	24	59	3	184	246	921
%HV	0.0%	1.1%	2.8%	1.4%	6.9%	6.0%	0.0%	6.1%	0.0%	0.0%	10.0%	4.2%	1.7%	0.0%	2.2%	2.0%	2.7%
PHF	0.58	0.87	0.39	0.76	0.60	0.82	0.33	0.79	0.44	0.35	0.50	0.67	0.43	0.75	0.81	0.68	0.75

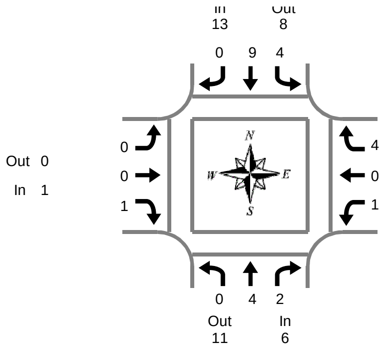
Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound				Southbound				Eastbound				Westbound				Interval Total	Pedestrians			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	4	358	65	0	52	123	3	0	7	4	8	0	56	2	170	0	852	0	0	12	0
7:15 AM	7	364	68	0	59	143	4	0	8	6	9	1	58	3	184	0	913	0	0	13	0
7:30 AM	7	352	68	0	55	152	4	0	7	7	12	1	58	3	176	0	901	0	0	15	0
7:45 AM	7	333	59	0	59	134	6	0	6	10	12	1	39	4	165	0	834	0	0	13	0
8:00 AM	8	295	19	0	46	128	4	0	5	10	8	1	23	5	158	0	709	0	0	10	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
7:20 AM to 8:20 AM

Rosemont Rd & Hidden Springs Rd

Tuesday, April 05, 2016
7:00 AM to 9:00 AM

Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	**Total**
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:05 AM	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	2
7:10 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
7:20 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:25 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	2
7:35 AM	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	2
7:40 AM	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	3
7:45 AM	0	0	1	1	2	0	0	2	0	0	0	0	0	0	0	0	3
7:50 AM	0	1	0	1	0	2	0	2	0	0	1	1	0	0	2	2	6
7:55 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
8:00 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
8:05 AM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	3
8:10 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:15 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	2
8:20 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:25 AM	0	1	0	1	0	1	0	1	0	0	0	0	0	0	1	1	3
8:30 AM	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2
8:35 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	2
8:40 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
8:45 AM	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	2
8:50 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
8:55 AM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Survey	0	9	2	11	6	12	2	20	0	0	2	2	1	0	7	8	41

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	**Total**
7:00 AM	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	2
7:15 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
7:30 AM	0	2	1	3	2	1	0	3	0	0	0	0	0	0	1	1	7
7:45 AM	0	1	1	2	2	4	0	6	0	0	1	1	0	0	2	2	11
8:00 AM	0	1	0	1	0	3	0	3	0	0	0	0	1	0	0	1	5
8:15 AM	0	1	0	1	0	2	0	2	0	0	0	0	0	0	2	2	5
8:30 AM	0	0	0	0	0	0	2	2	0	0	1	1	0	0	2	2	5
8:45 AM	0	3	0	3	1	1	0	2	0	0	0	0	0	0	0	0	5
Total Survey	0	9	2	11	6	12	2	20	0	0	2	2	1	0	7	8	41

Heavy Vehicle Peak Hour Summary
7:20 AM to 8:20 AM

By	**Northbound**			**Southbound**			**Eastbound**			**Westbound**			
Approach	Rosemont Rd			Rosemont Rd			Hidden Springs Rd			Hidden Springs Rd			**Total**
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	6	11	17	13	8	21	1	0	1	5	6	11	25
PHF	0.30			0.54			0.25			0.63			0.52

By	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Movement	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Total**
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	4	2	6	4	9	0	13	0	0	1	1	1	0	4	5	25
PHF	0.00	0.33	0.25	0.30	0.33	0.45	0.00	0.54	0.00	0.00	0.25	0.25	0.25	0.00	0.50	0.63	0.52

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	**Total**
7:00 AM	0	4	2	6	5	6	0	11	0	0	1	1	0	0	3	3	21
7:15 AM	0	4	2	6	5	8	0	13	0	0	1	1	1	0	3	4	24
7:30 AM	0	5	2	7	4	10	0	14	0	0	1	1	1	0	5	6	28
7:45 AM	0	3	1	4	2	9	2	13	0	0	2	2	1	0	6	7	26
8:00 AM	0	5	0	5	1	6	2	9	0	0	1	1	1	0	4	5	20

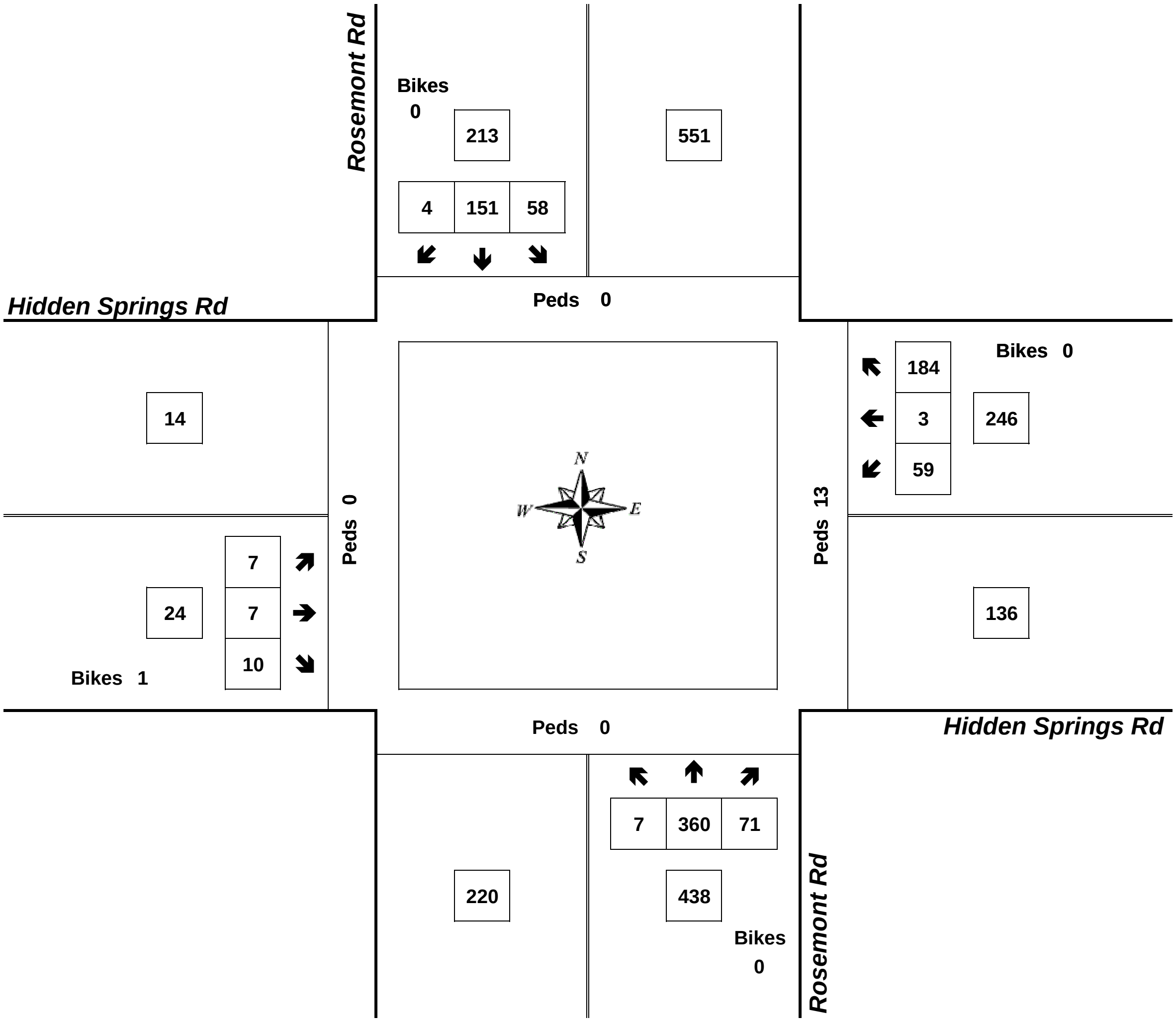
Peak Hour Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740

Rosemont Rd & Hidden Springs Rd

7:20 AM to 8:20 AM
Tuesday, April 05, 2016



Approach	PHF	HV%	Volume
EB	0.67	4.2%	24
WB	0.68	2.0%	246
NB	0.76	1.4%	438
SB	0.79	6.1%	213
Intersection	0.75	2.7%	921

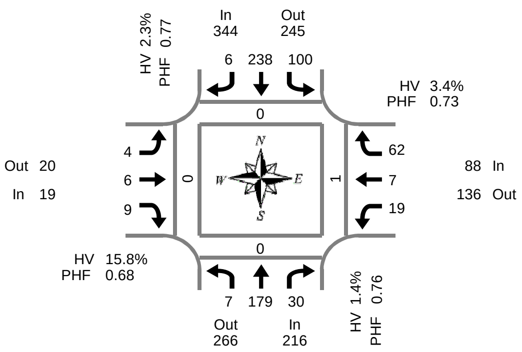
Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740

Rosemont Rd & Hidden Springs Rd

Tuesday, April 05, 2016
1:30 PM to 3:30 PM



Peak Hour Summary
2:30 PM to 3:30 PM

5-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	**Total**
1:30 PM	1	3	0	0	3	11	1	0	1	0	2	0	2	1	7	0	32
1:35 PM	0	15	1	0	4	12	0	0	0	2	0	0	5	0	3	0	42
1:40 PM	0	10	1	0	8	12	0	0	0	0	0	0	4	0	6	0	41
1:45 PM	0	7	2	0	6	22	1	0	0	1	0	0	3	1	6	0	49
1:50 PM	1	10	1	0	5	14	0	0	1	0	0	0	1	1	6	0	40
1:55 PM	0	7	2	0	5	10	0	0	0	1	0	0	6	0	3	0	34
2:00 PM	0	8	2	0	4	21	0	0	0	2	0	0	4	1	1	0	43
2:05 PM	0	10	0	0	6	15	1	0	1	0	0	0	3	0	5	0	41
2:10 PM	0	7	2	0	5	16	0	0	0	0	2	0	8	0	5	0	45
2:15 PM	2	12	7	0	9	8	0	0	0	0	0	0	4	0	4	0	46
2:20 PM	1	17	14	1	7	19	1	0	0	0	0	0	1	1	1	0	62
2:25 PM	2	11	2	0	12	26	1	0	0	1	0	0	1	0	2	0	58
2:30 PM	0	12	2	0	7	17	0	0	0	0	0	0	0	0	6	0	44
2:35 PM	0	20	2	0	3	19	1	0	1	0	1	0	1	0	5	0	53
2:40 PM	0	12	3	0	10	15	0	0	0	0	1	0	1	0	2	0	44
2:45 PM	0	13	2	0	3	14	0	0	0	1	1	0	0	0	6	0	40
2:50 PM	1	10	3	0	6	14	1	0	1	0	1	0	1	1	7	0	46
2:55 PM	0	9	3	0	11	26	0	0	0	1	1	0	0	0	3	0	54
3:00 PM	0	14	0	0	9	22	0	0	1	1	0	0	4	1	6	0	58
3:05 PM	0	20	4	0	17	25	1	0	0	1	2	0	2	0	5	0	77
3:10 PM	1	13	1	0	8	18	2	0	0	0	2	0	4	1	7	0	57
3:15 PM	1	13	2	0	6	23	0	0	1	0	0	0	3	1	3	0	53
3:20 PM	3	28	5	0	10	17	0	0	0	1	0	0	1	1	8	0	74
3:25 PM	1	15	3	0	10	28	1	0	0	1	0	0	2	2	4	0	67
Total Survey	14	296	64	1	174	424	11	0	7	13	13	0	61	12	111	0	1,200

Pedestrians			
Crosswalk			
North	South	East	West
1	0	0	0
0	0	1	0
0	0	0	0
0	0	1	0
0	0	1	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	1	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	1	0
0	0	0	0
1	0	5	0

15-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	**Total**
1:30 PM	1	28	2	0	15	35	1	0	1	2	2	0	11	1	16	0	115
1:45 PM	1	24	5	0	16	46	1	0	1	2	0	0	10	2	15	0	123
2:00 PM	0	25	4	0	15	52	1	0	1	2	2	0	15	1	11	0	129
2:15 PM	5	40	23	1	28	53	2	0	0	1	0	0	6	1	7	0	166
2:30 PM	0	44	7	0	20	51	1	0	1	0	2	0	2	0	13	0	141
2:45 PM	1	32	8	0	20	54	1	0	1	2	3	0	1	1	16	0	140
3:00 PM	1	47	5	0	34	65	3	0	1	2	4	0	10	2	18	0	192
3:15 PM	5	56	10	0	26	68	1	0	1	2	0	0	6	4	15	0	194
Total Survey	14	296	64	1	174	424	11	0	7	13	13	0	61	12	111	0	1,200

Pedestrians			
Crosswalk			
North	South	East	West
1	0	1	0
0	0	2	0
0	0	0	0
0	0	1	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	1	0
1	0	5	0

Peak Hour Summary
2:30 PM to 3:30 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	216	266	482	0	344	245	589	0	19	20	39	0	88	136	224	0	667
%HV	1.4%				2.3%				15.8%				3.4%				2.5%
PHF	0.76				0.77				0.68				0.73				0.86

Pedestrians			
Crosswalk			
North	South	East	West
0	0	1	0

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	7	179	30	216	100	238	6	344	4	6	9	19	19	7	62	88	667
%HV	0.0%	0.6%	6.7%	1.4%	3.0%	1.7%	16.7%	2.3%	25.0%	16.7%	11.1%	15.8%	5.3%	0.0%	3.2%	3.4%	2.5%
PHF	0.35	0.80	0.75	0.76	0.68	0.82	0.50	0.77	0.50	0.50	0.56	0.68	0.48	0.44	0.86	0.73	0.86

Rolling Hour Summary
1:30 PM to 3:30 PM

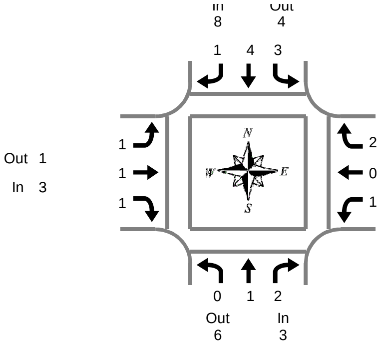
Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	**Total**
1:30 PM	7	117	34	1	74	186	5	0	3	7	4	0	42	5	49	0	533
1:45 PM	6	133	39	1	79	202	5	0	3	5	4	0	33	4	46	0	559
2:00 PM	6	141	42	1	83	210	5	0	3	5	7	0	24	3	47	0	576
2:15 PM	7	163	43	1	102	223	7	0	3	5	9	0	19	4	54	0	639
2:30 PM	7	179	30	0	100	238	6	0	4	6	9	0	19	7	62	0	667

Pedestrians			
Crosswalk			
North	South	East	West
1	0	4	0
0	0	3	0
0	0	1	0
0	0	1	0
0	0	1	0

Heavy Vehicle Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
2:30 PM to 3:30 PM

Rosemont Rd & Hidden Springs Rd

Tuesday, April 05, 2016
1:30 PM to 3:30 PM

Heavy Vehicle 5-Minute Interval Summary
1:30 PM to 3:30 PM

Interval Start Time	**Northbound** Rosemont Rd				**Southbound** Rosemont Rd				**Eastbound** Hidden Springs Rd				**Westbound** Hidden Springs Rd				**Interval Total**
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
1:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
1:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:40 PM	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	2
1:45 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	3
1:50 PM	0	1	0	1	0	2	0	2	0	0	0	0	0	0	0	0	3
1:55 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2:00 PM	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
2:05 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
2:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	3	3
2:15 PM	0	1	2	3	0	1	0	1	0	0	0	0	0	0	0	0	4
2:20 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
2:25 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
2:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:40 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:50 PM	0	0	0	0	0	1	1	2	0	0	0	0	0	0	1	1	3
2:55 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
3:00 PM	0	1	0	1	0	1	0	1	1	0	0	1	0	0	0	0	3
3:05 PM	0	0	1	1	2	0	0	2	0	1	0	1	0	0	0	0	4
3:10 PM	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	2
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:20 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
3:25 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
Total Survey	0	5	4	9	6	13	1	20	1	1	1	3	4	0	3	7	39

Heavy Vehicle 15-Minute Interval Summary
1:30 PM to 3:30 PM

Interval Start Time	**Northbound** Rosemont Rd				**Southbound** Rosemont Rd				**Eastbound** Hidden Springs Rd				**Westbound** Hidden Springs Rd				**Interval Total**
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
1:30 PM	0	0	0	0	1	2	0	3	0	0	0	0	0	0	0	0	3
1:45 PM	0	2	0	2	0	5	0	5	0	0	0	0	0	0	0	0	7
2:00 PM	0	1	0	1	1	0	0	1	0	0	0	0	3	0	1	4	6
2:15 PM	0	1	2	3	1	2	0	3	0	0	0	0	0	0	0	0	6
2:30 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	2
2:45 PM	0	0	0	0	0	2	1	3	0	0	0	0	0	0	1	1	4
3:00 PM	0	1	1	2	2	1	0	3	1	1	1	3	1	0	0	1	9
3:15 PM	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	2
Total Survey	0	5	4	9	6	13	1	20	1	1	1	3	4	0	3	7	39

Heavy Vehicle Peak Hour Summary
2:30 PM to 3:30 PM

By Approach	**Northbound** Rosemont Rd			**Southbound** Rosemont Rd			**Eastbound** Hidden Springs Rd			**Westbound** Hidden Springs Rd			**Total**
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	3	6	9	8	4	12	3	1	4	3	6	9	17
PHF	0.38			0.50			0.25			0.75			0.47

By Movement	**Northbound** Rosemont Rd				**Southbound** Rosemont Rd				**Eastbound** Hidden Springs Rd				**Westbound** Hidden Springs Rd				**Total**
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	1	2	3	3	4	1	8	1	1	1	3	1	0	2	3	17
PHF	0.00	0.25	0.50	0.38	0.38	0.33	0.25	0.50	0.25	0.25	0.25	0.25	0.25	0.00	0.50	0.75	0.47

Heavy Vehicle Rolling Hour Summary
1:30 PM to 3:30 PM

Interval Start Time	**Northbound** Rosemont Rd				**Southbound** Rosemont Rd				**Eastbound** Hidden Springs Rd				**Westbound** Hidden Springs Rd				**Interval Total**
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
1:30 PM	0	4	2	6	3	9	0	12	0	0	0	0	3	0	1	4	22
1:45 PM	0	4	3	7	2	7	0	9	0	0	0	0	3	0	2	5	21
2:00 PM	0	2	3	5	2	4	1	7	0	0	0	0	3	0	3	6	18
2:15 PM	0	2	4	6	3	5	1	9	1	1	1	3	1	0	2	3	21
2:30 PM	0	1	2	3	3	4	1	8	1	1	1	3	1	0	2	3	17

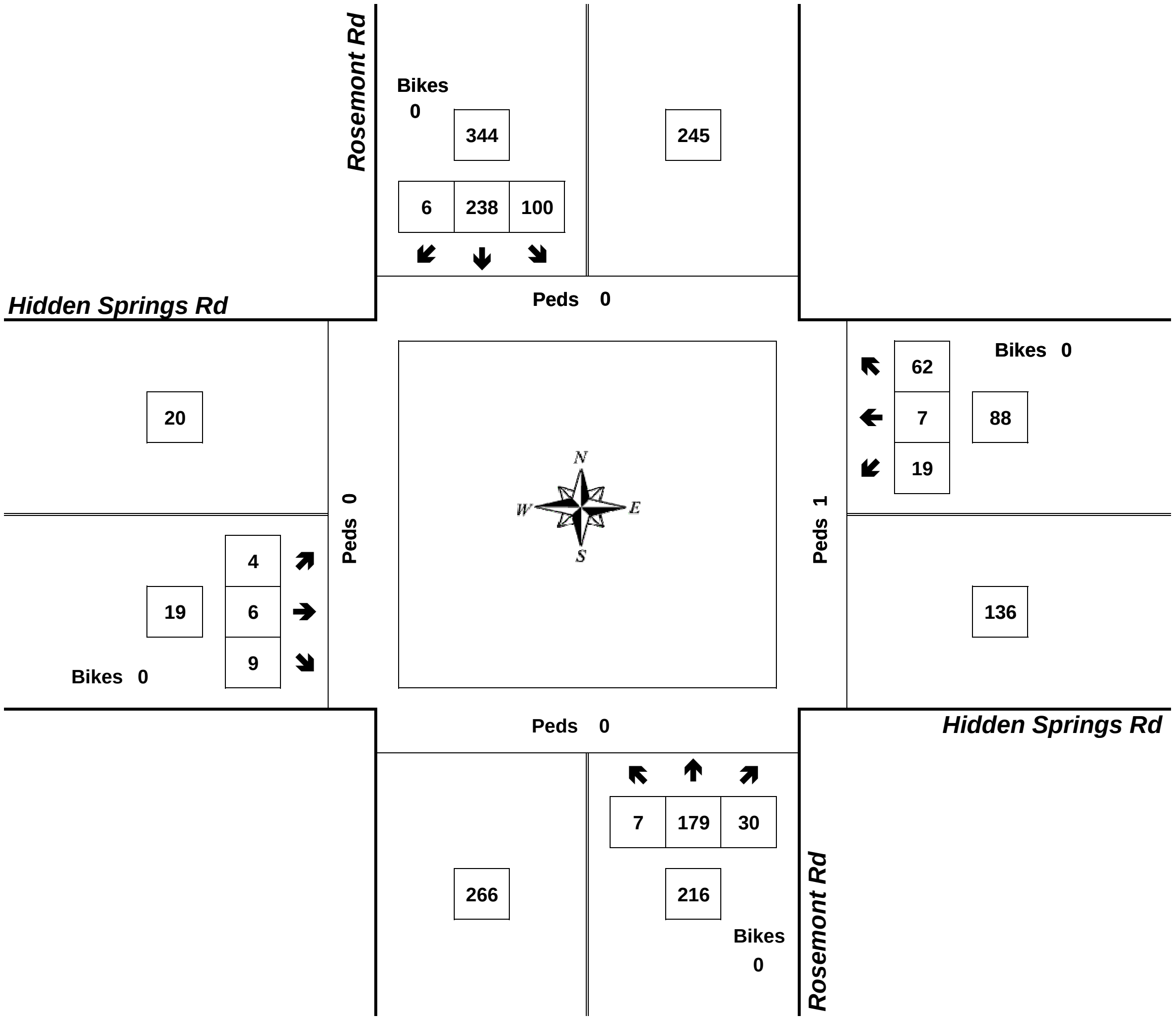
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Rosemont Rd & Hidden Springs Rd

2:30 PM to 3:30 PM
Tuesday, April 05, 2016

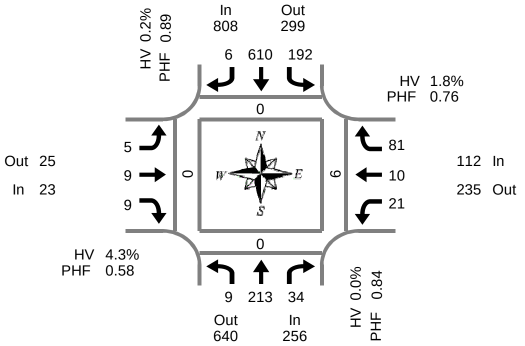


Approach	PHF	HV%	Volume
EB	0.68	15.8%	19
WB	0.73	3.4%	88
NB	0.76	1.4%	216
SB	0.77	2.3%	344
Intersection	0.86	2.5%	667

Count Period: 1:30 PM to 3:30 PM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
5:00 PM to 6:00 PM

Rosemont Rd & Hidden Springs Rd

Tuesday, April 05, 2016
4:00 PM to 6:00 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Interval Total**	**Pedestrians**			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	2	18	3	0	11	22	0	0	0	2	0	0	0	0	11	0	69	0	0	2	0
4:05 PM	2	24	1	0	5	20	2	0	0	0	0	0	3	0	10	0	67	0	0	0	0
4:10 PM	1	11	3	0	12	39	0	0	0	0	1	0	1	2	5	0	75	0	0	0	0
4:15 PM	0	20	1	0	13	40	0	0	1	0	1	0	1	0	3	0	80	0	0	1	0
4:20 PM	0	10	1	0	10	32	2	0	1	0	0	2	1	1	9	0	67	0	0	1	0
4:25 PM	1	14	4	1	10	34	1	0	0	1	1	0	1	2	9	0	78	0	0	0	0
4:30 PM	0	16	4	0	17	52	0	0	0	0	0	0	1	1	7	0	98	0	1	0	1
4:35 PM	0	16	5	0	18	31	0	0	1	0	1	0	0	2	8	0	82	0	1	1	1
4:40 PM	0	14	4	0	18	45	0	0	0	3	4	1	2	1	5	0	96	0	0	0	0
4:45 PM	0	7	3	0	6	52	0	0	0	1	1	0	3	0	7	1	80	0	0	1	0
4:50 PM	1	12	1	0	16	47	2	0	0	1	2	0	4	0	8	0	94	0	0	3	0
4:55 PM	0	17	2	0	11	43	0	0	0	2	2	0	1	1	7	0	86	0	0	1	0
5:00 PM	2	15	6	0	12	40	0	0	0	0	2	0	0	1	4	0	82	0	0	3	0
5:05 PM	0	18	1	0	13	34	0	0	0	0	0	0	2	0	5	0	73	0	0	2	0
5:10 PM	0	16	4	0	17	55	1	0	0	2	0	0	1	0	6	0	102	0	0	1	0
5:15 PM	0	19	2	0	19	58	0	0	0	0	0	0	1	1	10	1	110	0	0	0	0
5:20 PM	1	21	3	0	13	62	1	0	0	0	2	0	1	1	10	0	115	0	0	0	0
5:25 PM	2	18	1	0	13	57	1	0	0	0	2	0	4	1	8	0	107	0	0	0	0
5:30 PM	0	21	2	0	17	61	0	0	0	1	2	0	2	3	4	0	113	0	0	0	0
5:35 PM	0	21	1	0	19	41	0	0	3	2	0	0	3	0	7	0	97	0	0	0	0
5:40 PM	3	18	7	0	15	50	1	0	0	2	0	0	0	1	7	0	104	0	0	0	0
5:45 PM	1	22	3	0	14	49	1	0	0	1	1	0	1	0	7	0	100	0	0	0	0
5:50 PM	0	14	1	0	21	40	1	0	1	0	0	0	1	1	9	0	89	0	0	0	0
5:55 PM	0	10	3	0	19	63	0	0	1	1	0	0	5	1	4	0	107	0	0	0	0
Total Survey	16	392	66	1	339	1,067	13	0	8	19	22	3	39	20	170	2	2,171	0	2	16	2

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Interval Total**	**Pedestrians**			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	5	53	7	0	28	81	2	0	0	2	1	0	4	2	26	0	211	0	0	2	0
4:15 PM	1	44	6	1	33	106	3	0	2	1	2	2	3	3	21	0	225	0	0	2	0
4:30 PM	0	46	13	0	53	128	0	0	1	3	5	1	3	4	20	0	276	0	2	1	2
4:45 PM	1	36	6	0	33	142	2	0	0	4	5	0	8	1	22	1	260	0	0	5	0
5:00 PM	2	49	11	0	42	129	1	0	0	2	2	0	3	1	15	0	257	0	0	6	0
5:15 PM	3	58	6	0	45	177	2	0	0	0	4	0	6	3	28	1	332	0	0	0	0
5:30 PM	3	60	10	0	51	152	1	0	3	5	2	0	5	4	18	0	314	0	0	0	0
5:45 PM	1	46	7	0	54	152	2	0	2	2	1	0	7	2	20	0	296	0	0	0	0
Total Survey	16	392	66	1	339	1,067	13	0	8	19	22	3	39	20	170	2	2,171	0	2	16	2

Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**	**Pedestrians**			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	256	640	896	0	808	299	1,107	0	23	25	48	0	112	235	347	1	1,199	0	0	6	0
%HV	0.0%				0.2%				4.3%				1.8%				0.4%				
PHF	0.84				0.89				0.58				0.76				0.89				

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	9	213	34	256	192	610	6	808	5	9	9	23	21	10	81	112	1,199
%HV	0.0%	0.0%	0.0%	0.0%	0.5%	0.2%	0.0%	0.2%	0.0%	11.1%	0.0%	4.3%	0.0%	0.0%	2.5%	1.8%	0.4%
PHF	0.56	0.87	0.77	0.84	0.89	0.85	0.50	0.89	0.42	0.45	0.38	0.58	0.58	0.50	0.72	0.76	0.89

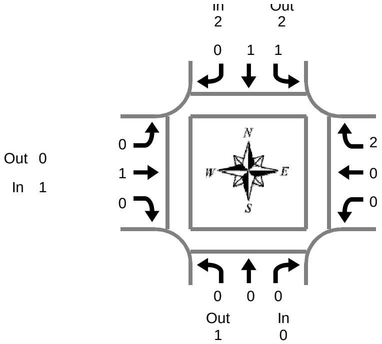
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Interval Total**	**Pedestrians**			
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	7	179	32	1	147	457	7	0	3	10	13	3	18	10	89	1	972	0	2	10	2
4:15 PM	4	175	36	1	161	505	6	0	3	10	14	3	17	9	78	1	1,018	0	2	14	2
4:30 PM	6	189	36	0	173	576	5	0	1	9	16	1	20	9	85	2	1,125	0	2	12	2
4:45 PM	9	203	33	0	171	600	6	0	3	11	13	0	22	9	83	2	1,163	0	0	11	0
5:00 PM	9	213	34	0	192	610	6	0	5	9	9	0	21	10	81	1	1,199	0	0	6	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
5:00 PM to 6:00 PM

Rosemont Rd & Hidden Springs Rd

Tuesday, April 05, 2016
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	**Total**
4:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	2
4:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:10 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:20 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	2	3
4:25 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:35 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:40 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
4:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
5:05 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:10 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:20 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
5:25 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:35 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:40 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:50 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:55 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	2	0	2	2	2	0	4	0	1	0	1	0	0	7	7	14

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	**Total**
4:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	2
4:15 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	3	3	5
4:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
5:00 PM	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	2	0	2	2	2	0	4	0	1	0	1	0	0	7	7	14

Heavy Vehicle Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	**Northbound**			**Southbound**			**Eastbound**			**Westbound**			**Total**
	Rosemont Rd			Rosemont Rd			Hidden Springs Rd			Hidden Springs Rd			
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	1	1	2	2	4	1	0	1	2	2	4	5
PHF	0.00			0.25			0.25			0.25			0.63

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	1	1	0	2	0	1	0	1	0	0	2	2	5
PHF	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.25	0.00	0.25	0.00	0.25	0.00	0.00	0.25	0.25	0.63

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Rosemont Rd				Rosemont Rd				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	**Total**
4:00 PM	0	2	0	2	1	1	0	2	0	0	0	0	0	0	5	5	9
4:15 PM	0	2	0	2	1	2	0	3	0	0	0	0	0	0	4	4	9
4:30 PM	0	0	0	0	1	2	0	3	0	0	0	0	0	0	3	3	6
4:45 PM	0	0	0	0	1	1	0	2	0	1	0	1	0	0	3	3	6
5:00 PM	0	0	0	0	1	1	0	2	0	1	0	1	0	0	2	2	5

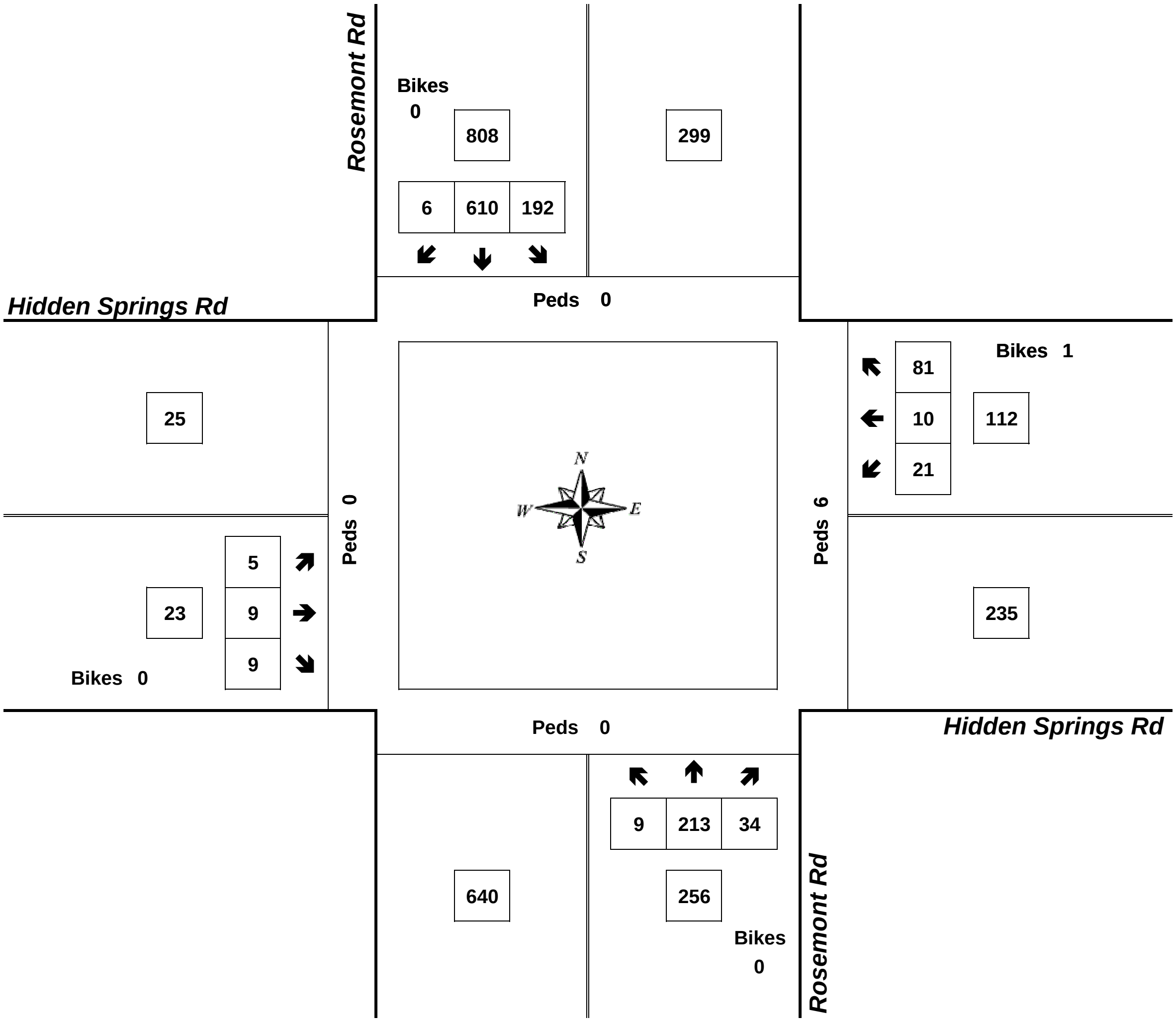
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Rosemont Rd & Hidden Springs Rd

5:00 PM to 6:00 PM
Tuesday, April 05, 2016



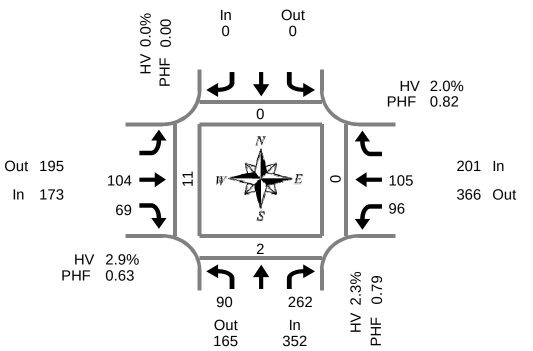
Approach	PHF	HV%	Volume
EB	0.58	4.3%	23
WB	0.76	1.8%	112
NB	0.84	0.0%	256
SB	0.89	0.2%	808
Intersection	0.89	0.4%	1,199

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
7:25 AM to 8:25 AM

Santa Anita Dr & Hidden Springs Rd

Tuesday, April 05, 2016
7:00 AM to 9:00 AM

5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	**Total**
7:00 AM	2		10	0				0		3	2	0	0	5		0	22
7:05 AM	1		12	0				0		4	4	0	2	4		0	27
7:10 AM	7		16	0				0		5	2	0	3	8		0	41
7:15 AM	11		12	0				0		5	7	0	3	5		0	43
7:20 AM	5		20	0				0		6	2	0	7	2		0	42
7:25 AM	8		14	0				0		3	4	0	8	10		0	47
7:30 AM	8		21	0				0		11	3	0	4	8		0	55
7:35 AM	8		17	0				0		3	3	0	6	15		0	52
7:40 AM	6		22	0				0		12	5	0	7	11		0	63
7:45 AM	13		30	0				0		20	8	0	8	11		0	90
7:50 AM	9		23	0				0		14	10	0	9	7		0	72
7:55 AM	7		30	0				0		8	7	0	8	4		0	64
8:00 AM	4		29	0				0		5	3	0	7	7		0	55
8:05 AM	9		18	0				0		9	8	0	6	4		0	54
8:10 AM	6		26	0				0		4	9	0	5	13		0	63
8:15 AM	6		14	0				0		6	7	0	18	9		0	60
8:20 AM	6		18	0				0		9	2	0	10	6		0	51
8:25 AM	6		15	0				0		2	6	0	8	6		0	43
8:30 AM	11		17	0				0		8	4	0	7	6		0	53
8:35 AM	6		19	0				0		8	6	0	6	4		0	49
8:40 AM	5		9	0				0		7	3	0	7	4		0	35
8:45 AM	6		21	0				0		4	1	0	6	6		0	44
8:50 AM	6		20	0				0		5	5	0	10	8		0	54
8:55 AM	9		8	0				0		4	2	0	12	6		0	41
Total Survey	165		441	0				0		165	113	0	167	169		0	1,220

Pedestrians			
Crosswalk			
North	South	East	West
0	0	0	1
0	0	0	2
0	0	0	1
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	4
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	3
0	2	0	0
0	0	0	2
0	0	0	1
0	0	0	1
0	0	0	0
0	0	0	0
0	0	0	2
0	0	0	1
0	0	0	1
0	0	0	3
0	2	0	24

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	**Total**
7:00 AM	10		38	0				0		12	8	0	5	17		0	90
7:15 AM	24		46	0				0		14	13	0	18	17		0	132
7:30 AM	22		60	0				0		26	11	0	17	34		0	170
7:45 AM	29		83	0				0		42	25	0	25	22		0	226
8:00 AM	19		73	0				0		18	20	0	18	24		0	172
8:15 AM	18		47	0				0		17	15	0	36	21		0	154
8:30 AM	22		45	0				0		23	13	0	20	14		0	137
8:45 AM	21		49	0				0		13	8	0	28	20		0	139
Total Survey	165		441	0				0		165	113	0	167	169		0	1,220

Pedestrians			
Crosswalk			
North	South	East	West
0	0	0	4
0	0	0	1
0	0	0	1
0	0	0	4
0	2	0	3
0	0	0	4
0	0	0	2
0	0	0	5
0	2	0	24

Peak Hour Summary
7:25 AM to 8:25 AM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	352	165	517	0	0	0	0	0	173	195	368	0	201	366	567	0	726
%HV	2.3%				0.0%				2.9%				2.0%				2.3%
PHF	0.79				0.00				0.63				0.82				0.80

Pedestrians			
Crosswalk			
North	South	East	West
0	2	0	11

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	90		262	352				0		104	69	173	96	105		201	726
%HV	2.2%	NA	2.3%	2.3%	NA	NA	NA	0.0%	NA	3.8%	1.4%	2.9%	1.0%	2.9%	NA	2.0%	2.3%
PHF	0.78		0.79	0.79				0.00		0.57	0.69	0.63	0.73	0.71		0.82	0.80

Rolling Hour Summary
7:00 AM to 9:00 AM

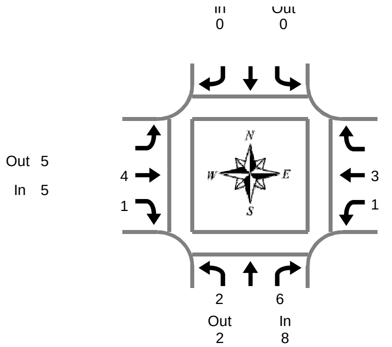
Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	**Total**
7:00 AM	85		227	0				0		94	57	0	65	90		0	618
7:15 AM	94		262	0				0		100	69	0	78	97		0	700
7:30 AM	88		263	0				0		103	71	0	96	101		0	722
7:45 AM	88		248	0				0		100	73	0	99	81		0	689
8:00 AM	80		214	0				0		71	56	0	102	79		0	602

Pedestrians			
Crosswalk			
North	South	East	West
0	0	0	10
0	2	0	9
0	2	0	12
0	2	0	13
0	2	0	14

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Santa Anita Dr & Hidden Springs Rd

Tuesday, April 05, 2016

7:00 AM to 9:00 AM

Peak Hour Summary
7:25 AM to 8:25 AM

Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time	L		R	Total				Total		T	R	Total	L	T		Total	Total
7:00 AM	0		0	0				0		0	0	0	0	0		0	0
7:05 AM	0		0	0				0		0	0	0	0	0		0	0
7:10 AM	0		0	0				0		0	0	0	0	0		0	0
7:15 AM	0		0	0				0		1	0	1	0	0		0	1
7:20 AM	0		0	0				0		0	0	0	1	0		1	1
7:25 AM	0		0	0				0		0	0	0	0	0		0	0
7:30 AM	1		0	1				0		1	0	1	0	0		0	2
7:35 AM	0		0	0				0		0	0	0	0	0		0	0
7:40 AM	0		1	1				0		1	0	1	0	0		0	2
7:45 AM	0		1	1				0		2	1	3	0	1		1	5
7:50 AM	0		0	0				0		0	0	0	1	1		2	2
7:55 AM	0		0	0				0		0	0	0	0	0		0	0
8:00 AM	0		2	2				0		0	0	0	0	0		0	2
8:05 AM	0		1	1				0		0	0	0	0	0		0	1
8:10 AM	0		0	0				0		0	0	0	0	1		1	1
8:15 AM	1		1	2				0		0	0	0	0	0		0	2
8:20 AM	0		0	0				0		0	0	0	0	0		0	0
8:25 AM	0		0	0				0		0	0	0	0	1		1	1
8:30 AM	0		0	0				0		0	0	0	0	0		0	0
8:35 AM	0		0	0				0		1	0	1	0	1		1	2
8:40 AM	0		0	0				0		0	0	0	0	0		0	0
8:45 AM	0		0	0				0		0	0	0	1	0		1	1
8:50 AM	0		1	1				0		0	0	0	2	0		2	3
8:55 AM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	2		7	9				0		6	1	7	5	5		10	26

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time	L		R	Total				Total		T	R	Total	L	T		Total	Total
7:00 AM	0		0	0				0		0	0	0	0	0		0	0
7:15 AM	0		0	0				0		1	0	1	1	0		1	2
7:30 AM	1		1	2				0		2	0	2	0	0		0	4
7:45 AM	0		1	1				0		2	1	3	1	2		3	7
8:00 AM	0		3	3				0		0	0	0	0	1		1	4
8:15 AM	1		1	2				0		0	0	0	0	1		1	3
8:30 AM	0		0	0				0		1	0	1	0	1		1	2
8:45 AM	0		1	1				0		0	0	0	3	0		3	4
Total Survey	2		7	9				0		6	1	7	5	5		10	26

Heavy Vehicle Peak Hour Summary
7:25 AM to 8:25 AM

By Approach	Northbound				Southbound				Eastbound				Westbound				Total
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	8	2	10		0	0	0		5	5	10		4	10	14		17
PHF	0.67				0.00				0.31				0.33				0.47

By Movement	Northbound				Southbound				Eastbound				Westbound				Total
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	2		6	8				0		4	1	5	1	3		4	17
PHF	0.50		0.50	0.67				0.00		0.33	0.25	0.31	0.25	0.38		0.33	0.47

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time	L		R	Total				Total		T	R	Total	L	T		Total	Total
7:00 AM	1		2	3				0		5	1	6	2	2		4	13
7:15 AM	1		5	6				0		5	1	6	2	3		5	17
7:30 AM	2		6	8				0		4	1	5	1	4		5	18
7:45 AM	1		5	6				0		3	1	4	1	5		6	16
8:00 AM	1		5	6				0		1	0	1	3	3		6	13

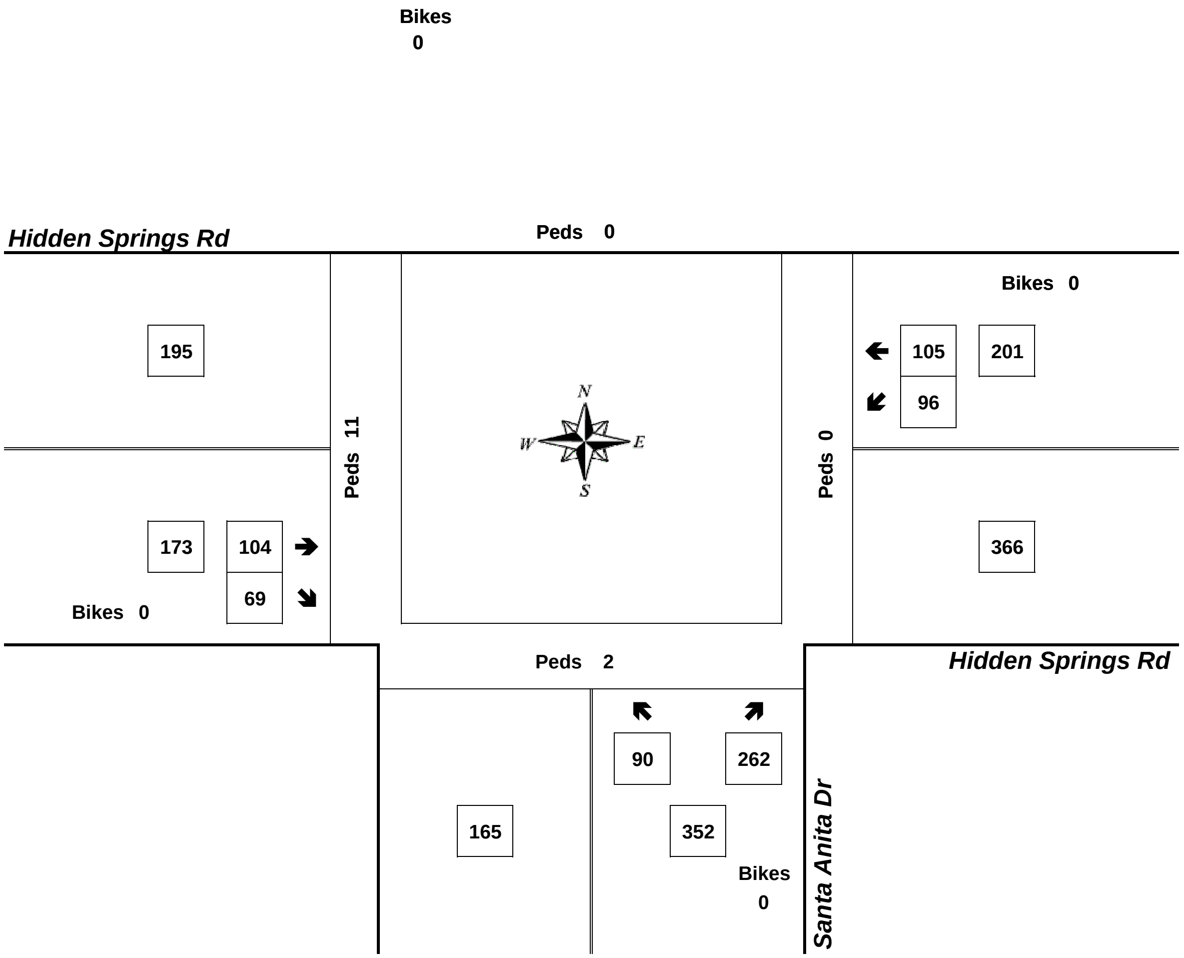
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Santa Anita Dr & Hidden Springs Rd

7:25 AM to 8:25 AM
Tuesday, April 05, 2016

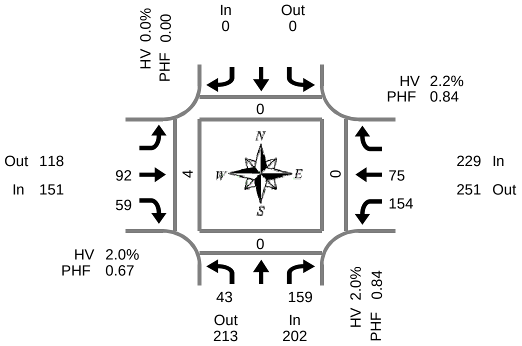


Approach	PHF	HV%	Volume
EB	0.63	2.9%	173
WB	0.82	2.0%	201
NB	0.79	2.3%	352
SB	0.00	0.0%	0
Intersection	0.80	2.3%	726

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
2:30 PM to 3:30 PM

Santa Anita Dr & Hidden Springs Rd

Tuesday, April 05, 2016
1:30 PM to 3:30 PM

5-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	Total
1:30 PM	2		3	0				0		2	2	0	10	13		0	32
1:35 PM	2		5	0				0		5	2	0	6	7		0	27
1:40 PM	5		7	0				0		4	0	1	10	7		0	33
1:45 PM	4		7	0				0		8	1	0	7	4		0	31
1:50 PM	6		12	0				0		2	2	0	12	6		0	40
1:55 PM	1		7	0				0		8	1	0	15	6		0	38
2:00 PM	3		10	0				0		3	6	0	5	5		0	32
2:05 PM	3		11	0				0		7	3	0	6	10		0	40
2:10 PM	1		9	0				0		9	2	0	8	10		0	39
2:15 PM	2		13	0				0		11	5	0	13	3		0	47
2:20 PM	6		10	0				0		11	7	0	10	4		0	48
2:25 PM	0		8	0				0		8	3	0	9	4		0	32
2:30 PM	1		18	0				0		4	7	0	6	4		0	40
2:35 PM	3		13	0				0		6	2	0	15	4		0	43
2:40 PM	2		11	0				0		8	2	0	10	5		0	38
2:45 PM	3		14	0				0		6	3	0	14	6		0	46
2:50 PM	2		14	0				0		9	7	0	12	7		0	51
2:55 PM	3		8	0				0		14	4	0	14	4		0	47
3:00 PM	3		16	0				0		8	8	0	14	7		0	56
3:05 PM	2		5	0				0		12	10	0	13	8		0	50
3:10 PM	6		18	0				0		6	4	0	18	8		0	60
3:15 PM	5		16	0				0		8	3	0	14	6		0	52
3:20 PM	7		8	1				0		8	4	0	10	8		0	45
3:25 PM	6		18	0				0		3	5	0	14	8		0	54
Total Survey	78		261	1				0		170	93	1	265	154		0	1,021

Pedestrians			
Crosswalk			
North	South	East	West
0	0	1	0
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	1	0	0
0	0	0	0
0	0	0	2
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	1	1	5

15-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	Total
1:30 PM	9		15	0				0		11	4	1	26	27		0	92
1:45 PM	11		26	0				0		18	4	0	34	16		0	109
2:00 PM	7		30	0				0		19	11	0	19	25		0	111
2:15 PM	8		31	0				0		30	15	0	32	11		0	127
2:30 PM	6		42	0				0		18	11	0	31	13		0	121
2:45 PM	8		36	0				0		29	14	0	40	17		0	144
3:00 PM	11		39	0				0		26	22	0	45	23		0	166
3:15 PM	18		42	1				0		19	12	0	38	22		0	151
Total Survey	78		261	1				0		170	93	1	265	154		0	1,021

Pedestrians			
Crosswalk			
North	South	East	West
0	0	1	1
0	0	0	0
0	0	0	0
0	1	0	0
0	0	0	2
0	0	0	0
0	0	0	1
0	0	0	1
0	1	1	5

Peak Hour Summary
2:30 PM to 3:30 PM

By Approach	Northbound				Southbound				Eastbound				Westbound				Total
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	202	213	415	1	0	0	0	0	151	118	269	0	229	251	480	0	582
%HV	2.0%				0.0%				2.0%				2.2%				2.1%
PHF	0.84				0.00				0.67				0.84				0.88

Pedestrians			
Crosswalk			
North	South	East	West
0	0	0	4

By Movement	Northbound				Southbound				Eastbound				Westbound				Total
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	43		159	202				0		92	59	151	154	75		229	582
%HV	0.0%	NA	2.5%	2.0%	NA	NA	NA	0.0%	NA	1.1%	3.4%	2.0%	2.6%	1.3%	NA	2.2%	2.1%
PHF	0.60		0.95	0.84				0.00		0.68	0.67	0.67	0.86	0.82		0.84	0.88

Rolling Hour Summary
1:30 PM to 3:30 PM

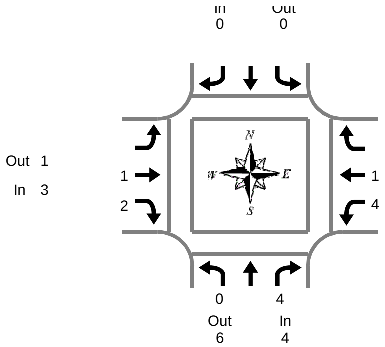
Interval	Northbound				Southbound				Eastbound				Westbound				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				Interval
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	Total
1:30 PM	35		102	0				0		78	34	1	111	79		0	439
1:45 PM	32		129	0				0		85	41	0	116	65		0	468
2:00 PM	29		139	0				0		96	51	0	122	66		0	503
2:15 PM	33		148	0				0		103	62	0	148	64		0	558
2:30 PM	43		159	1				0		92	59	0	154	75		0	582

Pedestrians			
Crosswalk			
North	South	East	West
0	1	1	1
0	1	0	2
0	1	0	2
0	1	0	3
0	0	0	4

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
2:30 PM to 3:30 PM

Santa Anita Dr & Hidden Springs Rd

Tuesday, April 05, 2016
1:30 PM to 3:30 PM

Heavy Vehicle 5-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
1:30 PM	0		0	0				0		0	0	0	0	0		0	0
1:35 PM	0		0	0				0		0	0	0	0	0		0	0
1:40 PM	0		0	0				0		1	0	1	0	0		0	1
1:45 PM	0		0	0				0		0	0	0	0	0		0	0
1:50 PM	0		0	0				0		0	0	0	0	0		0	0
1:55 PM	0		0	0				0		0	0	0	0	1		1	1
2:00 PM	0		0	0				0		0	1	1	0	0		0	1
2:05 PM	0		0	0				0		0	1	1	0	1		1	2
2:10 PM	0		2	2				0		0	0	0	0	0		0	2
2:15 PM	0		0	0				0		2	1	3	0	0		0	3
2:20 PM	0		1	1				0		0	0	0	0	0		0	1
2:25 PM	0		2	2				0		1	0	1	0	0		0	3
2:30 PM	0		0	0				0		0	0	0	0	0		0	0
2:35 PM	0		1	1				0		0	0	0	0	0		0	1
2:40 PM	0		1	1				0		1	0	1	1	0		1	3
2:45 PM	0		0	0				0		0	0	0	0	0		0	0
2:50 PM	0		1	1				0		0	0	0	1	1		2	3
2:55 PM	0		1	1				0		0	0	0	0	0		0	1
3:00 PM	0		0	0				0		0	0	0	0	0		0	0
3:05 PM	0		0	0				0		0	2	2	1	0		1	3
3:10 PM	0		0	0				0		0	0	0	1	0		1	1
3:15 PM	0		0	0				0		0	0	0	0	0		0	0
3:20 PM	0		0	0				0		0	0	0	0	0		0	0
3:25 PM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	0		9	9				0		5	5	10	4	3		7	26

Heavy Vehicle 15-Minute Interval Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
1:30 PM	0		0	0				0		1	0	1	0	0		0	1
1:45 PM	0		0	0				0		0	0	0	0	1		1	1
2:00 PM	0		2	2				0		0	2	2	0	1		1	5
2:15 PM	0		3	3				0		3	1	4	0	0		0	7
2:30 PM	0		2	2				0		1	0	1	1	0		1	4
2:45 PM	0		2	2				0		0	0	0	1	1		2	4
3:00 PM	0		0	0				0		0	2	2	2	0		2	4
3:15 PM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	0		9	9				0		5	5	10	4	3		7	26

Heavy Vehicle Peak Hour Summary
2:30 PM to 3:30 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	4	6	10		0	0	0		3	1	4		5	5	10		12
PHF	0.50				0.00				0.38				0.42				0.50

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	0		4	4				0		1	2	3	4	1		5	12
PHF	0.00		0.50	0.50				0.00		0.25	0.25	0.38	0.50	0.25		0.42	0.50

Heavy Vehicle Rolling Hour Summary
1:30 PM to 3:30 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
1:30 PM	0		5	5				0		4	3	7	0	2		2	14
1:45 PM	0		7	7				0		4	3	7	1	2		3	17
2:00 PM	0		9	9				0		4	3	7	2	2		4	20
2:15 PM	0		7	7				0		4	3	7	4	1		5	19
2:30 PM	0		4	4				0		1	2	3	4	1		5	12

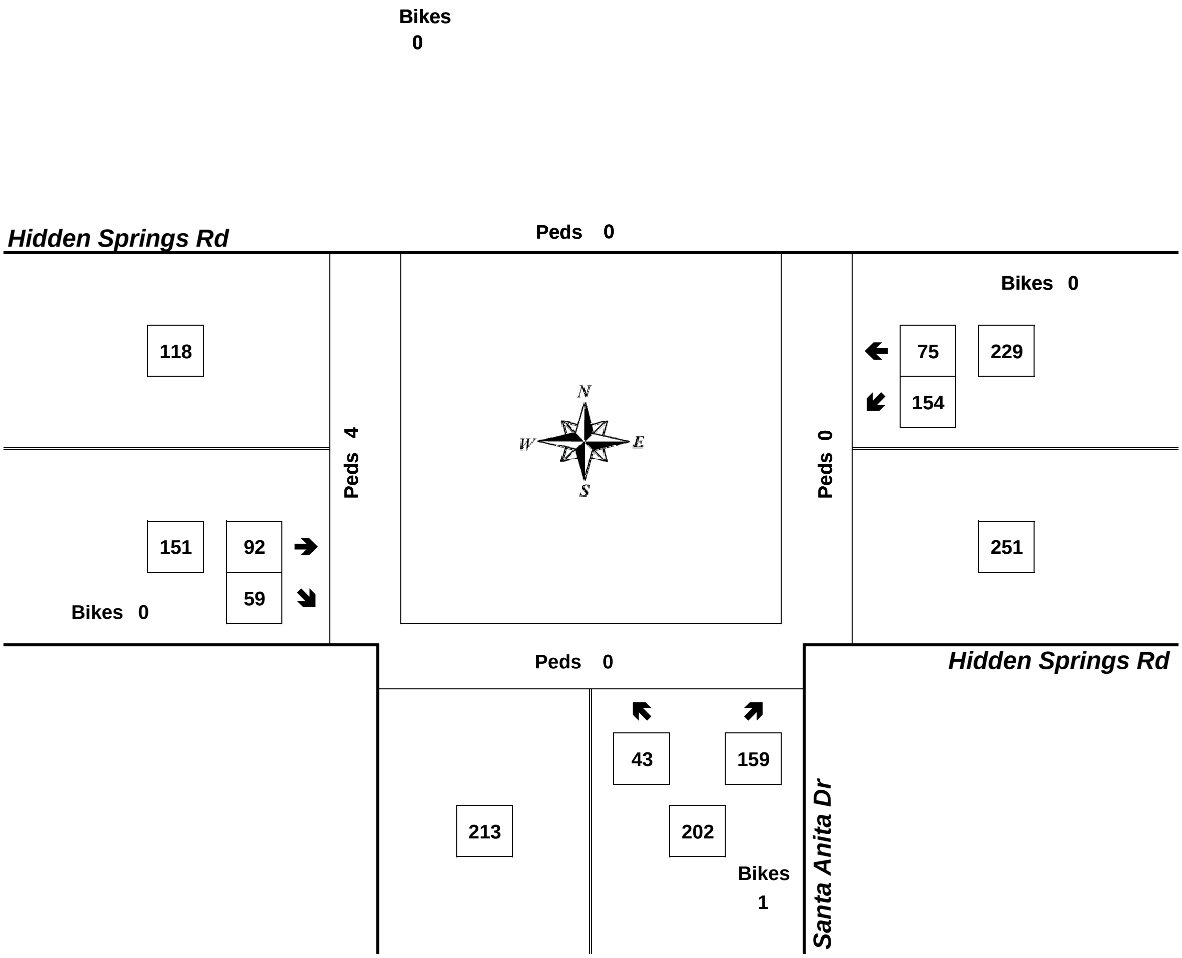
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

Santa Anita Dr & Hidden Springs Rd

2:30 PM to 3:30 PM
Tuesday, April 05, 2016



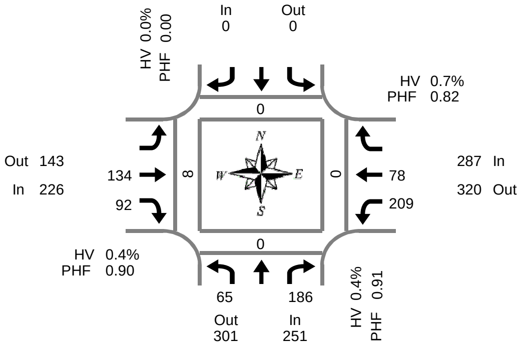
Approach	PHF	HV%	Volume
EB	0.67	2.0%	151
WB	0.84	2.2%	229
NB	0.84	2.0%	202
SB	0.00	0.0%	0
Intersection	0.88	2.1%	582

Count Period: 1:30 PM to 3:30 PM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Santa Anita Dr & Hidden Springs Rd

Tuesday, April 05, 2016

4:00 PM to 6:00 PM

Peak Hour Summary
4:50 PM to 5:50 PM

5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	**Total**	North	South	East	West
4:00 PM	7		19	0				0		10	5	0	18	6		0	65	0	0	0	1
4:05 PM	5		16	0				0		6	2	0	16	8		0	53	0	0	0	2
4:10 PM	4		9	0				0		4	8	0	10	6		0	41	0	0	0	0
4:15 PM	8		14	0				0		6	6	0	8	3		0	45	0	0	0	0
4:20 PM	4		12	0				0		8	5	1	24	10		0	63	0	0	0	0
4:25 PM	3		9	0				0		11	5	0	8	10		0	46	0	2	0	0
4:30 PM	3		7	0				0		12	4	0	15	7		0	48	0	0	0	0
4:35 PM	6		14	0				0		14	7	0	17	9		0	67	0	0	0	1
4:40 PM	5		15	0				0		13	14	0	15	5		0	67	0	0	0	0
4:45 PM	4		12	0				0		8	8	0	17	11		0	60	0	1	0	1
4:50 PM	7		22	0				0		14	4	0	16	7		0	70	0	0	0	0
4:55 PM	3		18	0				0		11	4	0	13	7		0	56	0	0	0	0
5:00 PM	5		14	0				0		11	3	0	22	2		0	57	0	0	0	1
5:05 PM	6		17	0				0		13	3	0	18	4		0	61	0	0	0	0
5:10 PM	3		11	0				0		15	6	0	15	9		0	59	0	0	0	1
5:15 PM	4		13	0				0		12	11	0	18	12		0	70	0	0	0	1
5:20 PM	4		13	0				0		5	14	0	22	11		0	69	0	0	0	2
5:25 PM	9		8	0				0		10	9	0	13	6		0	55	0	0	0	1
5:30 PM	7		19	0				0		11	11	0	16	5		0	69	0	0	0	1
5:35 PM	6		17	0				0		7	12	0	18	4		0	64	0	0	0	1
5:40 PM	5		13	0				0		13	6	0	24	5		0	66	0	0	0	0
5:45 PM	6		21	0				0		12	9	0	14	6		0	68	0	0	0	0
5:50 PM	4		15	0				0		12	10	0	15	11		0	67	0	0	0	0
5:55 PM	4		13	0				0		7	10	0	13	5		0	52	0	0	0	2
Total Survey	122		341	0				0		245	176	1	385	169		0	1,438	0	3	0	15

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	**Total**	North	South	East	West
4:00 PM	16		44	0				0		20	15	0	44	20		0	159	0	0	0	3
4:15 PM	15		35	0				0		25	16	1	40	23		0	154	0	2	0	0
4:30 PM	14		36	0				0		39	25	0	47	21		0	182	0	0	0	1
4:45 PM	14		52	0				0		33	16	0	46	25		0	186	0	1	0	1
5:00 PM	14		42	0				0		39	12	0	55	15		0	177	0	0	0	2
5:15 PM	17		34	0				0		27	34	0	53	29		0	194	0	0	0	4
5:30 PM	18		49	0				0		31	29	0	58	14		0	199	0	0	0	2
5:45 PM	14		49	0				0		31	29	0	42	22		0	187	0	0	0	2
Total Survey	122		341	0				0		245	176	1	385	169		0	1,438	0	3	0	15

Peak Hour Summary
4:50 PM to 5:50 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**	**Pedestrians**			
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd					Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	251	301	552	0	0	0	0	0	226	143	369	0	287	320	607	0	764	0	0	0	8
%HV	0.4%				0.0%				0.4%				0.7%				0.5%				
PHF	0.91				0.00				0.90				0.82				0.96				

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	65		186	251				0		134	92	226	209	78		287	764
%HV	1.5%	NA	0.0%	0.4%	NA	NA	NA	0.0%	NA	0.7%	0.0%	0.4%	0.0%	2.6%	NA	0.7%	0.5%
PHF	0.74		0.86	0.91				0.00		0.84	0.68	0.90	0.90	0.61		0.82	0.96

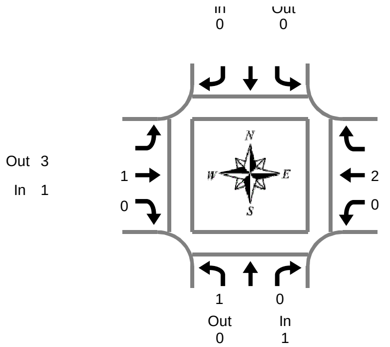
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**					**Pedestrians**			
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**	Crosswalk			
Time	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes	**Total**	North	South	East	West
4:00 PM	59		167	0				0		117	72	1	177	89		0	681	0	3	0	5
4:15 PM	57		165	0				0		136	69	1	188	84		0	699	0	3	0	4
4:30 PM	59		164	0				0		138	87	0	201	90		0	739	0	1	0	8
4:45 PM	63		177	0				0		130	91	0	212	83		0	756	0	1	0	9
5:00 PM	63		174	0				0		128	104	0	208	80		0	757	0	0	0	10

Heavy Vehicle Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:50 PM to 5:50 PM

Santa Anita Dr & Hidden Springs Rd

Tuesday, April 05, 2016
4:00 PM to 6:00 PM

Heavy Vehicle 5-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
4:00 PM	0		0	0				0		1	0	1	0	1		1	2
4:05 PM	0		1	1				0		1	0	1	1	0		1	3
4:10 PM	0		0	0				0		0	0	0	0	0		0	0
4:15 PM	0		0	0				0		0	1	1	0	0		0	1
4:20 PM	1		0	1				0		0	0	0	0	2		2	3
4:25 PM	0		0	0				0		0	0	0	0	0		0	0
4:30 PM	0		0	0				0		1	1	2	0	0		0	2
4:35 PM	1		0	1				0		0	0	0	1	0		1	2
4:40 PM	0		0	0				0		0	0	0	0	0		0	0
4:45 PM	0		0	0				0		0	0	0	0	0		0	0
4:50 PM	0		0	0				0		0	0	0	0	1		1	1
4:55 PM	0		0	0				0		0	0	0	0	0		0	0
5:00 PM	0		0	0				0		0	0	0	0	0		0	0
5:05 PM	0		0	0				0		0	0	0	0	0		0	0
5:10 PM	0		0	0				0		1	0	1	0	0		0	1
5:15 PM	0		0	0				0		0	0	0	0	0		0	0
5:20 PM	1		0	1				0		0	0	0	0	0		0	1
5:25 PM	0		0	0				0		0	0	0	0	1		1	1
5:30 PM	0		0	0				0		0	0	0	0	0		0	0
5:35 PM	0		0	0				0		0	0	0	0	0		0	0
5:40 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		0	0	0	0	0		0	0
5:50 PM	0		0	0				0		0	1	1	0	0		0	1
5:55 PM	0		0	0				0		0	0	0	0	0		0	0
Total Survey	3		1	4				0		4	3	7	2	5		7	18

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
4:00 PM	0		1	1				0		2	0	2	1	1		2	5
4:15 PM	1		0	1				0		0	1	1	0	2		2	4
4:30 PM	1		0	1				0		1	1	2	1	0		1	4
4:45 PM	0		0	0				0		0	0	0	0	1		1	1
5:00 PM	0		0	0				0		1	0	1	0	0		0	1
5:15 PM	1		0	1				0		0	0	0	0	1		1	2
5:30 PM	0		0	0				0		0	0	0	0	0		0	0
5:45 PM	0		0	0				0		0	1	1	0	0		0	1
Total Survey	3		1	4				0		4	3	7	2	5		7	18

Heavy Vehicle Peak Hour Summary
4:50 PM to 5:50 PM

By Approach	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	In	Out	Total		In	Out	Total		In	Out	Total		In	Out	Total		
Volume	1	0	1		0	0	0		1	3	4		2	1	3		4
PHF	0.25				0.00				0.25				0.50				0.50

By Movement	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				**Total**
	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	1		0	1				0		1	0	1	0	2		2	4
PHF	0.25		0.00	0.25				0.00		0.25	0.00	0.25	0.00	0.50		0.50	0.50

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval	**Northbound**				**Southbound**				**Eastbound**				**Westbound**				
Start	Santa Anita Dr				Santa Anita Dr				Hidden Springs Rd				Hidden Springs Rd				**Interval**
Time	L		R	Total				Total		T	R	Total	L	T		Total	**Total**
4:00 PM	2		1	3				0		3	2	5	2	4		6	14
4:15 PM	2		0	2				0		2	2	4	1	3		4	10
4:30 PM	2		0	2				0		2	1	3	1	2		3	8
4:45 PM	1		0	1				0		1	0	1	0	2		2	4
5:00 PM	1		0	1				0		1	1	2	0	1		1	4

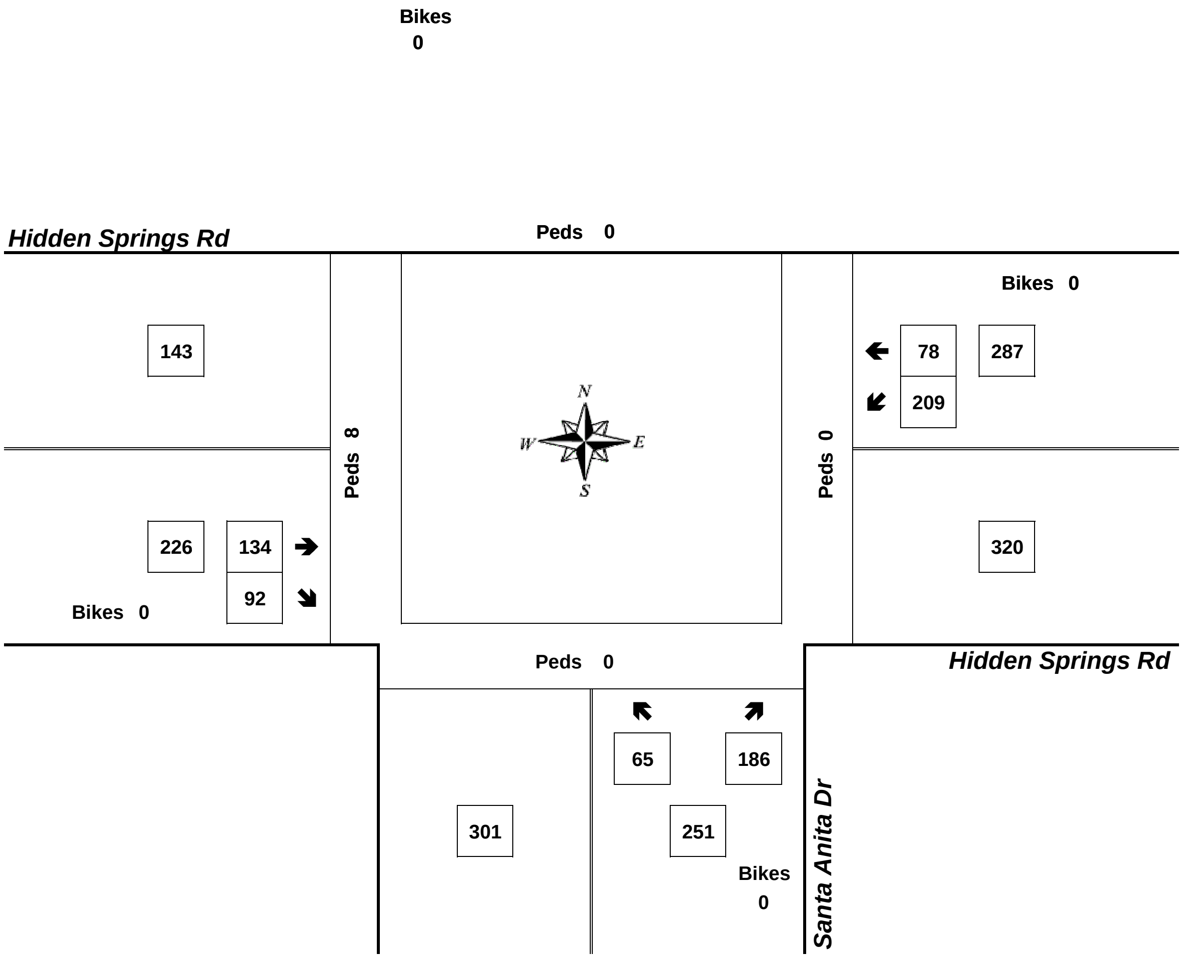
Peak Hour Summary

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740

Santa Anita Dr & Hidden Springs Rd

4:50 PM to 5:50 PM
Tuesday, April 05, 2016



Approach	PHF	HV%	Volume
EB	0.90	0.4%	226
WB	0.82	0.7%	287
NB	0.91	0.4%	251
SB	0.00	0.0%	0
Intersection	0.96	0.5%	764

Count Period: 4:00 PM to 6:00 PM

HCM Unsignalized Intersection Capacity Analysis
1: Hidden Springs & Rosemont Road

TVF&R Station #55
Existing Conditions - AM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	7	10	59	3	184	7	360	71	58	151	4
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	9	13	79	4	245	9	480	95	77	201	5
Pedestrians					13							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1152	965	204	936	920	540	207			588		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1152	965	204	936	920	540	207			588		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	*2.5	*2.5	*2.5	2.2			2.3		
p0 queue free %	91	96	98	71	99	63	99			92		
cM capacity (veh/h)	101	228	832	269	332	672	1371			958		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	328	584	284
Volume Left	9	79	9	77
Volume Right	13	245	95	5
cSH	214	490	1371	958
Volume to Capacity	0.15	0.67	0.01	0.08
Queue Length 95th (ft)	13	123	1	7
Control Delay (s)	24.8	26.0	0.2	3.1
Lane LOS	C	D	A	A
Approach Delay (s)	24.8	26.0	0.2	3.1
Approach LOS	C	D		

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

* User Entered Value

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	144	0	0	195	4	0	0	0	26	0	23
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	209	0	0	283	6	0	0	0	38	0	33
Pedestrians											7	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	295			209			562	539	209	536	536	293
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	295			209			562	539	209	536	536	293
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	92	100	96
cM capacity (veh/h)	1253			1356			412	440	832	449	445	747

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	17	209	288	0	71
Volume Left	17	0	0	0	38
Volume Right	0	0	6	0	33
cSH	1253	1700	1700	1700	553
Volume to Capacity	0.01	0.12	0.17	0.00	0.13
Queue Length 95th (ft)	1	0	0	0	11
Control Delay (s)	7.9	0.0	0.0	0.0	12.5
Lane LOS	A			A	B
Approach Delay (s)	0.6		0.0	0.0	12.5
Approach LOS				A	B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	104	69	96	105	90	262
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	130	86	120	131	112	328
Pedestrians	11				2	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			218		557	175
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			218		557	175
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		75	62
cM capacity (veh/h)			1349		443	867

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	216	120	131	112	328
Volume Left	0	120	0	112	0
Volume Right	86	0	0	0	328
cSH	1700	1349	1700	443	867
Volume to Capacity	0.13	0.09	0.08	0.25	0.38
Queue Length 95th (ft)	0	7	0	25	44
Control Delay (s)	0.0	7.9	0.0	15.9	11.7
Lane LOS		A		C	B
Approach Delay (s)	0.0	3.8		12.7	
Approach LOS				B	

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	32.9%	ICU Level of Service	A
Analysis Period (min)	15		

1: Hidden Springs & Rosemont Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	6	9	19	7	62	7	179	30	100	238	6
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	5	7	10	22	8	72	8	208	35	116	277	7
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	831	773	280	770	759	227	284			244		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	831	773	280	770	759	227	284			244		
tC, single (s)	7.3	6.7	6.4	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	98	99	92	97	91	99			91		
cM capacity (veh/h)	226	284	726	284	303	810	1284			1321		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	102	251	400
Volume Left	5	22	8	116
Volume Right	10	72	35	7
cSH	371	528	1284	1321
Volume to Capacity	0.06	0.19	0.01	0.09
Queue Length 95th (ft)	5	18	0	7
Control Delay (s)	15.3	13.4	0.3	2.9
Lane LOS	C	B	A	A
Approach Delay (s)	15.3	13.4	0.3	2.9
Approach LOS	C	B		

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Hidden Springs & Bay Meadows Drive

TVF&R Station #55
Existing Conditions - MD Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	133	0	0	92	21	0	0	0	16	0	7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	15	166	0	0	115	26	0	0	0	20	0	9
Pedestrians											6	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	147			166			333	344	166	330	330	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	147			166			333	344	166	330	330	134
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	97	100	99
cM capacity (veh/h)	1427			1418			607	570	878	616	583	916

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	15	166	141	0	29
Volume Left	15	0	0	0	20
Volume Right	0	0	26	0	9
cSH	1427	1700	1700	1700	684
Volume to Capacity	0.01	0.10	0.08	0.00	0.04
Queue Length 95th (ft)	1	0	0	0	3
Control Delay (s)	7.5	0.0	0.0	0.0	10.5
Lane LOS	A			A	B
Approach Delay (s)	0.6		0.0	0.0	10.5
Approach LOS				A	B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

5: Hidden Springs & Santa Anita Drive

	→	↘	↙	←	↖	↗
Movement	**EBT**	**EBR**	**WBL**	**WBT**	**NBL**	**NBR**
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	92	59	154	75	43	159
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	105	67	175	85	49	181
Pedestrians	4					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			172		577	138
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			172		577	138
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			88		88	80
cM capacity (veh/h)			1405		417	910

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	172	175	85	49	181
Volume Left	0	175	0	49	0
Volume Right	67	0	0	0	181
cSH	1700	1405	1700	417	910
Volume to Capacity	0.10	0.12	0.05	0.12	0.20
Queue Length 95th (ft)	0	11	0	10	18
Control Delay (s)	0.0	7.9	0.0	14.8	9.9
Lane LOS		A		B	A
Approach Delay (s)	0.0	5.3		11.0	
Approach LOS				B	

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Hidden Springs & Rosemont Road

TVF&R Station #55
Existing Conditions - PM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	9	9	21	10	81	9	213	34	192	610	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	6	10	10	24	11	91	10	239	38	216	685	7
Pedestrians					6							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1496	1424	689	1420	1408	264	692			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1496	1424	689	1420	1408	264	692			284		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	*2.5	*2.5	*2.5	*2.5	*2.5	*2.5	2.2			2.2		
p0 queue free %	94	93	98	78	92	91	99			83		
cM capacity (veh/h)	88	140	549	109	144	993	912			1284		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	126	288	908
Volume Left	6	24	10	216
Volume Right	10	91	38	7
cSH	167	325	912	1284
Volume to Capacity	0.15	0.39	0.01	0.17
Queue Length 95th (ft)	13	44	1	15
Control Delay (s)	30.5	22.9	0.4	3.8
Lane LOS	D	C	A	A
Approach Delay (s)	30.5	22.9	0.4	3.8
Approach LOS	D	C		

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	21	205	0	0	125	27	0	0	0	28	0	5
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	23	225	0	0	137	30	0	0	0	31	0	5
Pedestrians											6	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	173			225			429	444	225	430	430	158
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	173			225			429	444	225	430	430	158
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			100	100	100	94	100	99
cM capacity (veh/h)	1409			1349			524	497	814	523	505	880

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	23	225	167	0	36
Volume Left	23	0	0	0	31
Volume Right	0	0	30	0	5
cSH	1409	1700	1700	1700	557
Volume to Capacity	0.02	0.13	0.10	0.00	0.07
Queue Length 95th (ft)	1	0	0	0	5
Control Delay (s)	7.6	0.0	0.0	0.0	11.9
Lane LOS	A			A	B
Approach Delay (s)	0.7		0.0	0.0	11.9
Approach LOS				A	B

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		

5: Hidden Springs & Santa Anita Drive

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	134	92	209	78	65	186
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	140	96	218	81	68	194
Pedestrians	8					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			235		712	188
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			235		712	188
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		80	77
cM capacity (veh/h)			1338		334	860

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	235	218	81	68	194
Volume Left	0	218	0	68	0
Volume Right	96	0	0	0	194
cSH	1700	1338	1700	334	860
Volume to Capacity	0.14	0.16	0.05	0.20	0.23
Queue Length 95th (ft)	0	15	0	19	22
Control Delay (s)	0.0	8.2	0.0	18.5	10.4
Lane LOS		A		C	B
Approach Delay (s)	0.0	6.0		12.5	
Approach LOS				B	

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Hidden Springs & Rosemont Road

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	7	10	61	3	191	7	381	74	60	159	4
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	9	13	81	4	255	9	508	99	80	212	5
Pedestrians					13							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1207	1013	215	982	966	570	217			620		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1207	1013	215	982	966	570	217			620		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	*2.5	*2.5	*2.5	2.2			2.3		
p0 queue free %	89	96	98	67	99	60	99			91		
cM capacity (veh/h)	88	213	820	247	308	644	1358			931		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	340	616	297
Volume Left	9	81	9	80
Volume Right	13	255	99	5
cSH	192	461	1358	931
Volume to Capacity	0.17	0.74	0.01	0.09
Queue Length 95th (ft)	15	151	1	7
Control Delay (s)	27.5	31.7	0.2	3.1
Lane LOS	D	D	A	A
Approach Delay (s)	27.5	31.7	0.2	3.1
Approach LOS	D	D		

Intersection Summary			
Average Delay	9.9		
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

* User Entered Value

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	150	0	0	203	4	0	0	0	27	0	24
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	217	0	0	294	6	0	0	0	39	0	35
Pedestrians											7	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	307			217			584	559	217	556	556	304
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	307			217			584	559	217	556	556	304
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	91	100	95
cM capacity (veh/h)	1241			1346			397	429	822	435	433	736

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	17	217	300	0	74
Volume Left	17	0	0	0	39
Volume Right	0	0	6	0	35
cSH	1241	1700	1700	1700	539
Volume to Capacity	0.01	0.13	0.18	0.00	0.14
Queue Length 95th (ft)	1	0	0	0	12
Control Delay (s)	7.9	0.0	0.0	0.0	12.7
Lane LOS	A			A	B
Approach Delay (s)	0.6		0.0	0.0	12.7
Approach LOS				A	B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	108	72	100	109	94	275
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	135	90	125	136	118	344
Pedestrians	11				2	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			227		579	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		579	182
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		73	60
cM capacity (veh/h)			1339		428	859

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	225	125	136	118	344
Volume Left	0	125	0	118	0
Volume Right	90	0	0	0	344
cSH	1700	1339	1700	428	859
Volume to Capacity	0.13	0.09	0.08	0.27	0.40
Queue Length 95th (ft)	0	8	0	28	49
Control Delay (s)	0.0	8.0	0.0	16.6	12.0
Lane LOS		A		C	B
Approach Delay (s)	0.0	3.8		13.1	
Approach LOS				B	

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Hidden Springs & Rosemont Road

TVF&R Station #55
2018 Background Conditions - MD Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	6	9	20	7	65	7	190	31	104	254	6
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	5	7	10	23	8	76	8	221	36	121	295	7
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	876	815	299	811	800	240	302			258		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	876	815	299	811	800	240	302			258		
tC, single (s)	7.3	6.7	6.4	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	97	99	91	97	91	99			91		
cM capacity (veh/h)	209	267	709	265	285	796	1264			1306		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	107	265	423
Volume Left	5	23	8	121
Volume Right	10	76	36	7
cSH	350	506	1264	1306
Volume to Capacity	0.06	0.21	0.01	0.09
Queue Length 95th (ft)	5	20	0	8
Control Delay (s)	16.0	14.0	0.3	2.9
Lane LOS	C	B	A	A
Approach Delay (s)	16.0	14.0	0.3	2.9
Approach LOS	C	B		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	138	0	0	96	22	0	0	0	17	0	7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	15	172	0	0	120	28	0	0	0	21	0	9
Pedestrians											6	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	154			172			345	356	172	342	342	140
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	154			172			345	356	172	342	342	140
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	99
cM capacity (veh/h)	1420			1410			596	561	871	605	574	909

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	15	172	148	0	30
Volume Left	15	0	0	0	21
Volume Right	0	0	28	0	9
cSH	1420	1700	1700	1700	671
Volume to Capacity	0.01	0.10	0.09	0.00	0.04
Queue Length 95th (ft)	1	0	0	0	4
Control Delay (s)	7.6	0.0	0.0	0.0	10.6
Lane LOS	A			A	B
Approach Delay (s)	0.6		0.0	0.0	10.6
Approach LOS				A	B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	17.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Hidden Springs & Santa Anita Drive

TVF&R Station #55
2018 Background Conditions - MD Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	96	61	162	78	45	166
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	109	69	184	89	51	189
Pedestrians	4					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			178		605	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			178		605	144
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		87	79
cM capacity (veh/h)			1397		399	904

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	178	184	89	51	189
Volume Left	0	184	0	51	0
Volume Right	69	0	0	0	189
cSH	1700	1397	1700	399	904
Volume to Capacity	0.10	0.13	0.05	0.13	0.21
Queue Length 95th (ft)	0	11	0	11	20
Control Delay (s)	0.0	8.0	0.0	15.3	10.0
Lane LOS		A		C	B
Approach Delay (s)	0.0	5.4		11.2	
Approach LOS				B	

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	9	9	22	10	84	9	226	35	200	641	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	6	10	10	25	11	94	10	254	39	225	720	7
Pedestrians					6							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1567	1493	724	1488	1476	280	727			299		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1567	1493	724	1488	1476	280	727			299		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	*2.5	*2.5	*2.5	*2.5	*2.5	*2.5	2.2			2.2		
p0 queue free %	93	92	98	74	91	90	99			82		
cM capacity (veh/h)	76	124	523	95	129	972	886			1267		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	130	303	952
Volume Left	6	25	10	225
Volume Right	10	94	39	7
cSH	148	294	886	1267
Volume to Capacity	0.17	0.44	0.01	0.18
Queue Length 95th (ft)	15	54	1	16
Control Delay (s)	34.4	26.7	0.4	4.0
Lane LOS	D	D	A	A
Approach Delay (s)	34.4	26.7	0.4	4.0
Approach LOS	D	D		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
3: Hidden Springs & Bay Meadows Drive

TVF&R Station #55
2018 Background Conditions - PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	22	213	0	0	130	28	0	0	0	29	0	5
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	24	234	0	0	143	31	0	0	0	32	0	5
Pedestrians											6	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	180			234			446	462	234	447	447	164
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	180			234			446	462	234	447	447	164
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			100	100	100	94	100	99
cM capacity (veh/h)	1401			1339			510	486	805	509	494	873

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	24	234	174	0	37
Volume Left	24	0	0	0	32
Volume Right	0	0	31	0	5
cSH	1401	1700	1700	1700	542
Volume to Capacity	0.02	0.14	0.10	0.00	0.07
Queue Length 95th (ft)	1	0	0	0	6
Control Delay (s)	7.6	0.0	0.0	0.0	12.1
Lane LOS	A			A	B
Approach Delay (s)	0.7		0.0	0.0	12.1
Approach LOS				A	B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

5: Hidden Springs & Santa Anita Drive

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	139	96	219	81	68	195
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	145	100	228	84	71	203
Pedestrians	8					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			245		743	195
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			245		743	195
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		78	76
cM capacity (veh/h)			1327		317	852

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	245	228	84	71	203
Volume Left	0	228	0	71	0
Volume Right	100	0	0	0	203
cSH	1700	1327	1700	317	852
Volume to Capacity	0.14	0.17	0.05	0.22	0.24
Queue Length 95th (ft)	0	15	0	21	23
Control Delay (s)	0.0	8.3	0.0	19.6	10.5
Lane LOS		A		C	B
Approach Delay (s)	0.0	6.0		12.9	
Approach LOS				B	

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	7	10	62	3	192	7	381	75	61	159	4
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	9	13	83	4	256	9	508	100	81	212	5
Pedestrians					13							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1212	1017	215	985	970	571	217			621		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1212	1017	215	985	970	571	217			621		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	*2.5	*2.5	*2.5	2.2			2.3		
p0 queue free %	89	96	98	66	99	60	99			91		
cM capacity (veh/h)	86	211	820	246	306	643	1358			930		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	32	343	617	299
Volume Left	9	83	9	81
Volume Right	13	256	100	5
cSH	190	458	1358	930
Volume to Capacity	0.17	0.75	0.01	0.09
Queue Length 95th (ft)	15	155	1	7
Control Delay (s)	27.8	32.7	0.2	3.2
Lane LOS	D	D	A	A
Approach Delay (s)	27.8	32.7	0.2	3.2
Approach LOS	D	D		

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

* User Entered Value

HCM Unsignalized Intersection Capacity Analysis
2: Hidden Springs & West Access

TVF&R Station #55
2018 Background plus Site - AM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	162	2	2	227	2	2
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	235	3	3	329	3	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			238		571	236
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			238		571	236
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1323		481	803

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	238	332	6
Volume Left	0	3	3
Volume Right	3	0	3
cSH	1700	1323	602
Volume to Capacity	0.14	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.1	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	11.0
Approach LOS			B

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
3: Hidden Springs & Bay Meadows Drive

TVF&R Station #55
2018 Background plus Site - AM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	152	0	0	205	4	0	0	0	27	0	24
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	17	220	0	0	297	6	0	0	0	39	0	35
Pedestrians											7	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	310			220			590	565	220	562	562	307
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	310			220			590	565	220	562	562	307
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	91	100	95
cM capacity (veh/h)	1238			1343			393	426	819	431	430	733

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	17	220	303	0	74
Volume Left	17	0	0	0	39
Volume Right	0	0	6	0	35
cSH	1238	1700	1700	1700	535
Volume to Capacity	0.01	0.13	0.18	0.00	0.14
Queue Length 95th (ft)	1	0	0	0	12
Control Delay (s)	8.0	0.0	0.0	0.0	12.8
Lane LOS	A			A	B
Approach Delay (s)	0.6		0.0	0.0	12.8
Approach LOS				A	B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	21.5%	ICU Level of Service	A
Analysis Period (min)	15		

4: Hidden Springs & East Access

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	Y	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	179	0	0	209	0	0
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	259	0	0	303	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			259		562	259
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			259		562	259
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1299		488	779

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	259	303	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1299	1700
Volume to Capacity	0.15	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	14.3%	ICU Level of Service	A
Analysis Period (min)	15		

5: Hidden Springs & Santa Anita Drive

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	109	73	100	110	95	275
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	136	91	125	138	119	344
Pedestrians	11				2	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			230		582	184
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			230		582	184
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		72	60
cM capacity (veh/h)			1336		426	857

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	228	125	138	119	344
Volume Left	0	125	0	119	0
Volume Right	91	0	0	0	344
cSH	1700	1336	1700	426	857
Volume to Capacity	0.13	0.09	0.08	0.28	0.40
Queue Length 95th (ft)	0	8	0	28	49
Control Delay (s)	0.0	8.0	0.0	16.7	12.0
Lane LOS		A		C	B
Approach Delay (s)	0.0	3.8		13.2	
Approach LOS				B	

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: Hidden Springs & Rosemont Road

TVF&R Station #55
2018 Background plus Site - MD Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	6	9	20	7	66	7	190	32	104	254	6
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	5	7	10	23	8	77	8	221	37	121	295	7
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	877	816	299	811	801	241	302			259		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	877	816	299	811	801	241	302			259		
tC, single (s)	7.3	6.7	6.4	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	97	99	91	97	90	99			91		
cM capacity (veh/h)	208	267	709	264	285	795	1264			1304		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	108	266	423
Volume Left	5	23	8	121
Volume Right	10	77	37	7
cSH	349	508	1264	1304
Volume to Capacity	0.06	0.21	0.01	0.09
Queue Length 95th (ft)	5	20	0	8
Control Delay (s)	16.0	14.0	0.3	2.9
Lane LOS	C	B	A	A
Approach Delay (s)	16.0	14.0	0.3	2.9
Approach LOS	C	B		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
2: Hidden Springs & West Access

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	↰↱	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	151	0	0	104	0	0
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	189	0	0	130	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			189		319	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			189		319	189
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1391		675	853

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	189	130	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1391	1700
Volume to Capacity	0.11	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	11.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✥			✥	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	12	139	0	0	97	22	0	0	0	17	0	7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	15	174	0	0	121	28	0	0	0	21	0	9
Pedestrians											6	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	155			174			348	358	174	345	345	141
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	155			174			348	358	174	345	345	141
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	99
cM capacity (veh/h)	1418			1409			594	559	870	603	572	908

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	15	174	149	0	30
Volume Left	15	0	0	0	21
Volume Right	0	0	28	0	9
cSH	1418	1700	1700	1700	668
Volume to Capacity	0.01	0.10	0.09	0.00	0.04
Queue Length 95th (ft)	1	0	0	0	4
Control Delay (s)	7.6	0.0	0.0	0.0	10.6
Lane LOS	A			A	B
Approach Delay (s)	0.6		0.0	0.0	10.6
Approach LOS				A	B

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	155	1	1	118	1	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	194	1	1	148	1	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			195		344	194
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			195		344	194
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1384		652	847

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	195	149	2
Volume Left	0	1	1
Volume Right	1	0	1
cSH	1700	1384	737
Volume to Capacity	0.11	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	9.9
Lane LOS		A	A
Approach Delay (s)	0.0	0.1	9.9
Approach LOS			A

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	18.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Hidden Springs & Santa Anita Drive

TVF&R Station #55
2018 Background plus Site - MD Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	96	62	162	79	45	166
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	109	70	184	90	51	189
Pedestrians	4					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			180		606	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			180		606	144
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		87	79
cM capacity (veh/h)			1396		398	903

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	180	184	90	51	189
Volume Left	0	184	0	51	0
Volume Right	70	0	0	0	189
cSH	1700	1396	1700	398	903
Volume to Capacity	0.11	0.13	0.05	0.13	0.21
Queue Length 95th (ft)	0	11	0	11	20
Control Delay (s)	0.0	8.0	0.0	15.4	10.0
Lane LOS		A		C	B
Approach Delay (s)	0.0	5.4		11.2	
Approach LOS				B	

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	9	9	22	10	85	9	226	36	200	641	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	6	10	10	25	11	96	10	254	40	225	720	7
Pedestrians					6							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					1							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1569	1494	724	1489	1477	280	727			300		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1569	1494	724	1489	1477	280	727			300		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	*2.5	*2.5	*2.5	*2.5	*2.5	*2.5	2.2			2.2		
p0 queue free %	93	92	98	74	91	90	99			82		
cM capacity (veh/h)	76	124	523	95	128	972	886			1266		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	26	131	304	952
Volume Left	6	25	10	225
Volume Right	10	96	40	7
cSH	148	295	886	1266
Volume to Capacity	0.17	0.45	0.01	0.18
Queue Length 95th (ft)	15	54	1	16
Control Delay (s)	34.5	26.7	0.4	4.0
Lane LOS	D	D	A	A
Approach Delay (s)	34.5	26.7	0.4	4.0
Approach LOS	D	D		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

* User Entered Value

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↰	⋎	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	236	0	0	136	0	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	259	0	0	149	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			259		409	259
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			259		409	259
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1311		599	779

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	259	149	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1311	1700
Volume to Capacity	0.15	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	15.8%	ICU Level of Service	A
Analysis Period (min)	15		

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↱			✣			✣	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	22	214	0	0	131	28	0	0	0	29	0	5
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	24	235	0	0	144	31	0	0	0	32	0	5
Pedestrians											6	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	181			235			448	464	235	449	449	165
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	181			235			448	464	235	449	449	165
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			100	100	100	94	100	99
cM capacity (veh/h)	1400			1338			509	484	804	507	493	872

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	24	235	175	0	37
Volume Left	24	0	0	0	32
Volume Right	0	0	31	0	5
cSH	1400	1700	1700	1700	541
Volume to Capacity	0.02	0.14	0.10	0.00	0.07
Queue Length 95th (ft)	1	0	0	0	6
Control Delay (s)	7.6	0.0	0.0	0.0	12.2
Lane LOS	A			A	B
Approach Delay (s)	0.7		0.0	0.0	12.2
Approach LOS				A	B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

4: Hidden Springs & East Access

2018 Background plus Site - PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
	→	↘	↙	←	↖	↗
Lane Configurations	↱			↰	⇅	
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	242	1	1	158	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	266	1	1	174	1	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			267		442	266
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			267		442	266
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1303		572	772

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	267	175	2
Volume Left	0	1	1
Volume Right	1	0	1
cSH	1700	1303	657
Volume to Capacity	0.16	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.1	10.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	10.5
Approach LOS			B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	22.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Hidden Springs & Santa Anita Drive

TVF&R Station #55
2018 Background plus Site - PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱		↰	↑	↰	↱
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	139	97	219	82	68	195
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	145	101	228	85	71	203
Pedestrians	8					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			246		745	195
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			246		745	195
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			83		78	76
cM capacity (veh/h)			1326		316	851

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	246	228	85	71	203
Volume Left	0	228	0	71	0
Volume Right	101	0	0	0	203
cSH	1700	1326	1700	316	851
Volume to Capacity	0.14	0.17	0.05	0.22	0.24
Queue Length 95th (ft)	0	16	0	21	23
Control Delay (s)	0.0	8.3	0.0	19.6	10.6
Lane LOS		A		C	B
Approach Delay (s)	0.0	6.0		12.9	
Approach LOS				B	

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

04/13/2016

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

HIDDEN SPRINGS RD at BAY MEADOWS DR, City of West Linn, Clackamas County, 01/01/2010 to 12/31/2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
FINAL TOTAL														

04/13/2016 TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

CITY OF WEST LINN, CLACKAMAS COUNTY **HIDDEN SPRINGS RD at ROSEMONT RD, City of West Linn, Clackamas County, 01/01/2010 to 12/31/2014**

Total crash records: 2

```
       S   D
       P   R S W                                                     INT-TYPE                                      SPCL USE
       E A U C O DATE       CLASS     CITY STREET        RD CHAR    (MEDIAN) INT-REL     OFFRD  WTHR   CRASH       TRLR QTY     MOVE                     A   S
SER#   E L G H R DAY        DIST      FIRST STREET       DIRECT       LEGS   TRAF-       RNDBT  SURF   COLL        OWNER        FROM         PRTC  INJ   G   E  LICNS PED
INVEST D C S L K TIME       FROM      SECOND STREET      LOCTN      (#LANES) CONTL       DRVWY  LIGHT  SVRTY    V# TYPE         TO        P# TYPE  SVRTY E   X  RES   LOC    ERROR      ACT EVENT      CAUSE
04862  Y N N     09/30/2010      17    HIDDEN SPRINGS RD  INTER     CROSS     N           Y      CLR    FIX OBJ  01 NONE         TURN-L                                                      040        01
NONE             TH         0         ROSEMONT RD        NE                   NONE        N      DRY    FIX         PRVTE        NW-NE                                                   000 040        00
                 11P                                     05         0                     N      DLIT   PDO         PSNGR CAR             01 DRVR  NONE 14   M  NONE         047,081,001 017            01
                                                                                                                                                                OR<25

00033  N N N     01/04/2010      17    HIDDEN SPRINGS RD  INTER     CROSS     N           N      RAIN   S-1STOP  01 NONE   0     STRGHT                                                                 07
NO RPT           MO         0         ROSEMONT RD        CN                   UNKNOWN     N      WET    REAR        PRVTE        NW-SE                                                   000            00
                 5P                                      01         0                     N      DLIT   INJ         PSNGR CAR             01 DRVR  INJC 40   F  OR-Y         026         000            07
                                                                                                                                                                OR<25
                                                                                                                 02 NONE   0     STOP
                                                                                                                    PRVTE        NW-SE                                                   012            00
                                                                                                                    PSNGR CAR             01 DRVR  INJB 48   M  OR-Y         000         000            00
                                                                                                                                                                OR<25
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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

HIDDEN SPRINGS RD at ROSEMONT RD, City of West Linn, Clackamas County, 01/01/2010 to 12/31/2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2010														
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	1	0	0	1	1	0	1
REAR-END	0	1	0	1	0	2	0	0	1	0	1	1	0	0
YEAR 2010 TOTAL	**0**	**1**	**1**	**2**	**0**	**2**	**0**	**1**	**1**	**0**	**2**	**2**	**0**	**1**
FINAL TOTAL	**0**	**1**	**1**	**2**	**0**	**2**	**0**	**1**	**1**	**0**	**2**	**2**	**0**	**1**

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

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CDS380                                                                    OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
04/13/2016                                                                     TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT
                                                                                               URBAN NON-SYSTEM CRASH LISTING
CITY OF WEST LINN, CLACKAMAS COUNTY                                HIDDEN SPRINGS RD at SANTA ANITA DR, City of West Linn, Clackamas County, 01/01/2010 to 12/31/2014
                                                                                                  Total crash records: 4

       S   D
       P   R S W                                                     INT-TYPE                                       SPCL USE
       E A U C O DATE       CLASS     CITY STREET         RD CHAR    (MEDIAN) INT-REL     OFFRD WTHR  CRASH         TRLR QTY    MOVE                      A   S
SER#   E L G H R DAY        DIST      FIRST STREET        DIRECT       LEGS   TRAF-       RNDBT SURF  COLL          OWNER       FROM         PRTC  INJ    G   E LICNS  PED
INVEST D C S L K TIME       FROM      SECOND STREET       LOCTN      (#LANES) CONTL       DRVWY LIGHT SVRTY    V# TYPE        TO         P# TYPE  SVRTY  E   X RES    LOC   ERROR      ACT EVENT      CAUSE
03786  Y N N N N 10/17/2010     17    HIDDEN SPRINGS RD   INTER     3-LEG     N           N     CLR   S-STRGHT  01 NONE  0    STRGHT                                                                  30,07
CITY             SU         0         SANTA ANITA DR      S                   NONE        N     DRY   REAR         PRVTE      S -N                                                    001          00
                 3P                                       06        0                     N     DAY   PDO          PSNGR CAR            01 DRVR  NONE  17  M  OR-Y         050,042    000          30,07
                                                                                                                                                                OR<25
                                                                                                                 02 NONE  0    STRGHT
                                                                                                                    PRVTE      S -N                                                    006          00
                                                                                                                    PSNGR CAR            01 DRVR  NONE  16  M  OR-Y         000        000          00
                                                                                                                                                                OR<25
01776  N N N     05/21/2010     19    HIDDEN SPRINGS RD   INTER     3-LEG     N           N     CLR   ANGL-OTH  01 NONE  0    TURN-L                                                                  27,02
NO RPT           FR         0         SANTA ANITA DR      CN                  STOP SIGN   N     DRY   TURN         PRVTE      S -W                                                    015          00
                 1P                                       02        0                     N     DAY   PDO          PSNGR CAR            01 DRVR  NONE  53  M  OR-Y         016,028    000          27,02
                                                                                                                                                                OR<25
                                                                                                                 02 NONE  0    TURN-L
                                                                                                                    PRVTE      E -S                                                    000          00
                                                                                                                    PSNGR CAR            01 DRVR  NONE  59  M  OR-Y         000        000          00
                                                                                                                                                                OR<25
02745  N N N     07/28/2013     17    HIDDEN SPRINGS RD   INTER     3-LEG     N           N     CLR   BIKE                                                                                         110        02
CITY             SU         0         SANTA ANITA DR      CN                  NONE        N     DRY   TURN                     -
                 5P                                       03        0                     N     DAY   INJ                      STRGHT    01 BIKE  INJC  44  M        I INRD 000        034 110        00
                                                                                                                                W    E
                                                                                                                 01 NONE  0    TURN-L
                                                                                                                    PRVTE      E -S                                                    000          00
                                                                                                                    PSNGR CAR            01 DRVR  NONE  25  M  OR-Y         027        000 110        02
                                                                                                                                                                OR<25
01386  N N N N N 04/11/2014     17    HIDDEN SPRINGS RD   INTER     3-LEG     N           N     CLR   ANGL-OTH  01 NONE  0    TURN-R                                                                  02
CITY             FR         0         SANTA ANITA DR      CN                  STOP SIGN   N     DRY   TURN         PRVTE      S -E                                                    015          00
                 3P                                       04        0                     N     DAY   INJ          PSNGR CAR            01 DRVR  NONE  20  F  OTH-Y        028        000          02
                                                                                                                                                                OR<25
                                                                                                                 02 NONE  0    STRGHT
                                                                                                                    PRVTE      W -E                                                    000          00
                                                                                                                    PSNGR CAR            01 DRVR  NONE  17  F  OR-Y         000        000          00
                                                                                                                                                                OR<25
                                                                                                                 02 NONE  0    STRGHT
                                                                                                                    PRVTE      W -E                                                    000          00
                                                                                                                    PSNGR CAR            02 PSNG  INJB  16  M               000        000          00
```

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

HIDDEN SPRINGS RD at SANTA ANITA DR, City of West Linn, Clackamas County, 01/01/2010 to 12/31/2014

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2014														
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	1	0	1	0	0
YEAR 2014 TOTAL	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
YEAR: 2013														
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	1	0	1	0	0
YEAR 2013 TOTAL	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**
YEAR: 2010														
REAR-END	0	0	1	1	0	0	0	1	0	1	0	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
YEAR 2010 TOTAL	**0**	**0**	**2**	**2**	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**2**	**0**	**0**
FINAL TOTAL	**0**	**2**	**2**	**4**	**0**	**2**	**0**	**4**	**0**	**4**	**0**	**4**	**0**	**0**

Disclaimer: The information contained in this report is compiled from individual driver and police crash reports submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submittal of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirements, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

Left-Turn Lane Warrant Analysis

Project: 15155 - TVF&R Station #55
Intersection: Rosemont Road at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - AM Peak Hour (SB LT)

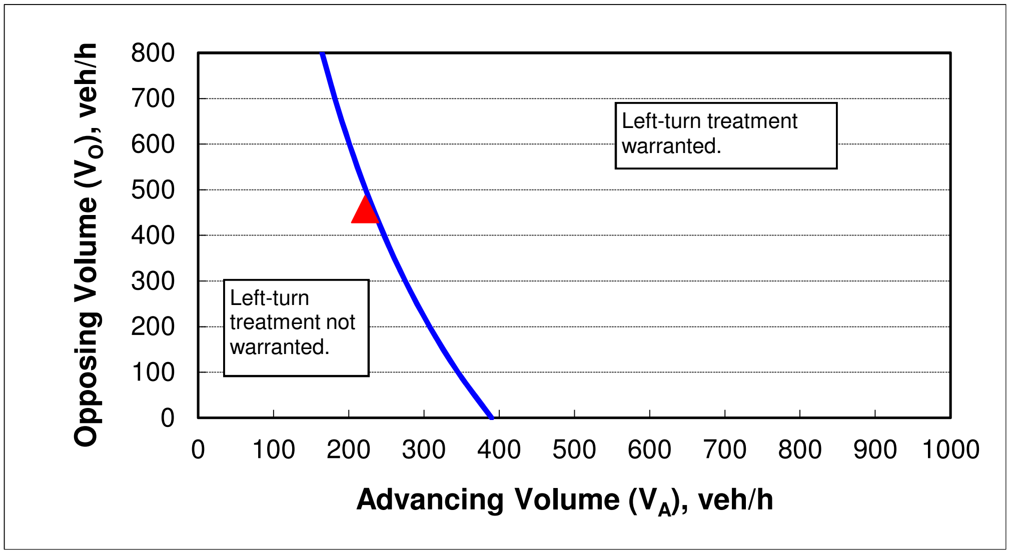
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	27%
Advancing volume (V_A), veh/h:	222
Opposing volume (V_O), veh/h:	457

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	233
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:	15155 - TVF&R Station #55
Intersection:	Rosemont Road at Hidden Springs Road
Date:	4/19/2016
Scenario:	2016 Existing Conditions - MD Peak Hour (SB LT)

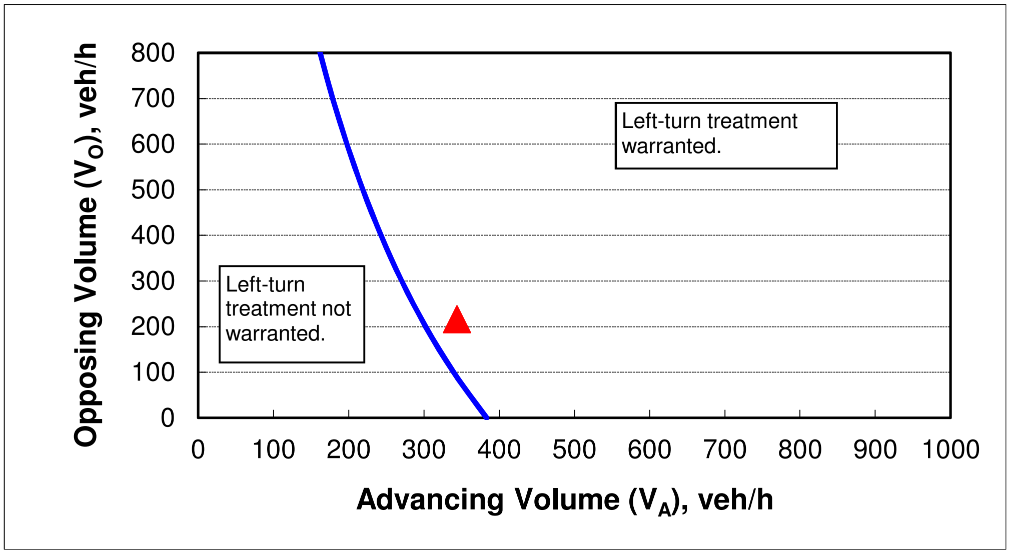
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	29%
Advancing volume (V_A), veh/h:	344
Opposing volume (V_O), veh/h:	216

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	297
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment 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:	15155 - TVF&R Station #55
Intersection:	Rosemont Road at Hidden Springs Road
Date:	4/19/2016
Scenario:	2016 Existing Conditions - PM Peak Hour (SB LT)

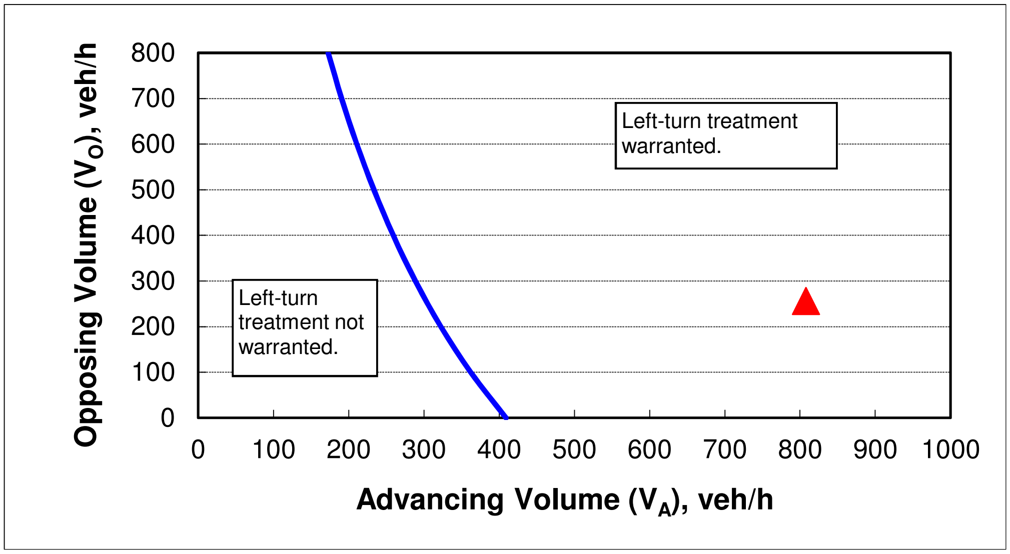
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	24%
Advancing volume (V_A), veh/h:	808
Opposing volume (V_O), veh/h:	256

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	303
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment 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: 15155 - TVF&R Station #55
Intersection: Rosemont Road at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - AM Peak Hour (NB LT)

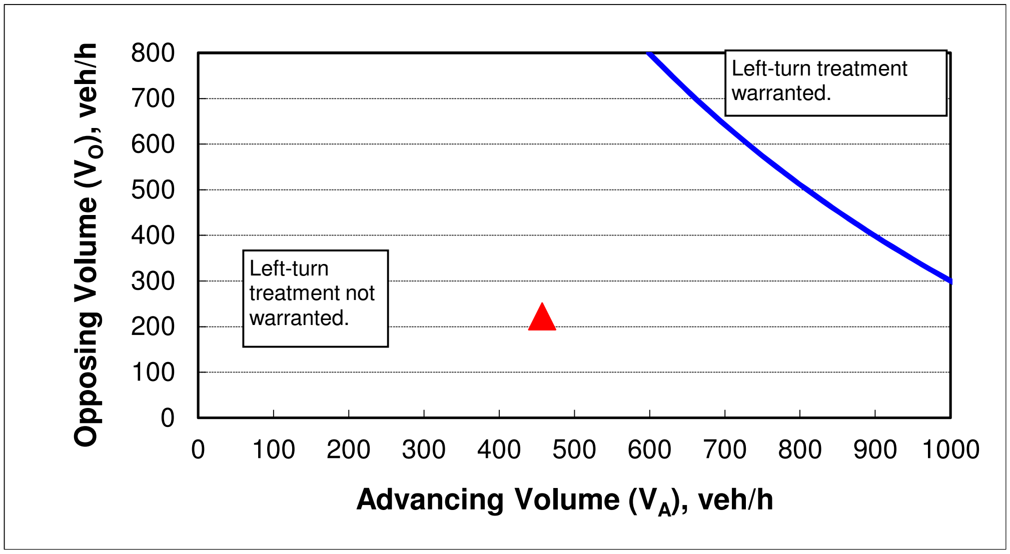
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	2%
Advancing volume (V_A), veh/h:	457
Opposing volume (V_O), veh/h:	222

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1091
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: 15155 - TVF&R Station #55
Intersection: Rosemont Road at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - MD Peak Hour (NB LT)

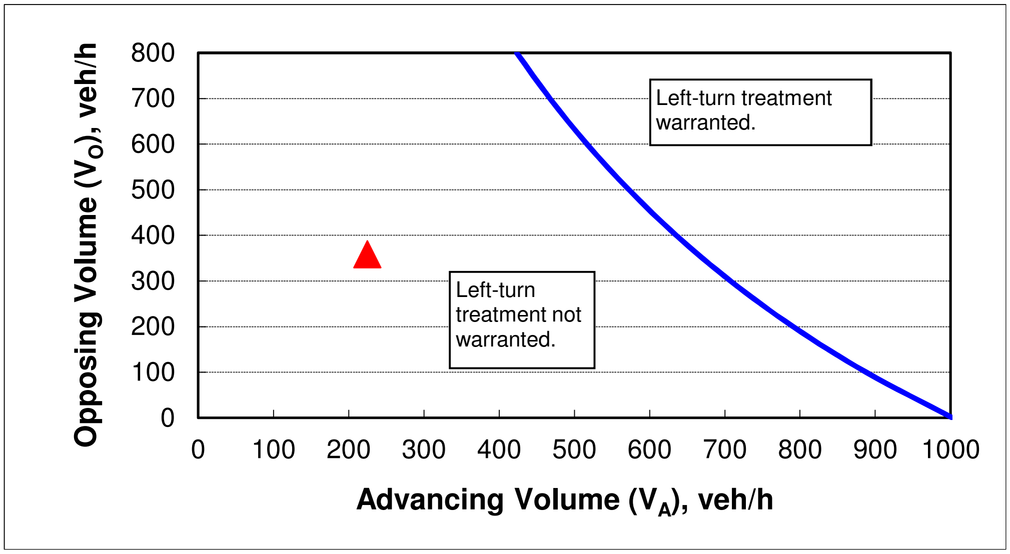
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	3%
Advancing volume (V_A), veh/h:	225
Opposing volume (V_O), veh/h:	358

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	665
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: 15155 - TVF&R Station #55
Intersection: Rosemont Road at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - PM Peak Hour (NB LT)

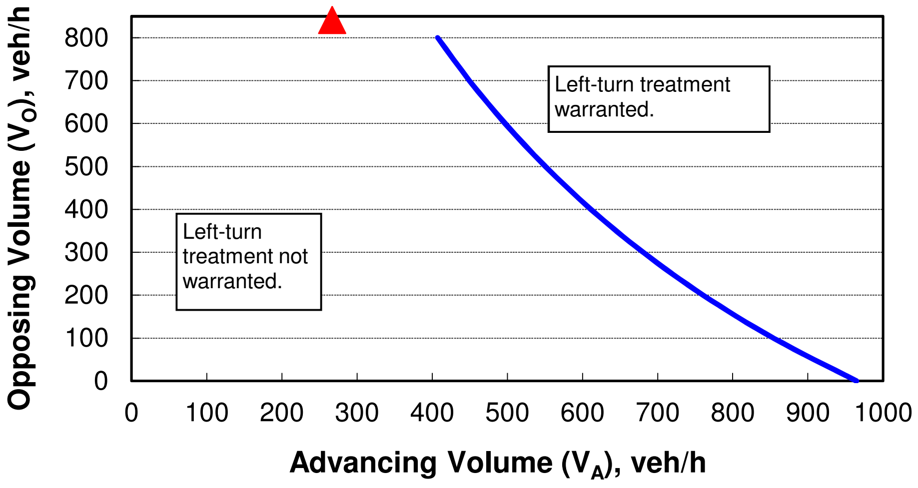
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	40
Percent of left-turns in advancing volume (V_A), %:	3%
Advancing volume (V_A), veh/h:	267
Opposing volume (V_O), veh/h:	841

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	391
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: 15155 - TVF&R Station #55
Intersection: West Access at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - AM Peak Hour

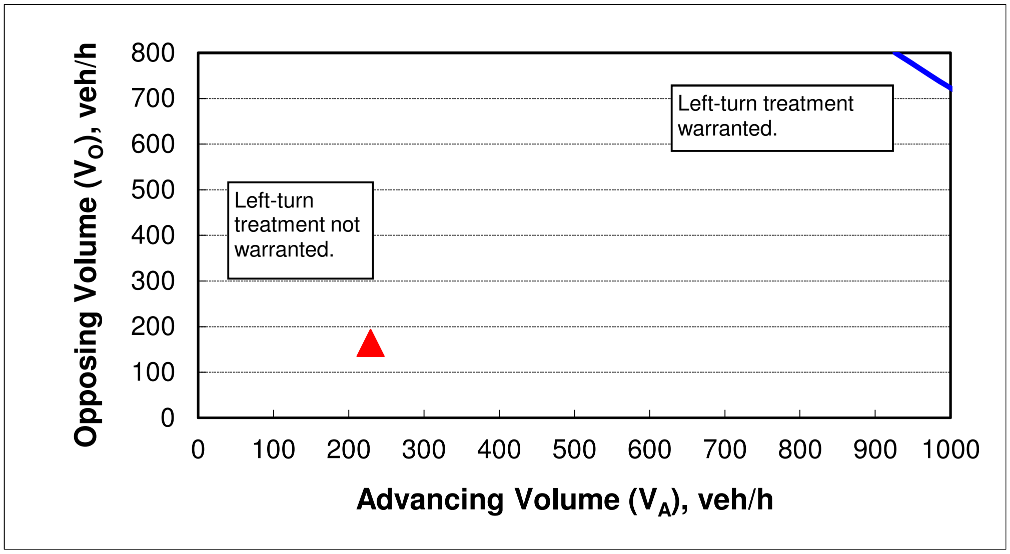
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	25
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	229
Opposing volume (V_O), veh/h:	164

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1803
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: 15155 - TVF&R Station #55
Intersection: East Access at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - MD Peak Hour

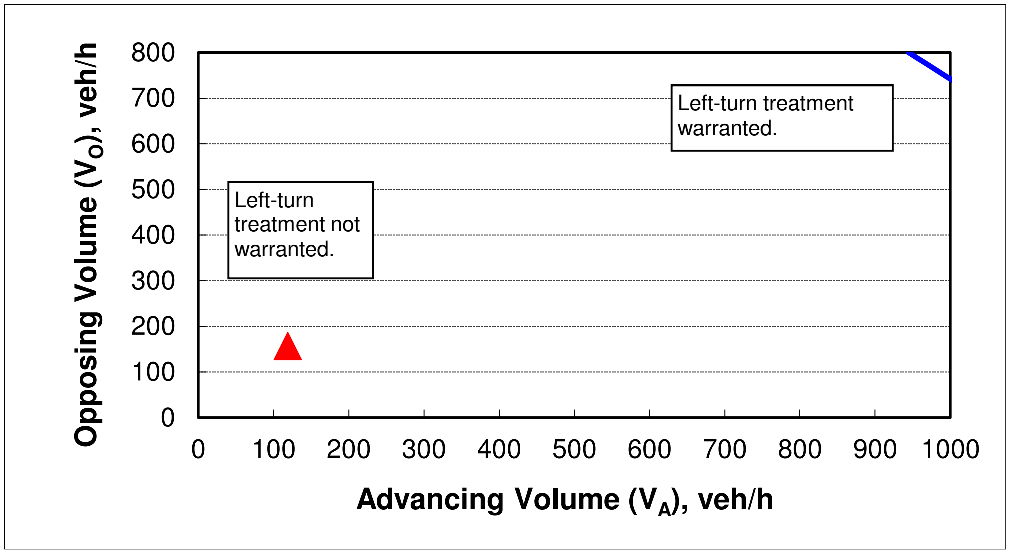
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	25
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	119
Opposing volume (V_O), veh/h:	156

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1855
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: 15155 - TVF&R Station #55
Intersection: East Access at Hidden Springs Road
Date: 4/19/2016
Scenario: 2018 Background + Site Conditions - PM Peak Hour

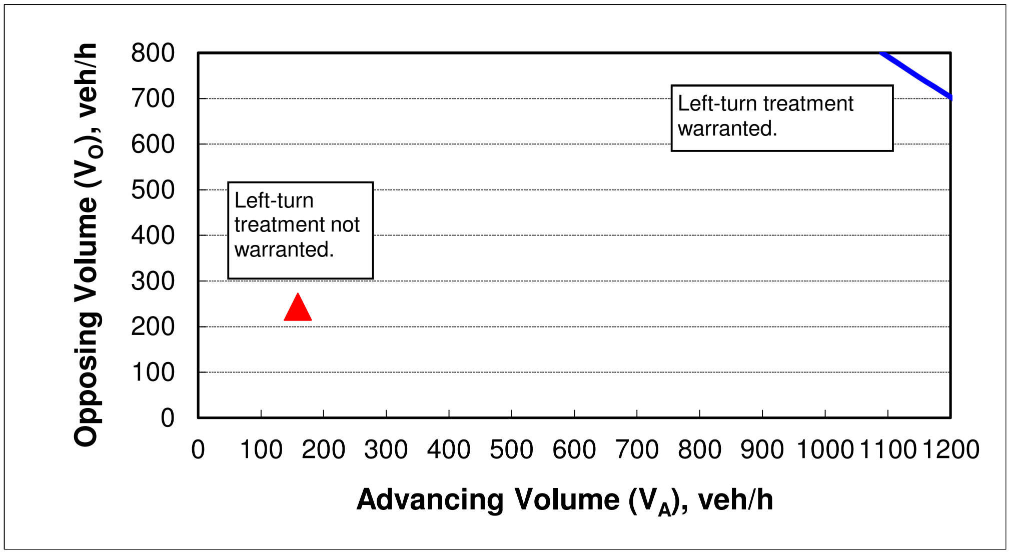
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	25
Percent of left-turns in advancing volume (V_A), %:	1%
Advancing volume (V_A), veh/h:	159
Opposing volume (V_O), veh/h:	243

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	1941
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: 15155 - TVF&R Station #55
Date: 4/18/2016
Scenario: 2018 Background plus Site Conditions - PM Peak Hour

Major Street:	Rosemont Road	Minor Street:	Hidden Springs Road
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	1108	PM Peak Hour Volumes:	96

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	11,080	8,850	
Minor Street*	960	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	11,080	13,300	
Minor Street*	960	1,350	**No**
Combination Warrant			
Major Street	11,080	10,640	
Minor Street*	960	2,120	**No**

* Minor street right-turning traffic volumes reduced by 25%

Traffic Signal Warrant Analysis

Project: 15155 - TVF&R Station #55
Date: 4/18/2016
Scenario: 2018 Background plus Site Conditions - PM Peak Hour

Major Street:	Hidden Springs Road	Minor Street:	Bay Meadows Drive
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	395	PM Peak Hour Volumes:	33

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	3,950	8,850	
Minor Street*	330	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	3,950	13,300	
Minor Street*	330	1,350	**No**
Combination Warrant			
Major Street	3,950	10,640	
Minor Street*	330	2,120	**No**

* Minor street right-turning traffic volumes reduced by 25%

Traffic Signal Warrant Analysis

Project: 15155 - TVF&R Station #55
Date: 4/18/2016
Scenario: 2018 Background plus Site Conditions - PM Peak Hour

Major Street:	Hidden Springs Road	Minor Street:	Santa Anita Drive
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	535	PM Peak Hour Volumes:	214

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	5,350	8,850	
Minor Street*	2,140	2,650	**No**
Condition B: Interruption of Continuous Traffic			
Major Street	5,350	13,300	
Minor Street*	2,140	1,350	**No**
Combination Warrant			
Major Street	5,350	10,640	
Minor Street*	2,140	2,120	**No**

* Minor street right-turning traffic volumes reduced by 25%

Section 4

Attachment F: GRI Geotechnical Investigation and Site Specific Seismic Hazard Evaluation, January 11, 2016

GRI
9750 SW Nimbus Avenue
Beaverton, OR 97008-7172
p | 503-641-3478 f | 503-644-8034

January 11, 2016

5794 GEOTECHNICAL RPT

Tualatin Valley Fire & Rescue
11945 SW 70th Avenue
Tigard, OR 97223

Attention: Tina Love

SUBJECT: Geotechnical Investigation and Site-Specific Seismic Hazard Evaluation
TVFR Fire Station #55
Hidden Springs Road and Bay Meadow Drive
West Linn, Oregon

At your request, GRI has conducted a geotechnical investigation for the proposed construction of Tualatin Valley Fire and Rescue (TVFR) Station 55, located on the south side of Hidden Springs Road and Bay Meadows Drive in West Linn, Oregon. The Vicinity Map, Figure 1, shows the general location of the site. The purpose of our investigation was to evaluate subsurface conditions at the site and develop conclusions and recommendations for site preparation and earthwork, subdrainage and floor support, design and construction of foundations, and seismic design considerations. The investigation included subsurface explorations and engineering analyses. This report describes the work accomplished and summarizes our conclusions and recommendations for the construction of TVFR Station 55.

SITE DESCRIPTION

Topography

Our observations at the site and review of available topographic maps indicate the site slopes from northwest to southeast and ranges from elevation 682 ft in the northwest corner to elevation 642 ft (NAVD 88) in the southeast corner of the property. The site is currently occupied by a small shed, grass fields, and several trees and shrubs. All elevations in this report reference NAVD 88 unless otherwise noted.

Geology

On a regional scale, the site is situated at the northern end of the Willamette Valley, a broad, gently deformed, north-south-trending topographic feature separating the Coast Range to the west from the Cascade Mountains to the east. Recent Oregon Department of Geology and Mineral Industries (DOGAMI) inventory mapping of existing landslides for the West Linn area does not show landslides on or adjacent to the site (Burns et al., 2011).

PROJECT DESCRIPTION

The proposed project includes construction of a new fire station in accordance with ASCE 7-10 *Minimum Design Loads for Buildings and other structures* and the applicable modifiers for essential facilities. Based on preliminary information from the project architect, we understand the new fire station will be a single-story masonry or wood-frame structure. Building loads are not known at this time, however we anticipate a maximum column load of approximately 50 kips and wall loads of 3 kips/ft. The finished floor elevation of the proposed building is currently planned for elevation 670 ft. We anticipate the maximum height of fills associated with grading the site will be up to 20 ft for the new building pad. It is anticipated that a retaining wall will be required on the southern and eastern borders of the property to restrain the proposed fills. We understand the fire station will likely facilitate new tiller steer apparatus with a gross vehicle weight of approximately 90,000 lbs.

SUBSURFACE CONDITIONS

General

Subsurface materials and conditions at the site were investigated on December 17, 2015, with seven borings, designated B-1 through B-7. The borings were advanced to depths of 6.5 to 25.3 ft. The locations of the explorations are shown on the Site Plan, Figure 2. A detailed discussion of the field exploration program conducted for this investigation is provided in Appendix A. Logs of the explorations are shown on Figures 1A through 7A. The field and laboratory programs conducted to evaluate the physical and engineering properties of the materials encountered in the borings are described in detail in Appendix A. The terms and symbols used to describe the materials encountered in the borings and test pits are defined on Tables 1A and 2A and the attached legend.

Soil and Rock

The materials disclosed by the subsurface exploration program indicate the project area is mantled with a surficial layer of silt and clay derived from decomposed basalt, which is underlain by shallow basalt. A more detailed description of the materials encountered in the subsurface explorations completed by GRI is discussed below.

For the purpose of discussion, the materials encountered in the explorations have been grouped into the following categories based on their physical characteristics and engineering properties.

1. **SILT and CLAY (Decomposed Basalt)**
2. **BASALT**

1. SILT and CLAY (Decomposed Basalt). The project site is mantled with residual silt and clay soil from the decomposition of basalt to a maximum depth of about 14.5 to 22.5 ft. Borings B-1 through B-5 were terminated in this unit. The silt and clay is generally brown with gray, orange, black, and yellow mottling, and typically contains a trace to some fine-grained sand, silt, and fragments of weathered basalt. Relict rock structure is present within the unit. Standard Penetration Test (SPT) N-values ranging from 6 to 75 blows/ft indicate the relative consistency of the silt and clay is medium stiff to hard, and is typically very stiff. However, it should be noted that very coarse material, such as the weathered basalt fragments, tend to artificially increase the blow count data, which could result in overestimation of the relative consistency using the SPT sampler. The natural moisture content of the silt clay ranges from about 15 to 58%.

2. BASALT. Extremely soft (R0) to medium hard (R3) basalt was encountered beneath the silt (decomposed basalt) in borings B-6 and B-7. The quality of basalt, as measured by the degree of hardness and weathering, is highly variable. Typically, the basalt is dark gray and moderately to slightly weathered with depth. Boring B-6 and B-7 were terminated in basalt at depths of 25.3 and 20.3 ft, respectively.

Groundwater

The borings were drilled using mud-rotary drilling techniques, and groundwater could not be measured due to the presence of drilling fluid. However, we anticipate the regional groundwater level occurs at least 100 ft below the ground surface. Groundwater can also become perched on top of the basalt rock, within the fine-grained soil that mantles the site during the typically wet, winter and spring months. We anticipate perched groundwater could approach the ground surface during extended periods of wet weather.

CONCLUSIONS AND RECOMMENDATIONS

General

The explorations indicate the site is mantled with very stiff clay and silt deposits to depths of approximately 14.5 to 22.5 ft. The clay and silt is underlain by extremely soft to medium hard basalt. We anticipate the groundwater level at this site is typically greater than 100 ft below the ground surface.

In our opinion, foundation support for the new structure can be provided by conventional spread and wall footings established in firm, undisturbed native silt/clay or compacted structural fill. The primary geotechnical considerations associated with construction of the proposed building and associated improvements are the presence of fine-grained soils at the ground surface that are extremely sensitive to moisture content, the presence of shallow basalt rock, and the proposed 20-ft-thick fill to grade the site.. The following sections of this report provide our conclusions and recommendations for use in the design and construction of the project.

Site Preparation and Grading

The ground surface in all new building areas, pavement areas, walkways and areas to receive structural fill, should be stripped of existing vegetation, tree stumps, surface organics, and loose surface soils. Stripping up to a depth of about 6 in. will likely be required; however, deeper grubbing may be required to remove brush and tree roots. Organic strippings should be removed from the site or stockpiled on site for later use in landscaped areas. Following stripping or excavation to subgrade level, the exposed subgrade should be evaluated by a qualified geotechnical engineer or engineering geologist to identify any soft areas that may require overexcavation. Soft areas should be overexcavated to firm material and backfilled with structural fill.

The near-surface site soils are fine grained and sensitive to moisture content. During wet conditions, the soils are easily disturbed, rutted, and weakened by construction activities. For this reason, we recommend site preparation and earthwork be accomplished during the dry, summer months, typically extending from mid-May to mid-October. Excavation should be accomplished using equipment with smooth cutting surfaces. It should be anticipated that haul roads constructed of imported granular fill will be required to provide access and protect subgrade areas from damage due to construction traffic during wet conditions. In our opinion, a 12- to 18-in.-thick granular work pad should be sufficient to prevent disturbance of the subgrade by lighter construction equipment and limited traffic by dump trucks. Haul roads and other high-density traffic areas will require a minimum of 18 to 24 in. of clean, free-draining crushed rock with a maximum size of 3 in. and not more than 5% passing the No. 200 sieve to reduce the risk of subgrade deterioration. This layer should be installed in a single lift and compacted. The use of a geotextile fabric over the subgrade prior to placement and compaction of the granular work pad may reduce maintenance during construction. Any subgrade soils disturbed by construction activity should be overexcavated to firm soil and backfilled with structural fill placed and compacted as recommended in the Structural Fill section of this report.

Final grading of the areas around the buildings should provide for positive drainage of surface water away from the proposed building and any exposed slopes to minimize erosion. Temporary excavation slopes should be made no steeper than about 1H:1V (Horizontal:Vertical), and permanent cut and fill slopes should be no steeper than 2H:1V.

Structural Fill

In our opinion, granular material would be most suitable for construction of the structural fills. If constructed during the drier summer months, the on-site silt soils that are free of organics and deleterious materials may be suitable as structural fill. If constructed during periods of extended wet weather, imported granular material, such as sand, sandy gravel, or fragmental rock with a maximum size of about 1 1/2 in. and with not more than about 5% passing the No. 200 sieve (washed analysis) would be suitable structural fill material. Granular fill should be placed in 12-in.-thick (loose) lifts (8-in.-thick loose lifts for fine grained soils) and compacted with a vibratory roller to at least 95% of the maximum dry density as determined by ASTM D 698, or until well keyed. Structural fills should be placed within -4% to +2% of the optimum moisture content.

We understand approximately 20 ft of fill will be required on the southern portion of the property to raise the building pad to the proposed elevation (Elev. 670 ft). Structural fills constructed on site should be placed on relatively level benches. Benches should be constructed with a minimum width of two compactor widths or 8 ft, whichever is greater. Current plans call for the construction of a retaining wall on the southern and eastern edges of the proposed fill. We anticipate maximum settlements of 1 to 2 inches will occur as a result of the proposed fill placement.

On-site, fine-grained soils that are free of debris may be used as fill in landscaped areas. Fill placed in landscaped areas with a total thickness of less than 4 ft should be compacted to a minimum of about 90% of ASTM D 698. Landscaping fills greater than 4 ft should be compacted to at least 95% of the maximum density as determined by ASTM D 698. Site strippings can be placed within the upper four ft of landscaping fills. The moisture content of soils placed in landscaped areas is not as critical, provided that construction equipment can effectively place and compact the materials.

All backfill placed in utility trench excavations within the limits of walkways and paved areas should consist of granular structural fill as described above. The granular backfill should be compacted to at least 92% of the aforementioned standard. Flooding or jetting the backfilled trenches with water to achieve the recommended compaction should not be permitted.

Floor Support and Subdrainage

We anticipate the permanent groundwater table at the site is below the proposed lowest slab-on-grade; however, perched groundwater may approach the ground surface during periods of extended wet weather. To minimize the potential for seepage into the floor slab base course, which could result in a wet floor, we recommend the installation of a perimeter foundation drain system where foundations are located within native cut soils. The perimeter foundation drain system should be constructed as shown on Figure 3. The floor slab should be underlain by a minimum 8-in.-thick granular drainage blanket. The drainage blanket material should consist of relatively clean crushed rock, up to about 1-in. maximum size, having less than 2% passing the No. 200 sieve (washed analysis), and at least 2 fractured faces. Crushed rock of $^3/_4$ to $^1/_4$ in. size is often used for this purpose. A non-woven geotextile filter fabric should be placed between the working pad and subgrade soils. The drainage blanket material should be installed in a single lift and compacted with a vibratory compactor to at least 95% of the maximum dry density as determined by ASTM D 698, or until well keyed.

Foundation Support

We anticipate the proposed new fire station will have maximum column and wall loads of up to about 50 kips and 4 kips/ft, respectively. We recommend the foundation loads for the building be supported on continuous and isolated spread footings embedded in firm native soil or compacted structural fill. We recommend establishing shallow spread and continuous footings at a minimum depth of 2 ft below the lowest adjacent finished grade. The footing width should not be less than 24 in. for isolated column footings and 18 in. for continuous wall footings. Excavations for all foundations should be made with a smooth-edged bucket. We recommend 3 to 4 in. of crushed rock be placed in the bottom of the footing excavation to prevent additional disturbance during construction. Soft or otherwise unsuitable material encountered at the foundation subgrade level should be overexcavated and backfilled with granular structural fill.

Shallow footings having the above minimum dimensions may be designed for an allowable bearing pressure of 3,000 psf. This value applies to the total of dead load and/or frequently applied live loads and can be increased by one-half for the total of all loads: dead, live, and wind or seismic. We estimate the total foundation induced settlement of column and wall footings will be less than 1 in. for footings supporting column and wall loads of up to 50 kips and 4 kips/ft, respectively. Differential settlement between adjacent comparably loaded footings should be less than half the total settlement.

Horizontal shear forces can be resisted partially or completely by frictional forces developed between the base of wall or spread footings and the underlying soil and by soil passive resistance. The total frictional resistance between the footing and the soil is the normal force times the coefficient of friction between the soil and the base of the footing. We recommend an ultimate value of 0.40 for the coefficient of friction for footings cast on crushed rock or native soil. The normal force is the sum of the vertical forces (dead load plus real live load). If additional lateral resistance is required, passive earth pressures against embedded footings can be computed on the basis of an equivalent fluid having a unit weight of 300 pcf in soil. This design passive earth pressure would be applicable only if the footing is cast neat against undisturbed soil, or if backfill for the footings is placed as granular structural fill. This value also assumes the ground surface in front of the foundation slope downward away from the toe of the footing at no steeper than 10H:1V.

Temporary Excavations

Temporary excavations can be made by sloping the excavation sidewalls at about 1H:1V to $1^1/_4$ H:1V or flatter. It should be understood the steeper the temporary slopes, the more risk there is of sloughing of the exposed surface during construction. In our opinion, the short-term stability of temporary slopes will be adequate if surcharge loads due to construction traffic, vehicle parking, material lay down, existing building foundations, etc., are not allowed within the prescribed setback from the top of the cut. The setback (horizontal distance) should be equal to the height of the planned excavation. Other measures that should be implemented to reduce the risk of localized failures of temporary slopes include (1) use geotextile fabric or plastic sheeting to protect the exposed cut slopes from surface erosion; (2) provide positive drainage away from the top and bottom of the cut slopes; (3) construct and backfill walls as soon as practical after completing the excavation; and (4) periodically monitor the area around the top of the excavation for evidence of ground cracking. It must be emphasized that following these recommendations will not guarantee that sloughing or movement of the temporary cut slopes will not occur; however, the measures should serve to reduce the risk of a major slope failure to an acceptable level.

It should be anticipated that excavations greater than 10 ft may encounter intact rock. If rock is encountered, it should be anticipated that rock quality may vary from R0 to R4 hardness. The earthwork contractor should have equipment capable of excavating rock within the excavation.

Retaining Wall Design

We anticipate retaining walls may be used to accommodate grade changes across the site and establish a flat area for the new building. Design lateral earth pressures for retaining walls depend on the drainage condition provided behind the wall and the type of construction, i.e., the ability of the wall to yield. The two possible conditions are 1) a wall that is laterally supported at its base and top and therefore is unable to yield, and 2) a conventional cantilevered retaining wall that yields by tilting about its base. Assuming the wall backfill will be horizontal and fully drained, yielding and non-yielding walls can be designed on the basis of a hydrostatic pressure using an equivalent fluid unit weight of 37 and 54 pcf, respectively.

Horizontal earth pressures due to a surcharge consisting of heavy trucks, such as a 90,000 lb tiller steer apparatus, may be taken as an additional uniform horizontal pressure of 300 psf over the entire height of the wall (rectangular distribution) for yielding and non-yielding walls. We recommend adding this surcharge load to the loads described above for any embedded building or retaining walls that retain paved driveway or parking areas. Additional lateral pressures due to surcharge loadings in the backfill area can be estimated using the guidelines provided on Figure 4. To evaluate the increase in design lateral earth pressures due to seismic loading, we reviewed recently developed recommendations provided in California Department of Transportation report CA13-2170 (Agusti and Sitar, 2013). Based on our review of the report, we recommend evaluating temporary seismic loading on the basis of a hydrostatic pressure using an equivalent fluid unit weight of about 6 and 14 pcf, respectively, for yielding and non-yielding walls with horizontal backfill. This seismic force is in addition to the static lateral earth pressure acting on the wall.

For evaluating resistance to driving forces, passive earth pressure against embedded portions of the walls can be computed on the basis of hydrostatic pressure using an equivalent fluid unit weight of 300 pcf, assuming granular structural fill is used for backfill in front of the wall. All walls should be embedded a minimum of 2 ft below the lowest adjacent grade. Shearing resistance between the base of walls and the underlying soil can be evaluated using an ultimate value of 0.35 for the coefficient of friction for concrete cast directly on undisturbed fine-grained soil or granular structural fill.

The foregoing lateral earth pressure criteria assume the walls will be backfilled with structural fill consisting of either granular backfill having less than 5% fines and a maximum particle size of 1.5 in. or native on-site fine-grained soils free of organics and deleterious materials. It was assumed the materials directly behind the wall will be fully drained. To provide adequate drainage, we recommend placing a minimum 2-ft-wide vertical drainage layer against the back of the wall during backfilling. The drainage layer should consist of clean granular material, such as gravel or crushed rock with not more than about 2% passing the No. 200 sieve (washed analysis), and should be installed following the perimeter wall drain recommendations shown on Figure 3. All granular backfill materials should be placed in maximum 12-in.-thick (loose) lifts and compacted to about 95% of the maximum dry density determined in accordance with ASTM D 698. Overcompaction of the backfill should be avoided. Heavy compactors and large pieces of construction equipment should be kept a minimum distance of 5 ft away from the walls to avoid the buildup of excessive lateral pressures. Compaction close to the walls should be accomplished using hand-operated, vibratory plate compactors.

Seismic Considerations

The project is being designed in accordance with the 2012 IBC, which we was recently adopted by the 2014 OSSC. GRI completed a site-specific seismic hazard evaluation for the project, which is discussed in Appendix B. The 2012 IBC design methodology uses two spectral response coefficients, S_S and S_1, corresponding to periods of 0.2 and 1.0 second, to develop the Risk-Targeted Maximum Considered Earthquake (MCE$_R$) response spectrum. The S_S and S_1 coefficients for the site are 0.96 and 0.41 g, respectively. Based on the available subsurface information for the site and the results of our site-specific seismic hazard evaluation, we recommend using the design spectrum shown on Figure 6B for design of the proposed structure.

Based on the relative consistency of the silt and clay soil, hardness of the basalt rock, and groundwater table elevation, it is our opinion the risk of liquefaction and liquefaction-induced settlement at the site is very low. The risk of damage by tsunami and/or seiche at the site is absent.

The site is located approximately 1 km from the assumed location of the Bolton Fault (USGS, 2008). Unless occurring on a previously unmapped or unknown fault, it is our opinion the risk of ground rupture at the site is low.

Slope Stability

The site in its current configuration has a gentle slope of about 10H:1V, decreasing from about elevation 682 in the northwest corner to 642 ft in the southeast portion of the site. We understand fills up to 20 ft in thickness with a retaining wall on the southern portion of the site is planned. The proposed site configuration with up to 20 ft of fill was evaluated for overall slope stability. The slope was analyzed in Slope/W 2012 by GEO-SLOPE International Ltd. utilizing the Spencer methodology, which satisfies both force and moment equilibrium. The estimated slope stability factor of safety for static conditions was greater than 1.5. Seismic conditions were evaluated assuming a pseudo-static horizontal acceleration taken as one half of the MCE$_R$ peak ground acceleration (PGA) equal to 0.20 times gravity. Seismic factors of safety against slope instability are greater than 1.2. It should be noted that shallow failures (less than 5 ft thick) were not considered as part of this evaluation of slope stability.

Pavement Recommendations

We understand paved areas to be used as parking stalls and drive lanes will be constructed as part of this project. We anticipate the paved areas around the fire station will be subjected to a combination of automobile and heavy truck traffic. We understand the new pavement would likely consist of PCC. Traffic estimates for the roadways and parking areas are presently unknown. Based on our experience with similar projects and subgrade materials, we recommend the use of the following site-specific pavement sections or the standard TVFR PCC sections.

	Minimum Site-Specific Thickness, in.		Standard TVFR Minimum Thickness, in.	
	Crushed Rock Base	**PCC**	**Crushed Rock Base**	**PCC**
Areas Subject to Automobile Traffic (Automobile parking stalls)	6	5	12	6
Areas Subject to Heavy Truck Traffic (Drive lanes)	6	10	12	8

The recommended pavement sections should be considered minimum thicknesses, and it should be assumed that some maintenance will be required over the life of the pavement (15 to 20 years). The section is based on the assumption that pavement construction will be accomplished during the dry season and after construction of the buildings has been completed. If wet-weather pavement construction is considered, it will likely be necessary to increase the thickness of crushed rock base (CRB) to support construction equipment and protect the subgrade from disturbance. The recommended pavement sections are not intended to support extensive construction traffic, such as dump trucks and concrete trucks. Pavements subject to construction traffic may require repair.

For the recommended pavement sections, drainage is an essential aspect of pavement performance. We recommend all paved areas be provided with positive drainage to remove surface water and water within the base course. This will be particularly important in cut sections or at low points within the paved areas, such as at catch basins. Effective methods to prevent saturation of the base course materials include providing weep holes in the sidewalls of catch basins, subdrains in conjunction with utility excavations, and separate trench drain systems. To provide quality materials and construction practices, we recommend the pavement work conform to Oregon Department of Transportation standards.

Prior to placing base course materials, all pavement areas should be proof rolled with a fully loaded 10-cy dump truck. Any soft areas detected by the proof rolling should be overexcavated to firm ground and backfilled with compacted structural fill.

Design Review and Construction Services

We welcome the opportunity to review and discuss construction plans and specifications for this project as they are being developed. In addition, GRI should be retained to review all geotechnical-related portions of the plans and specifications to evaluate whether they are in conformance with the recommendations provided in our report. In particular, GRI should be involved during development of the design and performance criteria for the shoring system, if required. Additionally, to observe compliance with the intent of our recommendations, design concepts, and the plans and specifications, we are of the opinion that all construction operations dealing with earthwork and foundations should be observed by a GRI representative. Our construction-phase services will allow for timely design changes if site conditions are encountered that are different from those described in our report. If we do not have the opportunity to confirm our interpretations, assumptions, and analyses during construction, we cannot be responsible for the application of our recommendations to subsurface conditions that are different from those described in this report.

LIMITATIONS

This report has been prepared to aid the architect and engineer in the design of this project. The scope is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects of the project relevant to earthwork and design and construction of floor support and foundations. In the event that any changes in the design and location of the proposed structure as outlined in this report are planned, we should be given the opportunity to review the changes and to modify or reaffirm the conclusions and recommendations of this report in writing.

The conclusions and recommendations submitted in this report are based on the data obtained from the explorations made at the locations indicated on Figure 2 and from other sources of information discussed in this report. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is acknowledged that variations in soil conditions may exist between exploration locations. This report does not reflect any variations that may occur between these explorations. The nature and extent of variation may not become evident until construction. If, during construction, subsurface conditions differ from those encountered in the explorations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Please contact the undersigned if you have any questions regarding this report.

Submitted for GRI,

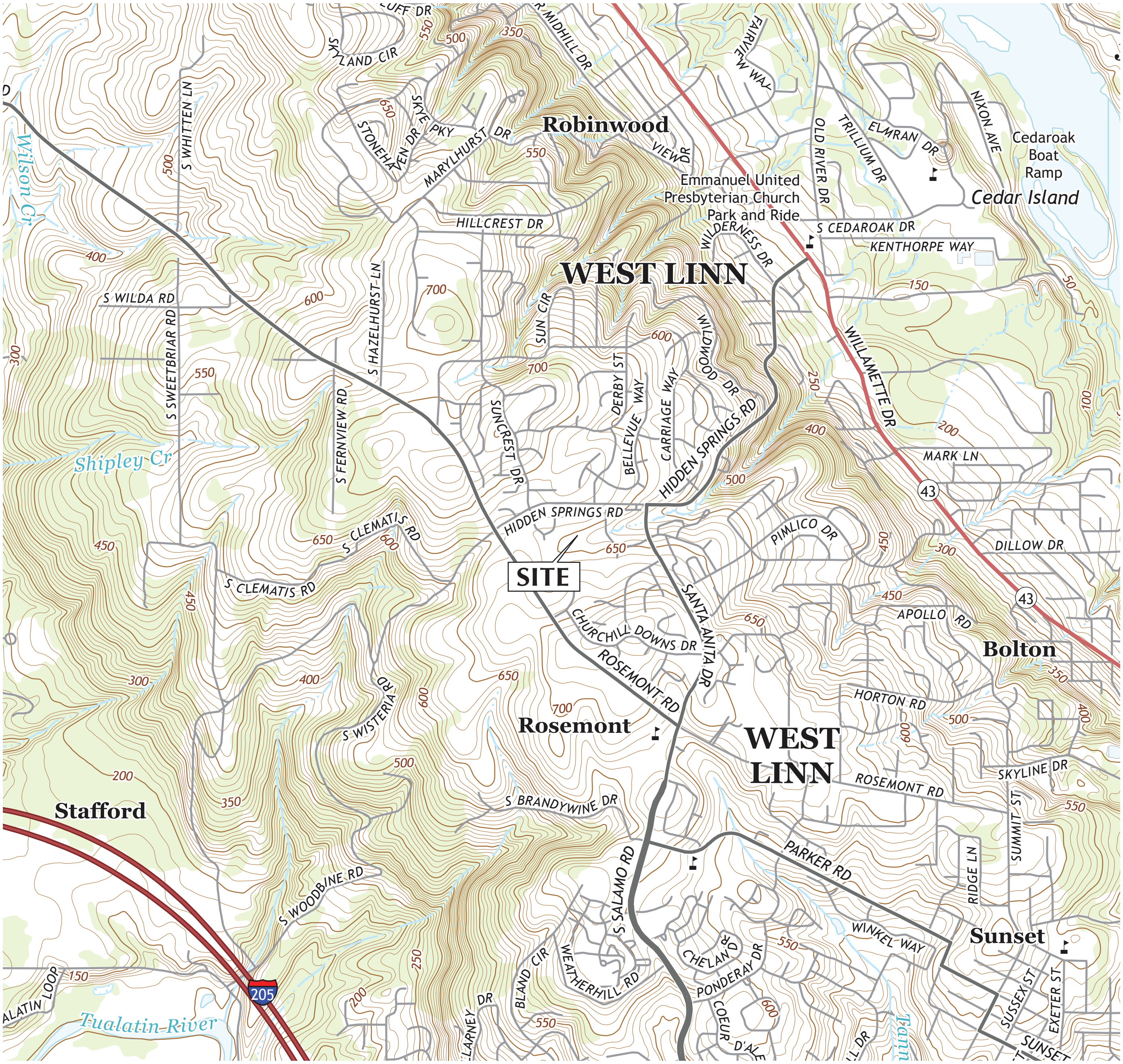
Michael W. Reed, PE, GE	Jason D. Bock, PE	Chris M. Landau, EIT
Principal	Project Engineer	Staff Engineer

References

Agusti, G.C., and Sitar, N., 2013, Seismic Earth Pressures on Retaining Structures in Cohesive Soils, University of California, Berkeley, UCB GT 13-02.

Burns, W.J., Madin, I. P. and. Mickelson, K. A., 2011, Landslide inventory maps of the Beaverton Quadrangle, Washington County, Oregon: Oregon Department of Geology and Mineral Industries Map IMS-34.

U.S. Geological Survey (USGS), 2008, 2008 U.S. Seismic Design Maps, accessed 12/14/15, from USGS website: http://earthquake.usgs.gov/designmaps/us/application.php?



USGS TOPOGRAPHIC MAP
LAKE OSWEGO, OREG. (2014)
CANBY, OREG. (2014)

North

0 1/2 1 MILE

GRI

TUALATIN VALLEY FIRE & RESCUE
STATION 55

VICINITY MAP

JAN. 2016	JOB NO. 5794	FIG. 1

● BORING MADE BY GRI
(DECEMBER 17, 2015)

SITE PLAN FROM FILE BY MACKENZIE, DATED AUGUST 2014

North

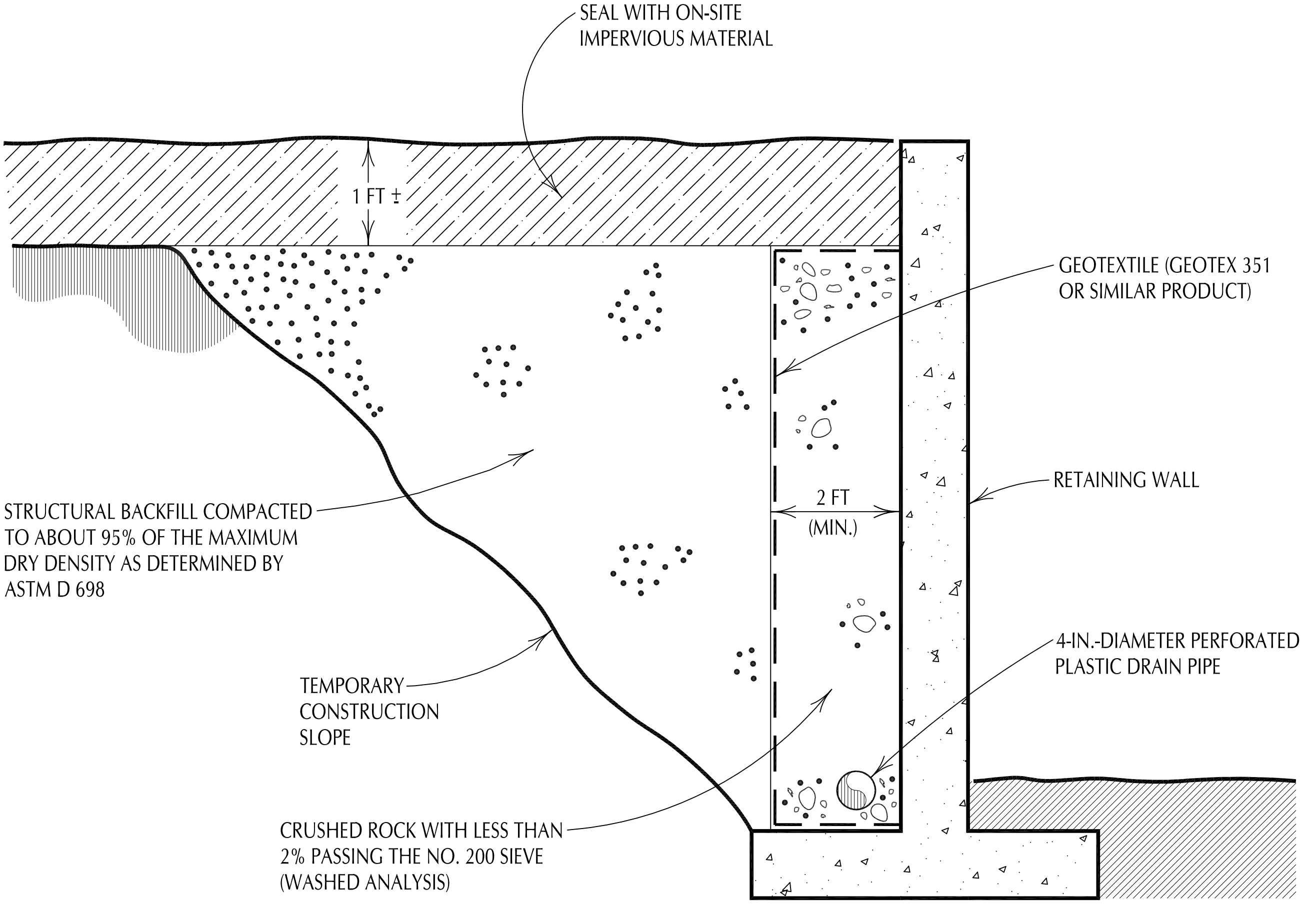
0 60 120 FT

GRI

TUALATIN VALLEY FIRE & RESCUE
STATION 55

SITE PLAN

JAN. 2016 JOB NO. 5794 FIG. 2



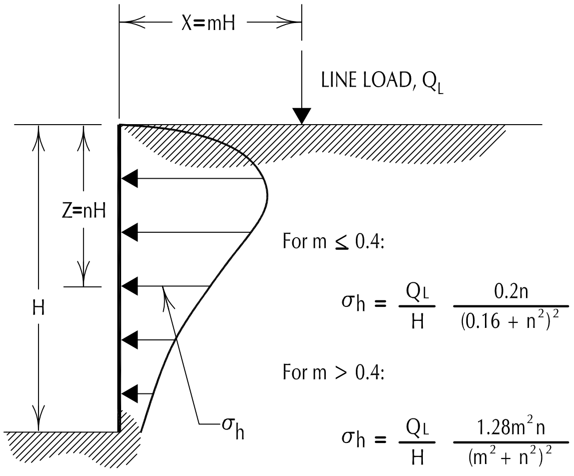
NOT TO SCALE

GRI

TUALATIN VALLEY FIRE & RESCUE
STATION 55

TYPICAL SUBDRAINAGE DETAIL

JAN. 2016 JOB NO. 5794 FIG. 3



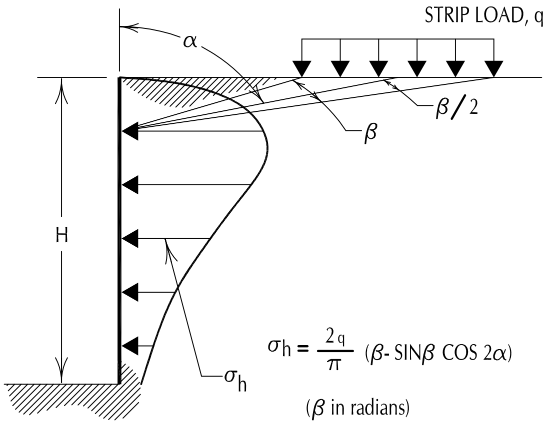
For m ≤ 0.4:

$$\sigma_h = \frac{Q_L}{H} \quad \frac{0.2n}{(0.16 + n^2)^2}$$

For m > 0.4:

$$\sigma_h = \frac{Q_L}{H} \quad \frac{1.28m^2 n}{(m^2 + n^2)^2}$$

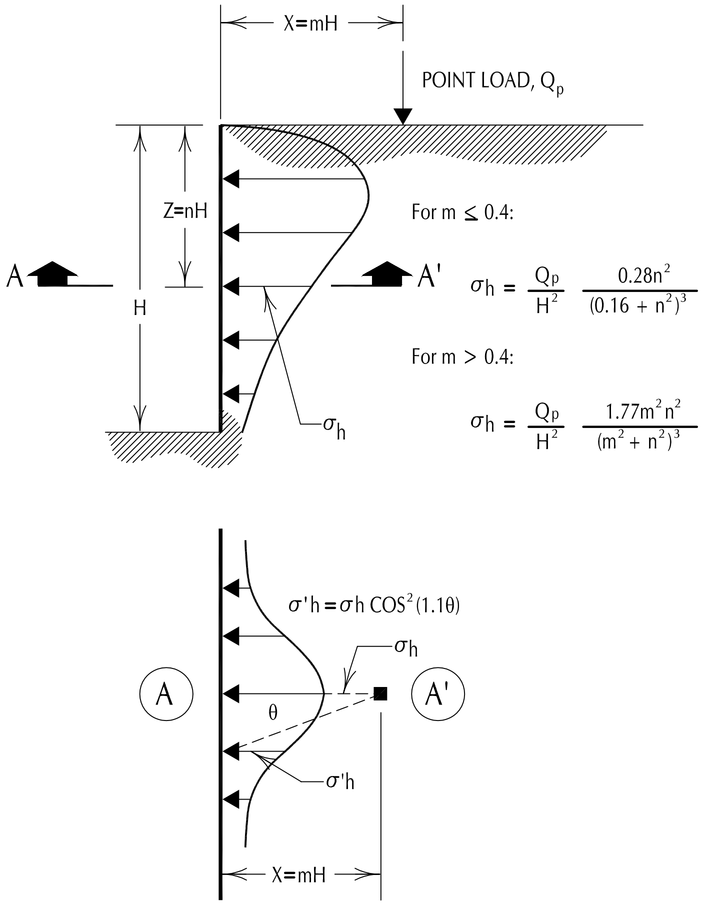
LINE LOAD PARALLEL TO WALL



$$\sigma_h = \frac{2q}{\pi} \; (\beta\text{- SIN}\beta \text{ COS } 2\alpha)$$

(β in radians)

STRIP LOAD PARALLEL TO WALL



For m ≤ 0.4:

$$\sigma_h = \frac{Q_p}{H^2} \quad \frac{0.28n^2}{(0.16 + n^2)^3}$$

For m > 0.4:

$$\sigma_h = \frac{Q_p}{H^2} \quad \frac{1.77m^2 n^2}{(m^2 + n^2)^3}$$

DISTRIBUTION OF HORIZONTAL PRESSURES

VERTICAL POINT LOAD

NOTES:

1. THESE GUIDELINES APPLY TO RIGID WALLS WITH POISSON'S RATIO ASSUMED TO BE 0.5 FOR BACKFILL MATERIALS.
2. LATERAL PRESSURES FROM ANY COMBINATION OF ABOVE LOADS MAY BE DETERMINED BY THE PRINCIPLE OF SUPERPOSITION.

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TUALATIN VALLEY FIRE & RESCUE
STATION 55

SURCHARGE-INDUCED LATERAL PRESSURE

JAN. 2016 JOB NO. 5794 FIG. 4

APPENDIX A

Field Explorations

APPENDIX A

FIELD EXPLORATIONS AND LABORATORY TESTING

FIELD EXPLORATIONS

Subsurface materials and conditions at the site were investigated on December 17, 2015, with seven borings, designated B-1 through B-7. The locations of the explorations are shown on the Site Plan, Figure 2. All explorations were observed by a geotechnical engineer from GRI.

Boring

The borings were advanced to depths of about 6.5 to 25.25 ft. Borings B-1 through B-7 were advanced with mud-rotary drilling methods. All borings were completed using a track-mounted drill rig provided and operated by Western State Soil Conservation, Inc. of Hubbard, Oregon. Disturbed soil samples were typically obtained from the borings at about 2.5- to 5-ft intervals of depth using a standard split-spoon sampler. At the time of sampling, the Standard Penetration Test was conducted. This test consists of driving a standard split-spoon sampler into the soil a distance of 18 in. using a 140-lb hammer dropped 30 in. The number of blows required to drive the sampler the last 12 in. is known as the Standard Penetration Resistance, or N-value. The N-values provide a measure of the relative density of granular soils and the relative consistency of cohesive soils. The soil samples obtained from the borings were carefully examined in the field, and representative portions were saved in airtight jars for further examination and physical testing in our laboratory.

Relatively undisturbed samples of fine-grained, cohesive soils were obtained by pushing 3-in.-O.D. Shelby tubes into the undisturbed soil a maximum distance of 24 in. using the hydraulic pressure of the drill rig. The soils exposed in the ends of the Shelby tubes were examined and classified in the field. After classification, the ends of the tubes were sealed with rubber caps and tape to preserve the natural moisture content of the soils. All samples were returned to our laboratory for further examination and testing.

Logs of the borings are provided on Figures 1A through 7A. The logs present a descriptive summary of the various types of materials encountered in the borings and note the depth where the materials and/or characteristics of the materials change. To the right of the descriptive summary, the numbers and types of samples taken during the drilling operation are indicated. Farther to the right, N-values are shown graphically, along with the natural moisture contents and washed sieve results. The terms and symbols used to describe the soil and rock encountered in the borings are defined in Tables 1A and 2A and the attached legend.

LABORATORY TESTING

General

The samples obtained from the borings were examined in our laboratory, where the physical characteristics of the samples were noted, and the field classifications were modified where necessary. At the time of classification, the natural moisture content of most samples was determined. Additional tests including percent passing No. 200 sieve were also completed.

Natural Moisture Contents

Natural moisture contents were determined in conformance with ASTM D 2216. The results are shown on Figures 1A through 7A and are summarized in Table 3A.

Grain size (Washed Sieve Analysis)

Washed sieve analyses were performed on representative soil samples to assist in their classification. Oven-dried samples were placed on the No. 200 sieve, the silt and clay fraction was washed through the sieve, and the portion of sample retained on the sieve was oven-dried and weighed. The test results are shown on the boring log, Figures 1A through 7A and are summarized in Table 3A.

Table 1A: GUIDELINES FOR CLASSIFICATION OF SOIL

Description of Relative Density for Granular Soil

Relative Density	Standard Penetration Resistance (N-values) blows per foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	over 50

Description of Consistency for Fine-Grained (Cohesive) Soils

Consistency	Standard Penetration Resistance (N-values) blows per foot	Torvane or Undrained Shear Strength, tsf
Very Soft	0 - 2	less than 0.125
Soft	2 - 4	0.125 - 0.25
Medium Stiff	4 - 8	0.25 - 0.50
Stiff	8 - 15	0.50 - 1.0
Very Stiff	15 - 30	1.0 - 2.0
Hard	over 30	over 2.0

Grain-Size Classification

Boulders:
  >12 in.

Cobbles:
  3 - 12 in.

Gravel:
  $^{1}/_{4}$ - $^{3}/_{4}$ in. (fine)
  $^{3}/_{4}$ - 3 in. (coarse)

Sand:
  No. 200 - No. 40 sieve (fine)
  No. 40 - No. 10 sieve (medium)
  No. 10 - No. 4 sieve (coarse)

Silt/Clay:
  pass No. 200 sieve

Modifier for Subclassification

	Primary Constituent SAND or GRAVEL	Primary Constituent SILT or CLAY
Adjective	Percentage of Other Material (by weight)	
trace:	5 - 15 (sand, gravel)	5 - 15 (sand, gravel)
some:	15 - 30 (sand, gravel)	15 - 30 (sand, gravel)
sandy, gravelly:	30 - 50 (sand, gravel)	30 - 50 (sand, gravel)
trace:	<5 (silt, clay)	*Relationship of clay and silt determined by plasticity index test*
some:	5 - 12 (silt, clay)	
silty, clayey:	12 - 50 (silt, clay)	

Table 2A: GUIDELINES FOR CLASSIFICATION OF ROCK

RELATIVE ROCK WEATHERING SCALE

Term	Field Identification
Fresh	Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.
Slightly Weathered	Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 1 in. into rock.
Moderately Weathered	Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.
Predominantly Decomposed	Rock mass is more than 50% decomposed. Rock can be excavated with geologist's pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.
Decomposed	Rock mass is completely decomposed. Original rock "fabric" may be evident. May be reduced to soil with hand pressure.

RELATIVE ROCK HARDNESS SCALE

Term	Hardness Designation	Field Identification	Approximate Unconfined Compressive Strength
Extremely Soft	R0	Can be indented with difficulty by thumbnail. May be moldable or friable with finger pressure.	< 100 psi
Very Soft	R1	Crumbles under firm blows with point of a geology pick. Can be peeled by a pocket knife and scratched with fingernail.	100 - 1,000 psi
Soft	R2	Can be peeled by a pocket knife with difficulty. Cannot be scratched with fingernail. Shallow indentation made by firm blow of geology pick.	1,000 - 4,000 psi
Medium Hard	R3	Can be scratched by knife or pick. Specimen can be fractured with a single firm blow of hammer/geology pick.	4,000 - 8,000 psi
Hard	R4	Can be scratched with knife or pick only with difficulty. Several hard hammer blows required to fracture specimen.	8,000 - 16,000 psi
Very Hard	R5	Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.	> 16,000 psi

RQD AND ROCK QUALITY

Relation of RQD and Rock Quality

RQD (Rock Quality Designation), %	Description of Rock Quality
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Terminology for Planar Surface

Bedding	Joints and Fractures	Spacing
Laminated	Very Close	< 2 in.
Thin	Close	2 in. – 12 in.
Medium	Moderately Close	12 in. – 36 in.
Thick	Wide	36 in. – 10 ft
Massive	Very Wide	> 10 ft

BORING AND TEST PIT LOG LEGEND

SOIL SYMBOLS

Symbol	Typical Description
⁙	LANDSCAPE MATERIALS
▩	FILL
◌	GRAVEL; clean to some silt, clay, and sand
◌	Sandy GRAVEL; clean to some silt and clay
◌	Silty GRAVEL; up to some clay and sand
◌	Clayey GRAVEL; up to some silt and sand
░	SAND; clean to some silt, clay, and gravel
░	Gravelly SAND; clean to some silt and clay
▥	Silty SAND; up to some clay and gravel
▨	Clayey SAND; up to some silt and gravel
▥	SILT; up to some clay, sand, and gravel
▥	Gravelly SILT; up to some clay and sand
▥	Sandy SILT; up to some clay and gravel
▨	Clayey SILT; up to some sand and gravel
▨	CLAY; up to some silt, sand, and gravel
▨	Gravelly CLAY; up to some silt and sand
▨	Sandy CLAY; up to some silt and gravel
▨	Silty CLAY; up to some sand and gravel
≋	PEAT

BEDROCK SYMBOLS

Symbol	Typical Description
⊞	BASALT
▤	MUDSTONE
▤	SILTSTONE
▤	SANDSTONE

SURFACE MATERIAL SYMBOLS

Symbol	Typical Description
■	Asphalt concrete PAVEMENT
▓	Portland cement concrete PAVEMENT
◌	Crushed rock BASE COURSE

SAMPLER SYMBOLS

Symbol	Sampler Description
Ⅰ	2.0-in. O.D. split-spoon sampler and Standard Penetration Test with recovery (ASTM D1586)
▮	Shelby tube sampler with recovery (ASTM D1587)
Ⅱ	3.0-in. O.D. split-spoon sampler with recovery (ASTM D3550)
⊠	Grab Sample
▯	Rock core sample interval
▓	Sonic core sample interval
░	Geoprobe sample interval

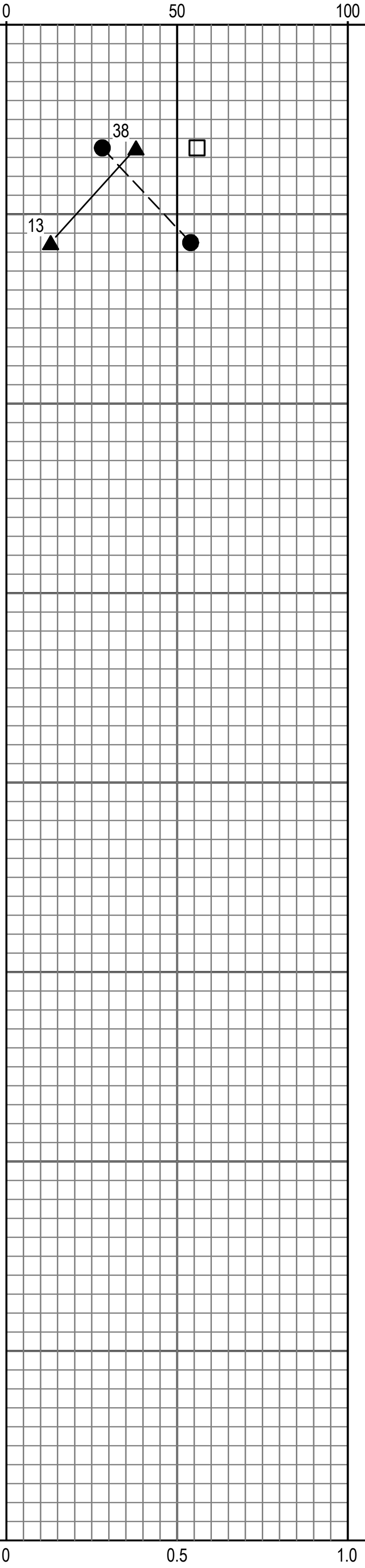
INSTALLATION SYMBOLS

Symbol	Symbol Description
▥	Flush-mount monument set in concrete
▥	Concrete, well casing shown where applicable
▨	Bentonite seal, well casing shown where applicable
░	Filter pack, machine-slotted well casing shown where applicable
▥	Grout, vibrating-wire transducer cable shown where applicable
Ⓟ	Vibrating-wire pressure transducer
▥	1-in.-diameter solid PVC
⁞	1-in.-diameter hand-slotted PVC
▥	Grout, inclinometer casing shown where applicable

FIELD MEASUREMENTS

Symbol	Typical Description
▽	Groundwater level during drilling and date measured
▼	Groundwater level after drilling and date measured
▨	Rock core recovery
▨	Rock quality designation (RQD)

DEPTH, FT	GRAPHIC LOG	**CLASSIFICATION OF MATERIAL** **Surface Elevation:** Not Available	DEPTH, FT	INSTALLATION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	▲ BLOWS PER FOOT ● MOISTURE CONTENT, % ☐ FINES CONTENT, % LIQUID LIMIT, % PLASTIC LIMIT, %	**COMMENTS AND ADDITIONAL TESTS**
0–6.5	▨	CLAY, some silt, trace fine-grained sand, gray mottled brown, yellow, orange, and black, very stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt) ---stiff below 5 ft			S-1	I	11 28 10		
					S-2	I	5 6 7		
		(12/17/2015)	6.5						



◆ TORVANE SHEAR STRENGTH, TSF
■ UNDRAINED SHEAR STRENGTH, TSF

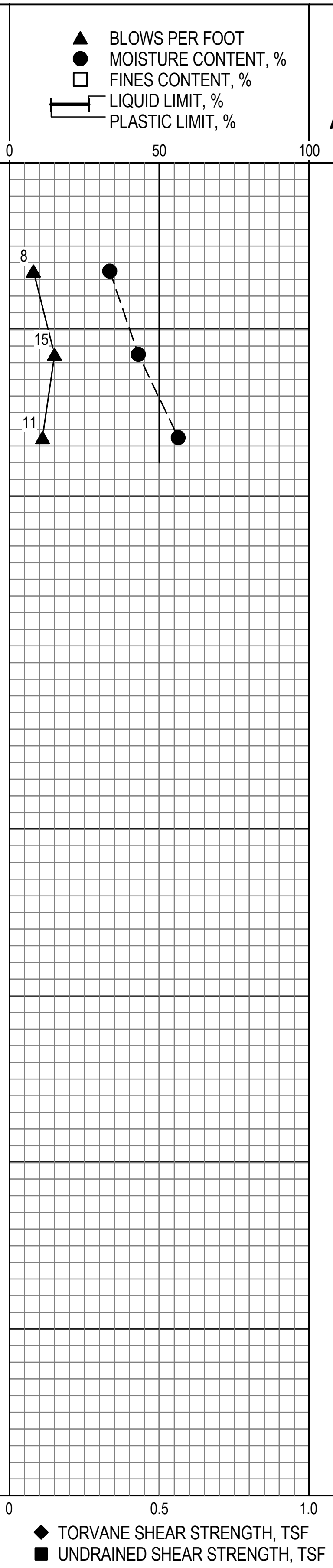
Logged By: C. Landau	**Drilled by:** Western States Soil Conservation, Inc.
Date Started: 12/17/15	**Coordinates:** Not Available
Drilling Method: Mud Rotary **Equipment:** CME 55 HT Track-Mounted Drill Rig **Hole Diameter:** 4 in.	**Hammer Type:** Auto Hammer **Weight:** 140 lb **Drop:** 30 in. **Energy Ratio:** 76%
Note: See Legend for Explanation of Symbols	

GRI

BORING B-1

JAN. 2016 JOB NO. 5794 FIG. 1A

DEPTH, FT	GRAPHIC LOG	CLASSIFICATION OF MATERIAL **Surface Elevation:** Not Available	DEPTH, FT	INSTALLATION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT
0–9.0	▨	CLAY, some silt, trace fine-grained sand, brown mottled light brown and black, medium stiff to stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt) ---stiff below 5 ft			S-1	I	3 3 5
					S-2	I	5 6 9
			9.0		S-3	I	7 6 5
		(12/17/2015)					



COMMENTS AND ADDITIONAL TESTS

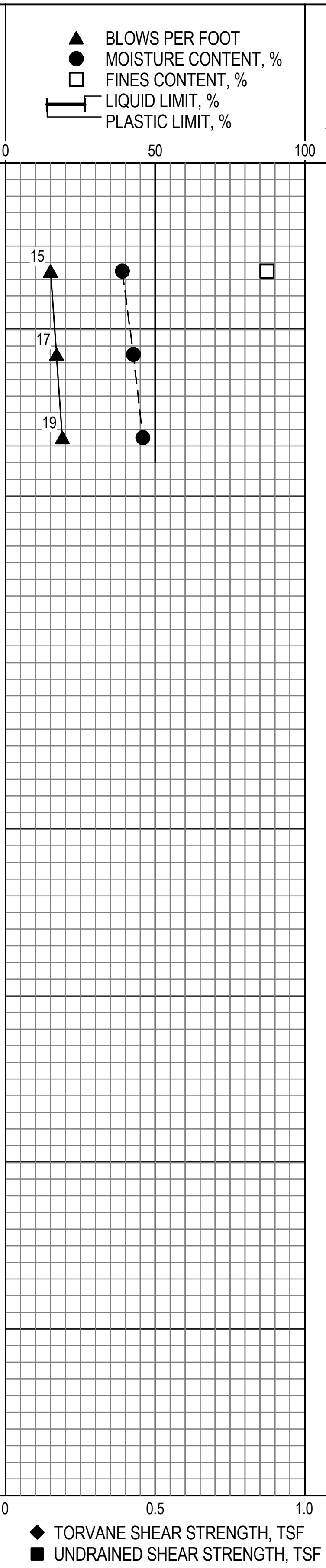
Logged By: C. Landau	**Drilled by:** Western States Soil Conservation, Inc.
Date Started: 12/17/15	**Coordinates:** Not Available
Drilling Method: Mud Rotary **Equipment:** CME 55 HT Track-Mounted Drill Rig **Hole Diameter:** 4 in.	**Hammer Type:** Auto Hammer **Weight:** 140 lb **Drop:** 30 in. **Energy Ratio:** 76%
Note: See Legend for Explanation of Symbols	

GRI

BORING B-2

JAN. 2016 JOB NO. 5794 FIG. 2A

DEPTH, FT	GRAPHIC LOG	CLASSIFICATION OF MATERIAL	DEPTH, FT	INSTALLATION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT		COMMENTS AND ADDITIONAL TESTS
		Surface Elevation: Not Available							
0–9.0	▨	CLAY, some silt, trace fine-grained sand, gray mottled light gray, stiff to very stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt) ---very stiff below 5 ft	9.0		S-1 S-2 S-3	I I I	5, 5, 10 7, 7, 10 10, 8, 11		
		(12/17/2015)							



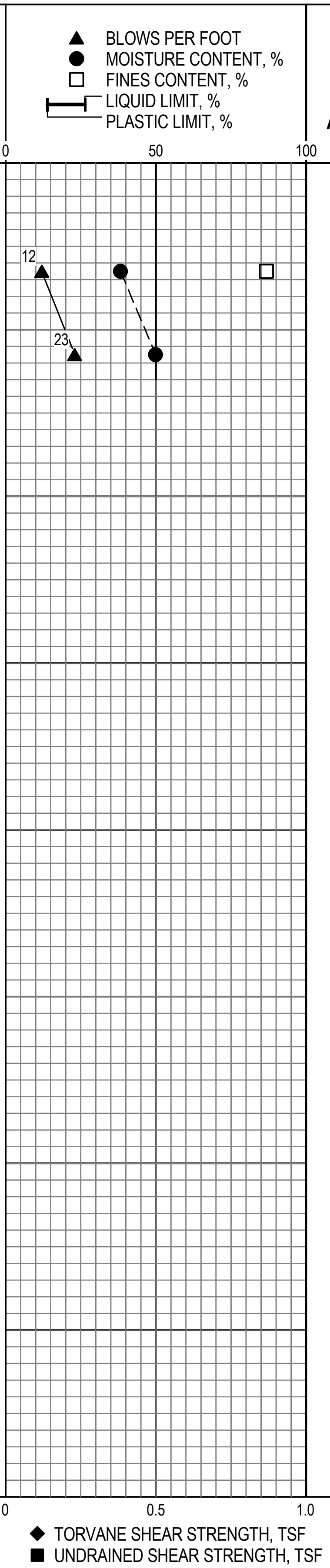
Logged By: C. Landau	**Drilled by:** Western States Soil Conservation, Inc.
Date Started: 12/17/15	**Coordinates:** Not Available
Drilling Method: Mud Rotary **Equipment:** CME 55 HT Track-Mounted Drill Rig **Hole Diameter:** 4 in.	**Hammer Type:** Auto Hammer **Weight:** 140 lb **Drop:** 30 in. **Energy Ratio:** 76%
Note: See Legend for Explanation of Symbols	

GRI

BORING B-3

JAN. 2016 JOB NO. 5794 FIG. 3A

DEPTH, FT	GRAPHIC LOG	CLASSIFICATION OF MATERIAL Surface Elevation: Not Available	DEPTH, FT	INSTALLATION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	COMMENTS AND ADDITIONAL TESTS
0–6.5	▨	CLAY, some silt, trace fine-grained sand, brown mottled light brown, stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt) ---gray mottled yellow, orange, and black, very stiff below 5 ft	6.5		S-1 S-2	I I	4 6 6 7 11 12	
		(12/17/2015)						



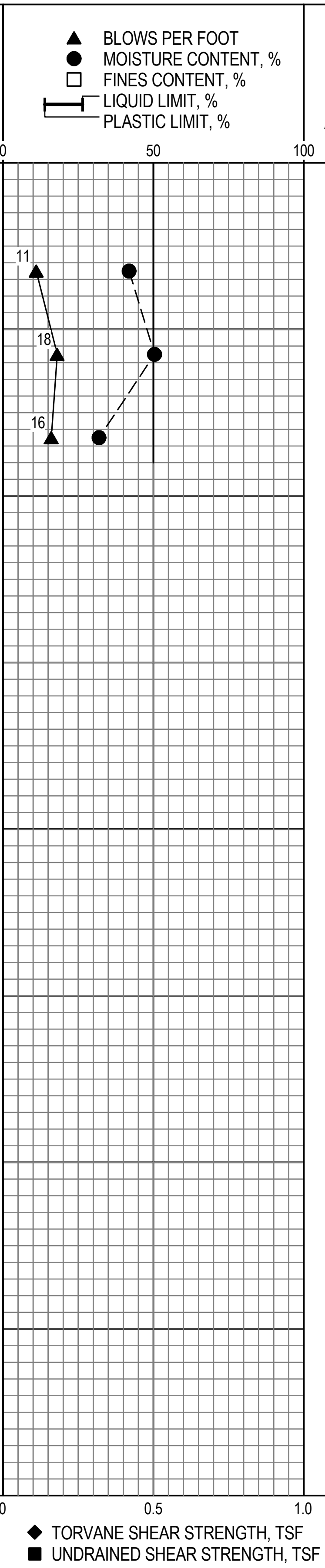
Logged By: C. Landau	**Drilled by:** Western States Soil Conservation, Inc.
Date Started: 12/17/15	**Coordinates:** Not Available
Drilling Method: Mud Rotary **Equipment:** CME 55 HT Track-Mounted Drill Rig **Hole Diameter:** 4 in.	**Hammer Type:** Auto Hammer **Weight:** 140 lb **Drop:** 30 in. **Energy Ratio:** 76%
Note: See Legend for Explanation of Symbols	

GRI

BORING B-4

JAN. 2016 JOB NO. 5794 FIG. 4A

DEPTH, FT	GRAPHIC LOG	CLASSIFICATION OF MATERIAL **Surface Elevation:** Not Available	DEPTH, FT	INSTALLATION	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	COMMENTS AND ADDITIONAL TESTS
0–9	▨	CLAY, some silt, trace fine-grained sand, brown mottled light brown, stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt)			S-1	I	4 5 6	
		---gray mottled orange and black, very stiff below 5 ft			S-2	I	9 9 9	
					S-3	I	8 8 8	
		(12/17/2015)	9.0					



GRI BORING LOG (LAT/LONG)-NO ELEV-16'PP GRI DATA TEMPLATE.GDT 1/6/16

Logged By: C. Landau
Drilled by: Western States Soil Conservation, Inc.
Date Started: 12/17/15
Coordinates: Not Available
Drilling Method: Mud Rotary
Equipment: CME 55 HT Track-Mounted Drill Rig
Hole Diameter: 4 in.
Note: See Legend for Explanation of Symbols
Hammer Type: Auto Hammer
Weight: 140 lb
Drop: 30 in.
Energy Ratio: 76%

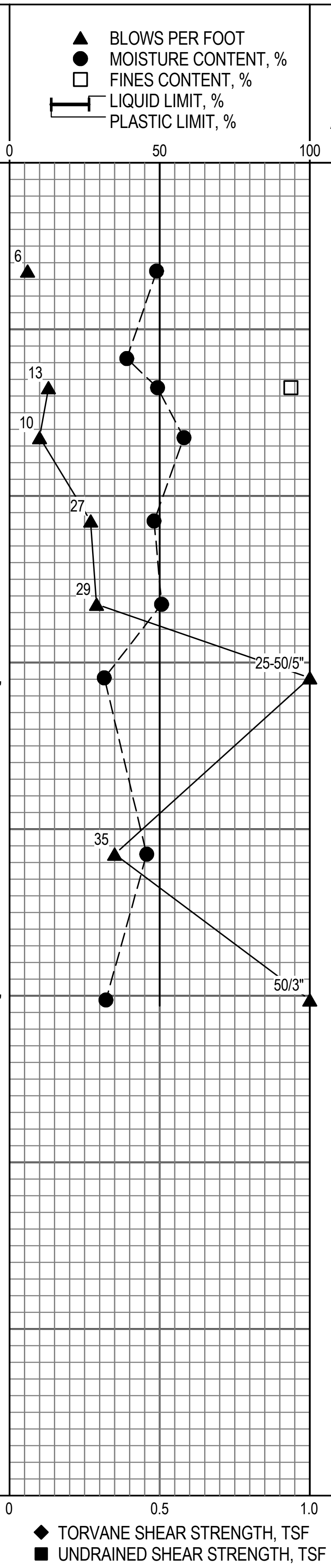
GRI

BORING B-5

JAN. 2016 JOB NO. 5794 FIG. 5A

DEPTH, FT	GRAPHIC LOG	CLASSIFICATION OF MATERIAL **Surface Elevation:** Not Available	DEPTH, FT	INSTALLATION
0–22.5	╱╱╱	Clayey SILT, trace fine to coarse grained sand, brown mottled light brown, medium stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt) ---brown mottled black and yellow below 5 ft ---very stiff below 6 ft ---stiff below 7.5 ft ---very stiff below 10 ft ---hard below 15 ft	22.5	
22.5–25.3	+++	Basalt, gray and orange, predominately decomposed, extremely soft to very soft (R0-R1)	25.3	
		(12/17/2015)		

SAMPLE NO.	BLOW COUNT
S-1	0 2 4
S-2	
S-3	4 7 6
S-4	4 6 4
S-5	6 8 19
S-6	9 13 16
S-7	25 50/5"
S-8	11 14 21
S-9	50/3"



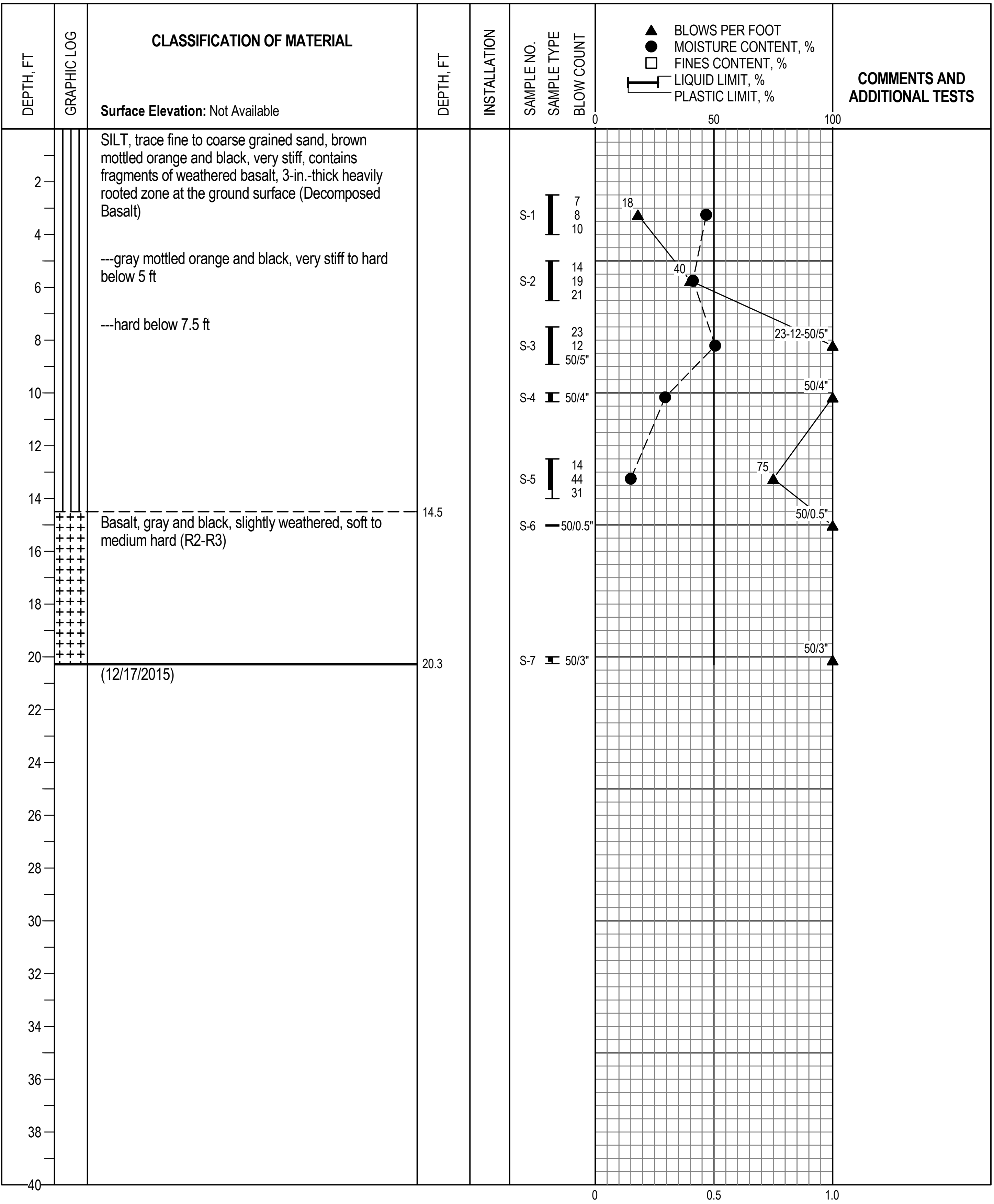
COMMENTS AND ADDITIONAL TESTS

Logged By: C. Landau	**Drilled by:** Western States Soil Conservation, Inc.
Date Started: 12/17/15	**Coordinates:** Not Available
Drilling Method: Mud Rotary **Equipment:** CME 55 HT Track-Mounted Drill Rig **Hole Diameter:** 4 in.	**Hammer Type:** Auto Hammer **Weight:** 140 lb **Drop:** 30 in. **Energy Ratio:** 76%
Note: See Legend for Explanation of Symbols	

GRI

BORING B-6

JAN. 2016 JOB NO. 5794 FIG. 6A



Surface Elevation: Not Available

SILT, trace fine to coarse grained sand, brown mottled orange and black, very stiff, contains fragments of weathered basalt, 3-in.-thick heavily rooted zone at the ground surface (Decomposed Basalt)

---gray mottled orange and black, very stiff to hard below 5 ft

---hard below 7.5 ft

Basalt, gray and black, slightly weathered, soft to medium hard (R2-R3)

(12/17/2015)

Logged By: C. Landau	**Drilled by:** Western States Soil Conservation, Inc.
Date Started: 12/17/15	**Coordinates:** Not Available
Drilling Method: Mud Rotary **Equipment:** CME 55 HT Track-Mounted Drill Rig **Hole Diameter:** 4 in.	**Hammer Type:** Auto Hammer **Weight:** 140 lb **Drop:** 30 in. **Energy Ratio:** 76%
Note: See Legend for Explanation of Symbols	

GRI

BORING B-7

APPENDIX B

Site Specific Seismic Hazard Study

APPENDIX B

SITE-SPECIFIC SEISMIC HAZARD EVALUATION

GRI has completed a site-specific seismic hazard evaluation for the proposed Tualatin Valley Fire and Rescue Station 55 development in West Linn, Oregon. The purpose of our work was to evaluate the potential seismic hazards associated with regional and local seismicity. The site-specific evaluation is intended to meet the requirements of the 2014 *Oregon Structural Specialty Code* (OSSC), which is based on the 2012 *International Building Code* (IBC). Seismic design in accordance with the 2012 IBC is based on the American Society of Civil Engineers (ASCE) standard 7-10, *Minimum Design Loads for Buildings and Other Structures*. Our work was based on the potential for regional and local seismic activity, as described in the existing scientific literature, and on the subsurface conditions at the site, as disclosed by subsurface explorations completed for this project. Specifically, our work included the following tasks:

1) A detailed review of available literature, including published papers, maps, open-file reports, seismic histories and catalogs, and other sources of information regarding the tectonic setting, regional and local geology, and historical seismic activity that might have a significant effect on the site.

2) Compilation and evaluation of subsurface data collected at and in the vicinity of the site, including classification and laboratory analyses of soil samples. This information was used to prepare a generalized subsurface profile for the site.

3) Identification of potential seismic sources appropriate for the site and characterization of those sources in terms of magnitude, distance, and acceleration response spectra.

4) Engineering analyses, based on the generalized subsurface profile and the potential seismic sources, resulting in conclusions and recommendations regarding:

    a) specific seismic events and characteristic earthquakes that might have a significant effect on the project site,

    b) the potential for seismic energy amplification and liquefaction or soil strength loss at the site, and

    c) site-specific acceleration response spectra for design of the proposed structure.

This appendix describes the work accomplished and summarizes our conclusions and recommendations.

Geologic Setting

On a regional scale, the site is located in the northern limits of the Willamette-Puget Sound lowland trough of the Cascadia convergent tectonic system (Blakely et al., 2000). The lowland areas consist of broad north-south trending basins in the underlying geologic structure between the Coast Range to the west and the Cascade Mountains to the east. The lowland trough is characterized by alluvial plains with areas of buttes and terraces. The site is located approximately 100 km inland from the rupture zone of the Cascadia Subduction Zone (CSZ), an active convergent plate boundary along which remnants of the Farallon Plate (the Gorda, Juan de Fuca, and Explorer plates) are being subducted beneath the western edge of the North American continent. The subduction zone is a broad, eastward-dipping zone of contact between the upper portion of the subducting slabs and the over-riding North American Plate as shown on Figure 1B.

On a local scale, the site is located on the eastern flanks of the Tualatin Mountains in the Portland Basin, a well-defined structural basin bounded by high-angle, northwest-trending, right-lateral strike-slip faults, some of which are considered to be seismogenic. The distribution of these faults relative to the site is shown on the Local Geologic Map, Figure 2B. Additional faults considered by the U.S. Geologic Survey (USGS) are shown on the Local Fault Map, Figure 3B. Information regarding the continuity and potential activity of these faults is lacking, due largely to the scale at which geologic mapping in the area has been conducted and the presence of thick, relatively young, basin-filling sediments that obscure underlying structural features. Active faults may be present within the basin, but clear stratigraphic and/or geophysical evidence regarding their location and extent is not presently available. Additional discussion regarding crustal faults is provided in the Local Crustal Event section below.

Because of the proximity of the site to the CSZ and its location in the Portland Basin, three distinctly different seismic sources contribute to the potential for damaging earthquake motions at the site. Two of these sources are associated with deep-seated tectonic activity related to the CSZ; the third is associated with movement on relatively shallow faults within and adjacent to the Portland Basin.

Geologic mapping completed for the project area indicates the site is underlain by Miocene-age Wanapum Basalt of the Columbia River Basalt Group (Beeson et al., 1989). The site and other areas of the Tualatin Mountain upland are capped by relatively thin deposits of fine-grained, wind-blown silt, locally referred to as Portland Hills Silt.

Seismicity

General. The geologic and seismologic information available for identifying the potential seismicity at the site is incomplete, and large uncertainties are associated with estimates of the probable magnitude, location, and frequency of occurrence of earthquakes that might affect the site. The available information indicates the potential seismic sources that may affect the site can be grouped into three independent categories: *subduction zone events* related to sudden slip between the upper surface of the Juan de Fuca plate and the lower surface of the North American plate, *subcrustal events* related to deformation and volume changes within the subducted mass of the Juan de Fuca plate, and *local crustal events* associated with movement on shallow, local faults within and adjacent to the Portland Basin. Based on our review of currently available information, we have developed generalized design earthquakes for each of these categories in accordance with Section 1803 of the OSSC. The design earthquakes are characterized by three important properties: size, location relative to the subject site, and the peak horizontal bedrock accelerations produced by the event. In this study, earthquake size is generally expressed by moment magnitude (Mw); location is expressed as the closest distance to the fault rupture, measured in kilometers; and peak horizontal bedrock accelerations are expressed in units of gravity (1 g = 32.2 ft/sec^2 = 981 cm/sec^2).

Subduction Zone Event. Written Japanese tsunami records provide evidence that a great CSZ earthquake likely occurred in January 1700. Geological studies show that great megathrust earthquakes have occurred repeatedly in the past 7,000 years (Atwater et al., 1995; Clague, 1997; Goldfinger, 2003; and Kelsey et al., 2005), and geodetic studies (Hyndman and Wang, 1995; Savage et al., 2000) indicate rate of strain accumulation consistent with the assumption that the CSZ is locked beneath offshore northern California, Oregon, Washington, and southern British Columbia (Fluck et al., 1997; Wang et al., 2001). Numerous geological and geophysical studies suggest the CSZ may be segmented (Hughes and Carr, 1980; Weaver and Michaelson, 1985; Guffanti and Weaver, 1988; Goldfinger, 1994; Kelsey et al., 1994; Mitchell et al., 1994; Personius, 1995; Nelson and Personius, 1996; Witter, 1999), but the most recent studies suggest that for the last great earthquake in 1700, most of the subduction zone ruptured in a single Mw 9.0 earthquake (Satake et al., 1996; Atwater and Hemphill-Haley, 1997; Clague et al., 2000). Published estimates of the probable maximum size of subduction zone events range from M8.0 to greater than Mw 9.0. Numerous detailed studies of coastal subsidence, tsunamis, and turbidites yield a wide range of recurrence intervals, but the most complete records (>4,000 years) indicate average intervals of 350 to 600 years between great earthquakes on the CSZ (Adams, 1990; Atwater and Hemphill-Haley, 1997; Witter, 1999; Clague et al., 2000; Kelsey et al., 2002; Kelsey et al., 2005; Witter et al., 2003; Goldfinger et al, 2012). Tsunami inundation in buried marshes along the Washington and Oregon coast and stratigraphic evidence from the Cascadia margin support these recurrence intervals (Kelsey et al., 2005; Goldfinger, 2003).

The U.S. Geological Survey (USGS) 2008 Probabilistic Seismic Hazard Analysis (PSHA) assumes four potential locations for the location of the eastern edge of the earthquake rupture zone as shown on Figure 4B. The 2008 USGS mapping effort indicates two rupture scenarios are assumed to represent these megathrust events: 1) Mw 9±0.2 events that rupture the entire CSZ every 500 years and 2) M8.0 to 8.7 events with rupture zones that occur on segments of the CSZ and occur over the entire length of the CSZ during a period of about 500 years (Petersen et al., 2008). The assumed distribution of earthquakes is shown on the Assumed Magnitude-Frequency Distribution, Figure 5B. This distribution assumes the larger Mw 9.0 earthquake is the most likely single CSZ earthquake scenario, which is consistent with our review of the 2008 USGS PSHA interactive deaggregation for the site. Therefore, for our deterministic analysis, we have chosen to represent the subduction zone event by a design earthquake of Mw 9.0 at a focal depth of 25 km and rupture distance of about 100 km. This corresponds to a sudden rupture of the whole length of the Juan de Fuca-North American plate interface with an assumed rupture zone due west of the site. Based on an average of the attenuation relationships published by Youngs et al. (1997), Atkinson and Boore (2003), and Zhao et al. (2006), a subduction zone earthquake of this size and location would result in a peak horizontal bedrock acceleration of approximately 0.13 g at the site.

Subcrustal Event. There is no historic earthquake record of subcrustal, intraslab earthquakes in Oregon. Although both the Puget Sound and northern California region have experienced many of these earthquakes in historic times, Wong (2005) hypothesizes that due to subduction zone geometry, geophysical conditions, and local geology, Oregon may not be subject to intraslab earthquakes. In the Puget Sound area, these moderate to large earthquakes are deep (40 to 60 km) and over 200 km from the deformation front of the subduction zone. Offshore, along the northern California coast, the earthquakes are shallower (up to 40 km) and located along the deformation front. Estimates of the probable size, location, and frequency of subcrustal events in Oregon are generally based on comparisons of the CSZ with active convergent plate margins in other parts of the world and on the historical seismic record for the region surrounding Puget Sound, where significant events known to have occurred within the subducting

Juan de Fuca plate have been recorded. Published estimates of the probable maximum size of these events range from Mw 7.0 to 7.5. The 1949, 1965, and 2001 documented subcrustal earthquakes in the Puget Sound area correspond to Mw 7.1, 6.5, and 6.8, respectively. Published information regarding the location and geometry of the subducting zone indicates that a focal depth of 50 km is probable (Weaver and Shedlock, 1989). We have chosen to represent the subcrustal event by a design earthquake of Mw 7.0 at a focal depth of 50 km and a rupture distance of 60 km. Based on the attenuation relationships published by Youngs et al. (1997) and Atkinson and Boore (2003), a subcrustal earthquake of this size and location would result in a peak horizontal bedrock acceleration of approximately 0.12 g at the site.

Local Crustal Event. Sudden crustal movements along relatively shallow, local faults in the project area, although rare, have been responsible for local crustal earthquakes. The precise relationship between specific earthquakes and individual faults is not well understood, since few of the faults in the area are expressed at the ground surface, and the foci of the observed earthquakes have not been located with precision. The history of local seismic activity is commonly used as a basis for determining the size and frequency to be expected of local crustal events. Although the historical record of local earthquakes is relatively short (the earliest reported seismic event in the area occurred in 1920), it can serve as a guide for estimating the potential for seismic activity in the area.

Based on fault mapping conducted by the USGS (USGS, 2014), the Bolton Fault is the closest mapped crustal fault identified as a hazard to the site. It should be noted that the USGS considers the Bolton Fault to be a Class B structure, which indicates large uncertainty in the age or relative activity of the fault. The Bolton Fault has a characteristic earthquake magnitude of Mw 6.2, and is considered by the USGS to be located approximately 1 km from the site. A crustal earthquake of this size and location would result in a peak horizontal bedrock acceleration of approximately 0.49 g at the site based on an average of the next generation attenuation (NGA) ground motion relations published by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), and Chiou and Youngs (2008).

Summary of Deterministic Earthquake Parameters

In summary, three distinctly different types of earthquakes affect seismicity in the project area. Deterministic evaluation of the earthquake sources using recently published attenuation ground motion relations provides an estimate of the ground response for each individual earthquake type. Unlike probabilistic estimates, these deterministic estimates are not associated with a relative hazard level or probability of occurrence, and simply provide an estimate of the ground motion parameters for each type of fault at a given distance from the site. For each earthquake source, we have attempted to use attenuation relationships that are consistent with the development of the 2008 USGS seismic hazard maps. The parameters for each deterministic estimate are summarized in the following table. These deterministic parameters are provided as required by the OSSC, but are not intended for design purposes.

Earthquake Source	Attenuation Relationship	Magnitude, Mw	Rupture Distance, km	Focal Depth, km	Peak Bedrock Acceleration, g	Average Peak Bedrock Acceleration, g
Subduction Zone	Youngs et al., 1997	9.0	100	25	0.15	0.13
	Atkinson and Boore, 2003	9.0	100	25	0.08	
	Zhao et al., 2006 (1)	9.0	100	25	0.15	

Earthquake Source	Attenuation Relationship	Magnitude, Mw	Rupture Distance, km	Focal Depth, km	Peak Bedrock Acceleration, g	Average Peak Bedrock Acceleration, g
Subcrustal	Youngs, et al., 1997	7.0	60	50	0.15	0.12
	Atkinson and Boore, 2003	7.0	60	NA	0.09	
Local Crustal	Campbell and Bozorgnia, 2008	6.2	1	NA	0.43	0.49
	Chiou and Youngs, 2008	6.2	1	NA	0.64	
	Boore and Atkinson, 2008	6.2	1	NA	0.40	

(1) Relationship by Zhao et al. (2006) limited to magnitude 8.5.

Probabilistic Considerations

The probability of an earthquake of a specific magnitude occurring at a given location is commonly expressed by its return period, i.e., the average length of time between successive occurrences of an earthquake of that size or larger at that location. The return period of a design earthquake is calculated once a project design life and some measure of the acceptable risk that the design earthquake might occur or be exceeded are specified. These expected earthquake recurrences are expressed as a probability of exceedance during a given time period or design life. Historically, building codes have adopted an acceptable risk level by identifying ground acceleration values that meet or exceed a 10% probability of exceedance in 50 years, which corresponds to an earthquake with an expected recurrence interval of 475 years. Previous versions of the IBC developed response spectra based on ground motions associated with the Maximum Considered Earthquake (MCE), which is generally defined as a probabilistic earthquake with a 2% probability of exceedance in 50 years (return period of about 2,500 years) except where subject to deterministic limitations (Leyendecker et al., 2000).

The recent 2012 IBC develops site-specific response spectra based on ground motions associated with the Risk-Targeted Maximum Considered Earthquake (MCE$_R$), which is generally defined as the response spectrum that is expected to achieve a 1% probability of building collapse within a 50-year period, except where subject to deterministic limitations. The design-level response spectrum is calculated as two-thirds of the MCE$_R$ ground motions. Since the MCE$_R$ earthquake ground motions were developed by the USGS to incorporate the targeted 1% in 50 years risk of structural collapse based upon a generic structural fragility, they are different than the ground motions associated with the traditional MCE. Although site response is evaluated based on the MCE$_R$, it should be noted that seismic hazards, such as liquefaction and soil strength loss, are evaluated using the Maximum Considered Earthquake Geometric Mean (MCE$_G$) peak ground acceleration (PGA), which is more consistent with the traditional MCE.

The 2012 IBC design methodology uses two mapped spectral acceleration parameters, S$_S$ and S$_1$, corresponding to periods of about 0.2 and 1.0 second, to develop the MCE$_R$ earthquake. The S$_S$ and S$_1$ parameters for the site located at the approximate latitude and longitude coordinates of 45.3765°N and 122.6514°W are 0.96 and 0.41 g, respectively.

Estimated Site Response

The effect of a specific seismic event on the site is related to 1) the type and quantity of seismic energy delivered to the bedrock beneath the site by the earthquake and 2) the type and thickness of soil overlying the bedrock at the site. The subsurface explorations completed for this investigation disclosed relatively stiff silt soils over basalt bedrock. Based on our review of Section 20.3 of the 2012 IBC, we recommend defining the site as Site Class C, or a very dense soil and soft rock site.

Other Seismic Hazards. Based on the relative consistency and plasticity of the soils below the anticipated regional groundwater level at the site, it is our opinion the risk of seismically-induced liquefaction or significant loss of soil strength during ground motions associated with the MCE_G is low. The Bolton Fault is located approximately 1 km from the site. Unless occurring on a previously unmapped or unknown fault, it is our opinion the risk of ground rupture at the site is low. The risk of damage by tsunami and/or seiche at the site is absent.

Conclusions

The 2012 IBC design methodology uses two spectral response parameters, S_S and S_1, corresponding to periods of 0.2 and 1.0 second, to develop the MCE_R response spectrum. The S_S and S_1 parameters for the site are 0.96 and 0.41 g, respectively. Based on the results of subsurface explorations completed during this investigation and previous investigations at the campus, the soils at the site are representative of Site Class C conditions. For design of the new building, we recommend using the Site Class C design response spectrum shown on Figure 6B and tabulated below.

RECOMMENDED RESPONSE SPECTRA (SITE CLASS C), 5% DAMPING

Period, s	MCE_R Response Spectral Values, g	Design Response Spectral Values, g
0.00	0.39	0.26
0.12	0.98	0.65
0.59	0.98	0.65
0.60	0.95	0.64
0.70	0.82	0.55
0.80	0.72	0.48
0.90	0.64	0.42
1.00	0.57	0.38
1.50	0.38	0.25
2.00	0.29	0.19
2.50	0.23	0.15
3.00	0.19	0.13
3.50	0.16	0.11
4.00	0.14	0.10

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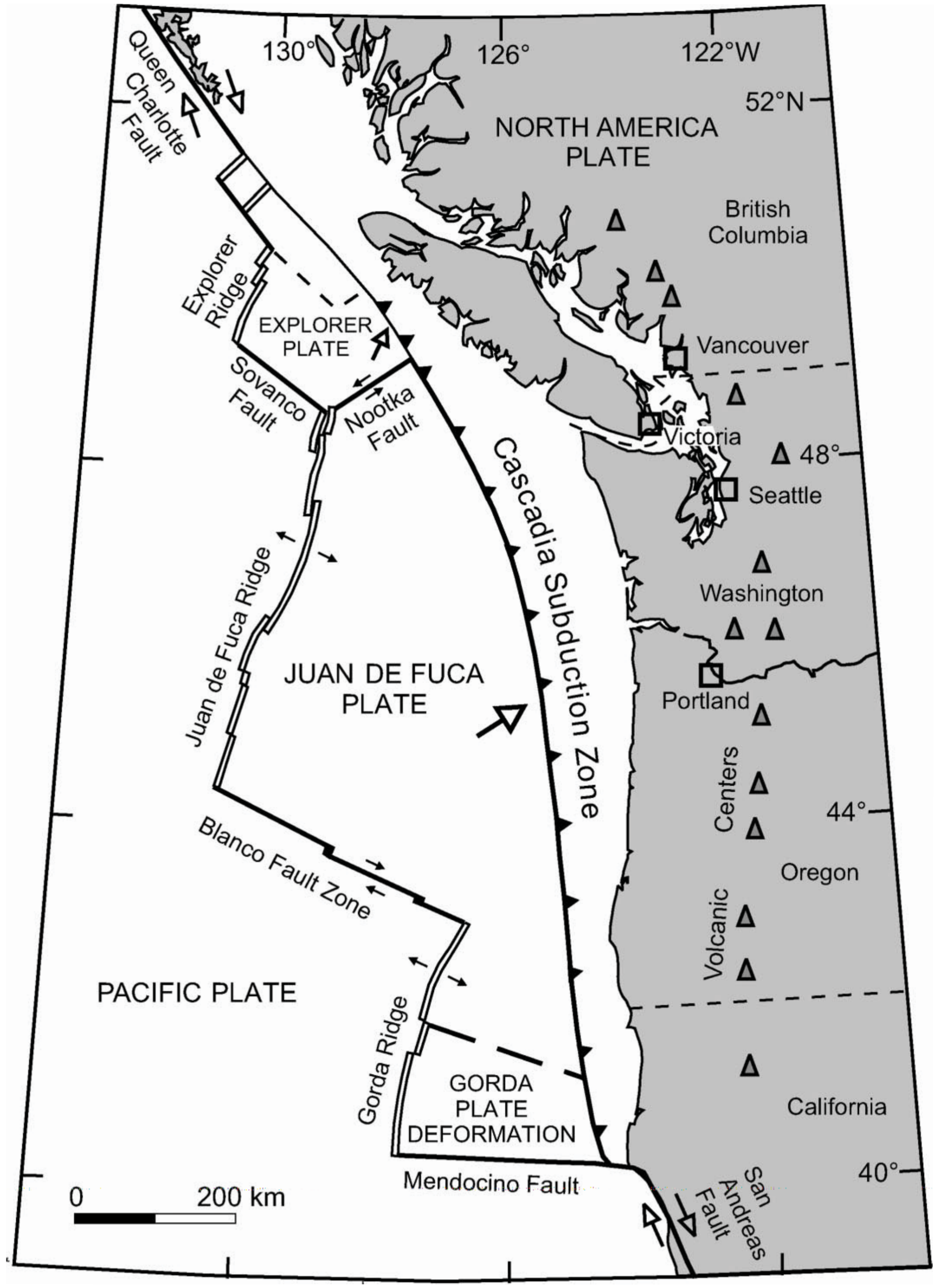
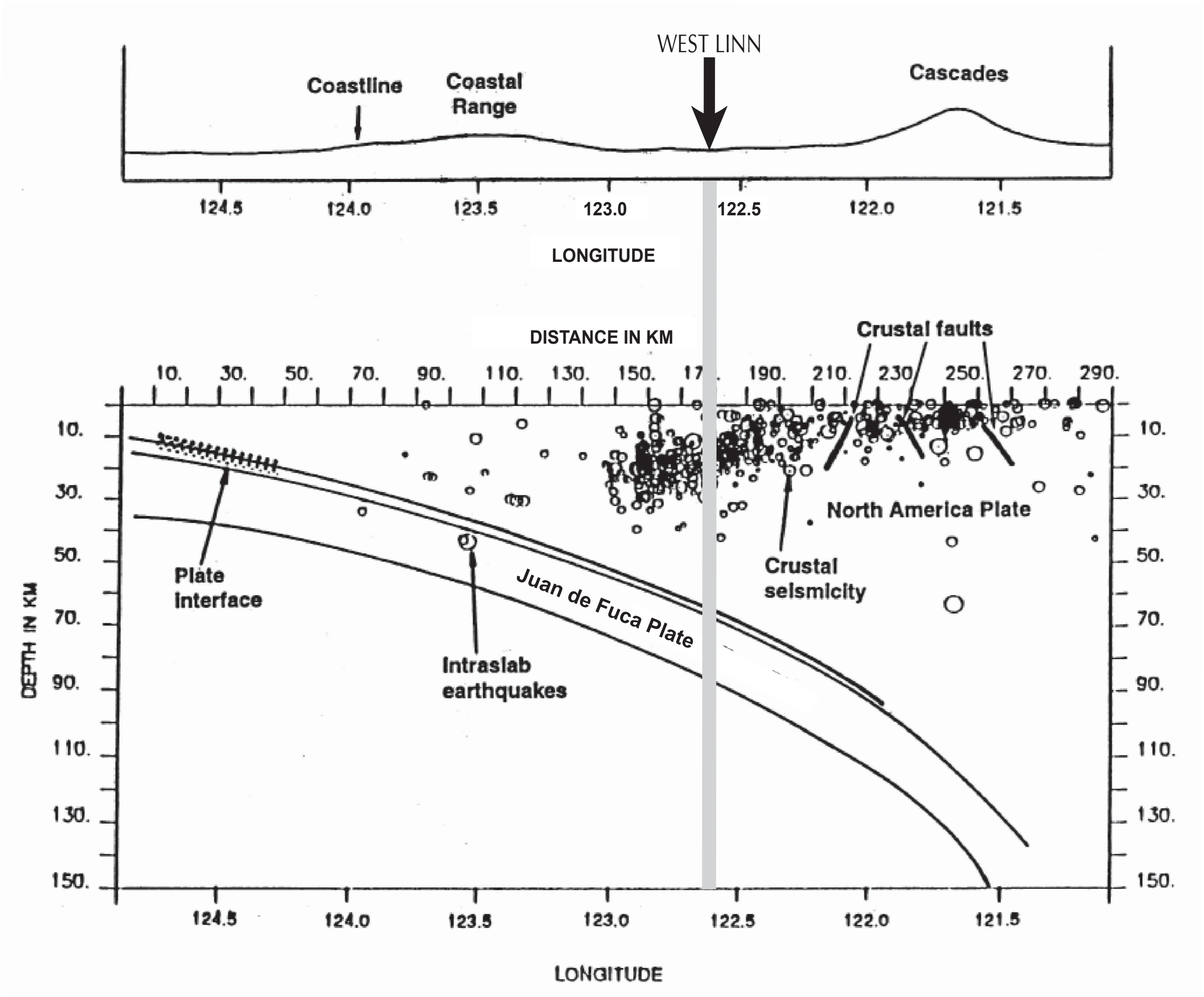


A) TECTONIC MAP OF PACIFIC NORTHWEST, SHOWING ORIENTATION AND EXTENT OF CASCADIA SUBDUCTION ZONE (MODIFIED FROM WANG, K., AND OTHERS, 1994)

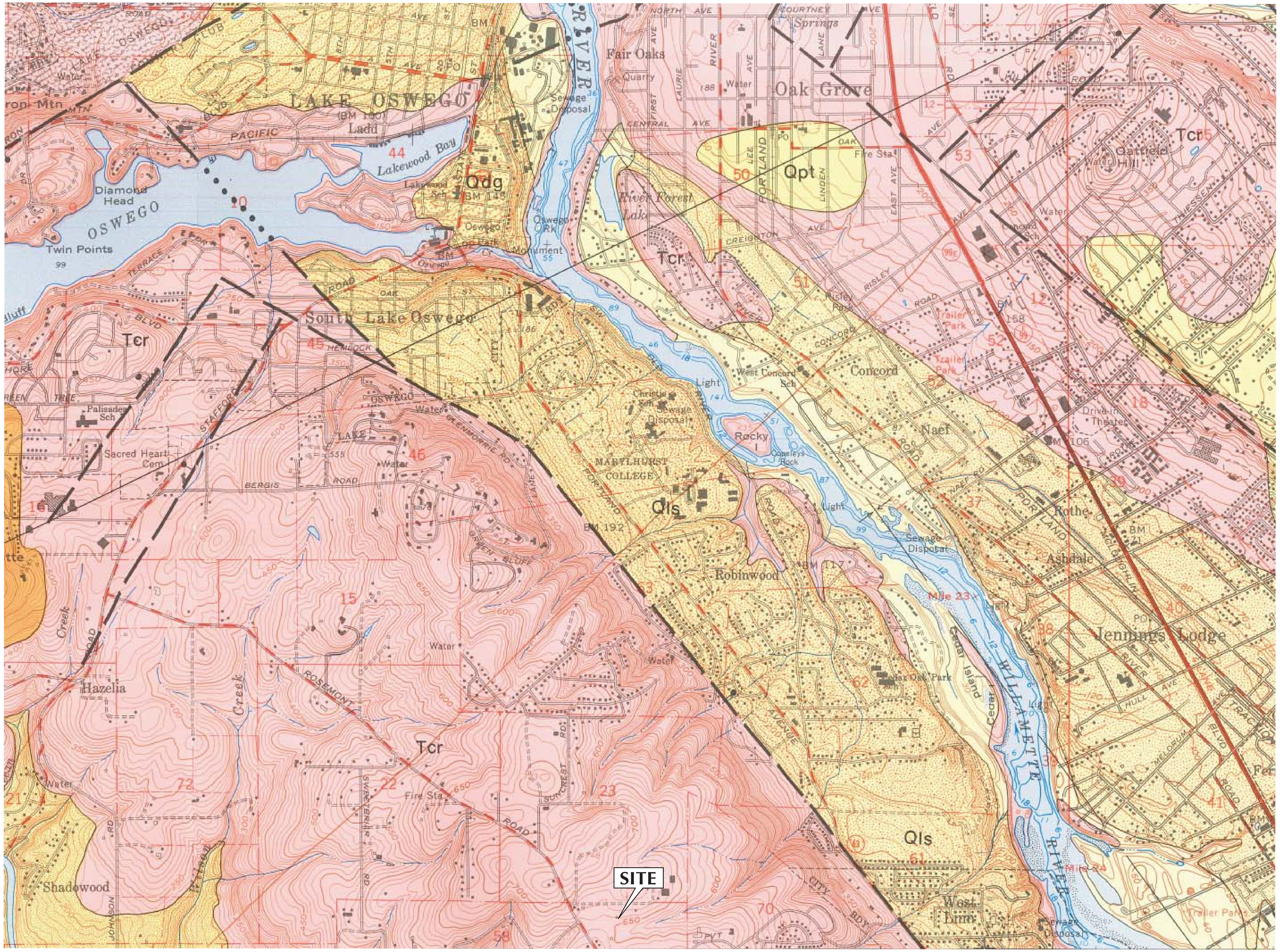


B) EAST-WEST CROSS-SECTION THROUGH WESTERN OREGON AT THE LATITUDE OF PORTLAND, SHOWING THE SEISMIC SOURCES CONSIDERED IN THE SITE-SPECIFIC SEISMIC HAZARD STUDY (MODIFIED FROM GEOMATRIX, 1995)

GRI

TECTONIC SETTING SUMMARY

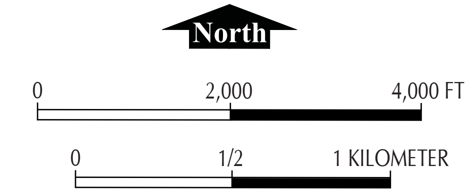
JAN. 2016 JOB NO. 5794 FIG. 1B



GEOLOGIC UNITS

Tcr	**Columbia River Basalt Group:** *Miocene flood basalt; composed of gray to black, dense, fine-grained, low-olivine basalt; locally porphyritic; locally deeply weathered and laterized; saprolite developed on some interbeds occurring between basalt flows; thick saprolite on Vantage horizon is responsible for major landslides; maximum thickness of basalt in map area is about 975 ft. Unit is extensive in western part of map area. Hazards include high potential for deep bedrock slides in dipping saprolitic interbeds and potential for rockfall in areas of nearly vertical exposures. Other engineering features include high foundation strength, good construction-rock source, and abundant ground water where structure is favorable*

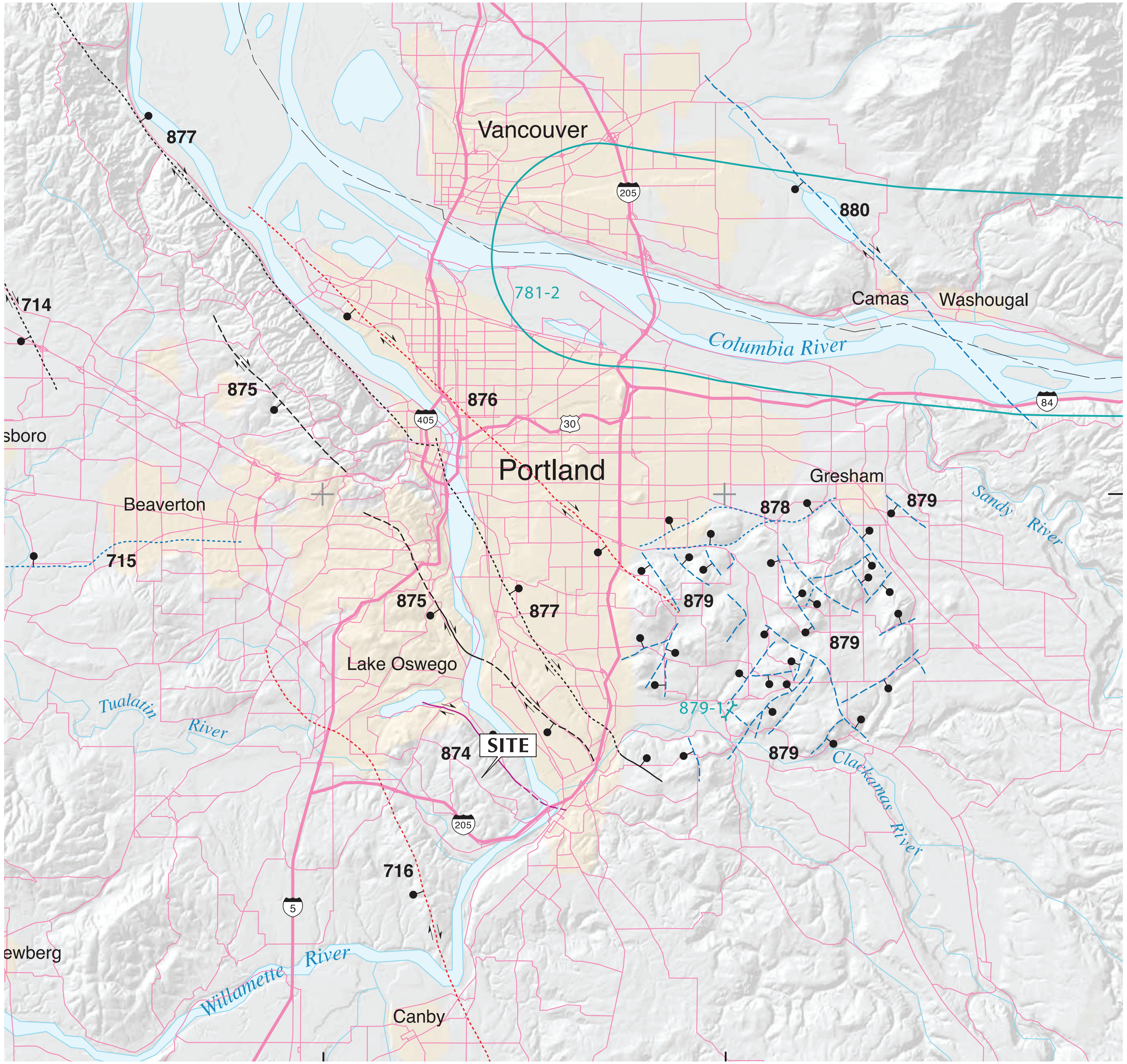
GEOLOGIC MAP BY: HERBERT G. SCHLICKER AND CHRISTOPHER T. FINLAYSON



GRI

LOCAL GEOLOGIC MAP

JAN. 2016 JOB NO. 5794 FIG. 2B



MAP EXPLANATION

TIME OF MOST RECENT SURFACE RUPTURE

- Holocene (<10,000 years) or post last glaciation (<15,000 years; 15 ka); no historic ruptures in Oregon to date
- Late Quaternary (<130,000; post penultimate glaciation)
- Late and middle Quaternary (<750,000 years; 750 ka)
- Quaternary, undifferentiated (<1,600,000 years; <1.6 Ma)
- Class B structure (age or origin uncertain)

SLIP RATE

- >5 mm/year
- 1.0-5.0 mm/year
- 0.2-1.0 mm/year
- <0.2 mm/year

TRACE

- Mostly continuous at map scale
- Mostly discontinuous at map scale
- Inferred or concealed

STRUCTURE TYPE AND RELATED FEATURES

- Normal or high-angle reverse fault
- Strike-slip fault
- Thrust fault
- Anticlinal fold
- Synclinal fold
- Monoclinal fold
- Plunge direction of fold
- Fault section marker

DETAILED STUDY SITES

- 731-2 Trench site
- 781-2 Subduction zone study site

CULTURAL AND GEOGRAPHIC FEATURES

- Divided highway
- Primary or secondary road
- Permanent river or stream
- Intermittent river or stream
- Permanent or intermittent lake

FAULT NUMBER	NAME OF STRUCTURE
716	CANBY-MOLLALA FAULT
874	BOLTON FAULT
875	OATFIELD FAULT
876	EAST BANK FAULT
877	PORTLAND HILLS FAULT
878	GRANT BUTTE
879	DAMASCUS-TICKLE CREEK FAULT ZONE

FROM: PERSONIUS, S.F., AND OTHERS, 2003, MAP OF QUATERNARY FAULTS AND FOLDS IN OREGON, USGS OPEN FILE REPORT OFR-03-095.

North

0 5 10 MILES

0 5 10 KILOMETERS

GRI

LOCAL FAULT MAP

JAN. 2016 JOB NO. 5794 FIG. 3B

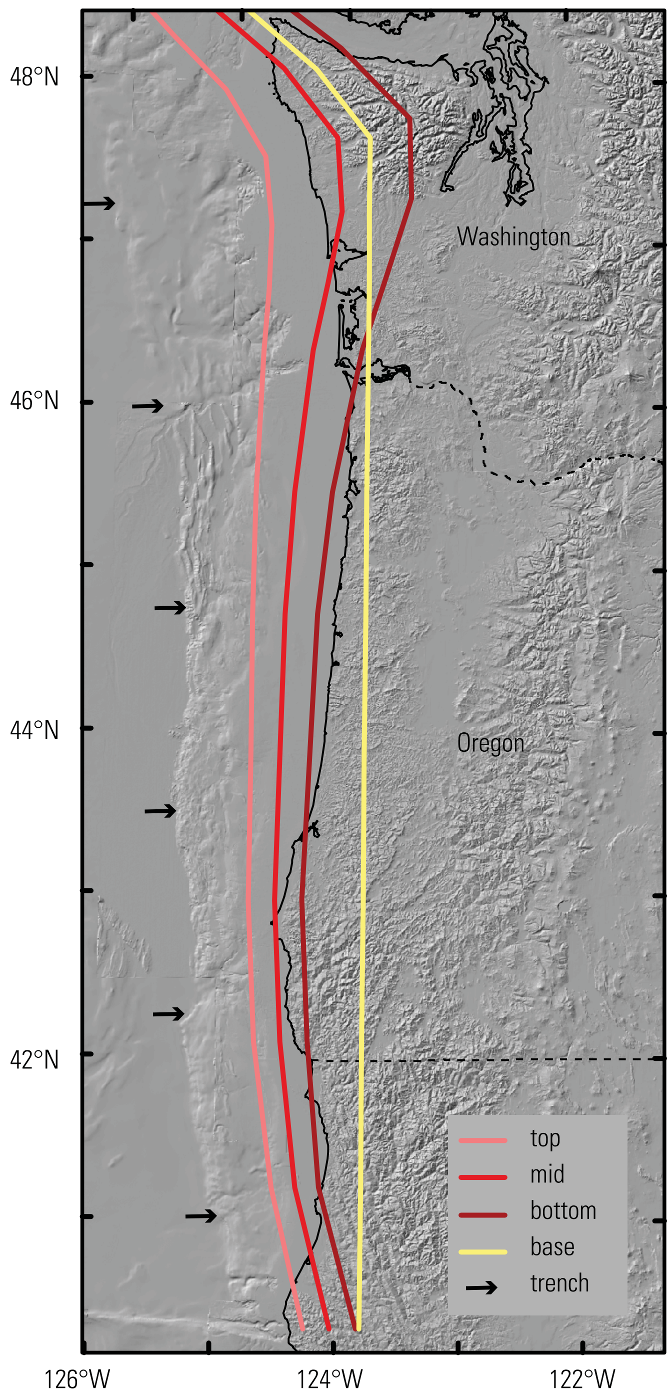


FIGURE 21. LOCATION OF THE EASTERN EDGE OF EARTHQUAKE RUPTURE ZONES ON THE CASCADIA SUBDUCTION ZONE FOR THE VARIOUS MODELS USED IN THIS STUDY RELATIVE TO THE SURFICIAL EXPRESSION OF THE TRENCH: TOP, BASE OF THE ELASTIC ZONE; MID, MIDPOINT OF THE TRANSITION ZONE; BOTTOM, BASE OF THE TRANSITION ZONES; BASE, BASE OF THE MODEL THAT ASSUMES RUPTURES EXTEND TO ABOUT 30-KILOMETERS DEPTH. FIGURE PROVIDED BY RAY WELDON.

FROM: PETERSEN, MD, FRANKEL, AD, HARMSEN, SC, AND OTHERS, 2008, DOCUMENTATION FOR THE 2008 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: US GEOLOGICAL SURVEY, OPEN FILE REPORT 2008-1128

GRI

ASSUMED RUPTURE LOCATIONS
(CASCADIA SUBDUCTION ZONE)

JAN. 2016 JOB NO. 5794 FIG. 4B

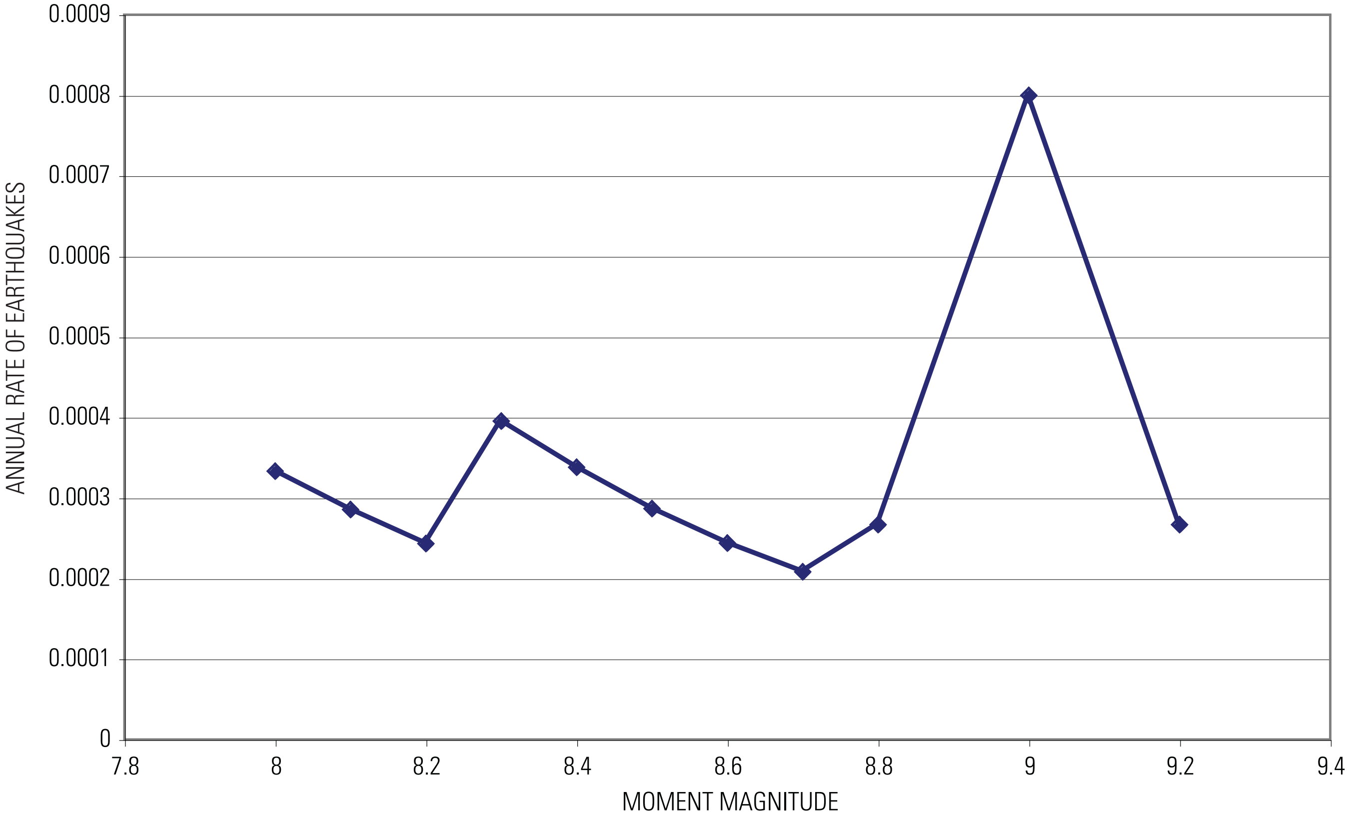


Figure 22. Magnitude-frequency distribution of the Cascadia subduction zone.

FROM: PETERSEN, M, FRANKEL, A, HARMSEN, S, AND OTHERS, 2008, DOCUMENTATION FOR THE 2008 UPDATE OF THE UNITED STATES NATIONAL SEISMIC HAZARD MAPS: US GEOLOGICAL SURVEY, OPEN FILE REPORT 2008-1128

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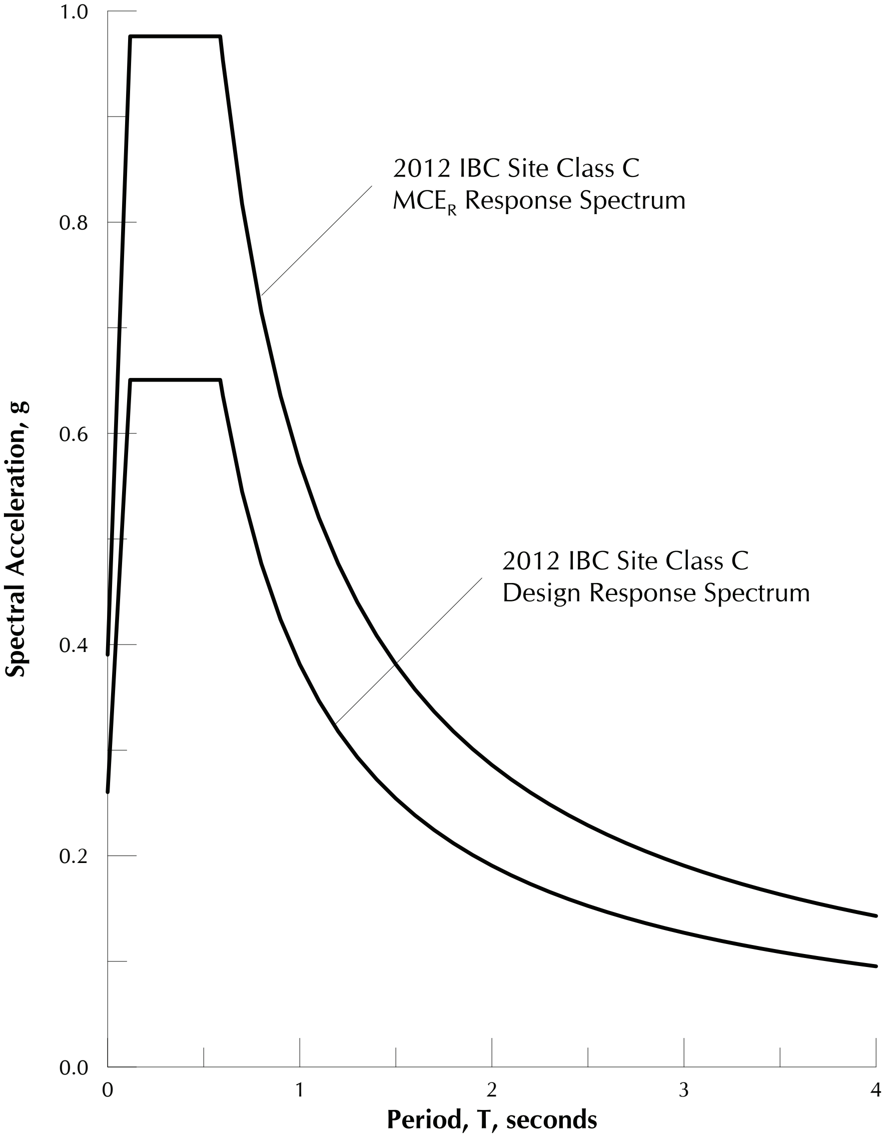
ASSUMED
MAGNITUDE-FREQUENCY DISTRIBUTION
(CASCADIA SUBDUCTION ZONE)

JAN. 2016 JOB NO. 5794 FIG. 5B



GRI

RECOMMENDED RESPONSE SPECTRA

(5% DAMPING)

JAN. 2016 JOB NO. 5794 FIG. 6B

Section 4

Attachment G: Lighting Cut Sheets

D-Series Size 1

LED Area Luminaire

Catalog Number

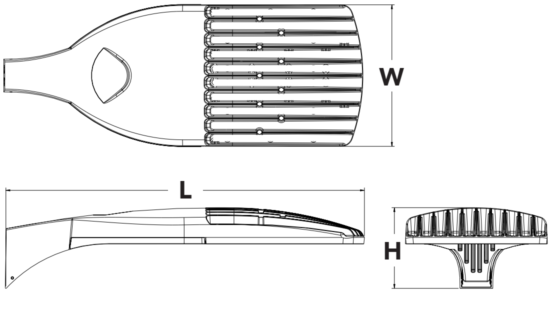
Notes

Type **TYPE SA**

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

EPA:	1.01 ft^2 (0.09 m^2)
Length:	33" (83.8 cm)
Width:	13" (33.0 cm)
Height:	7-1/2" (19.0 cm)
Weight (max):	27 lbs (12.2 kg)



Introduction

The modern styling of the D-Series is striking yet unobtrusive - making a bold, progressive statement even as it blends seamlessly with its environment.

The D-Series distills the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire. The outstanding photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. It is ideal for replacing up to 750W metal halide in pedestrian and area lighting applications with typical energy savings of 65% and expected service life of over 100,000 hours.

Ordering Information

EXAMPLE: DSX1 LED 60C 1000 40K T3M MVOLT SPA DDBXD

DSX1LED

Series	LEDs		Drive current		Color temperature		Distribution				Voltage	Mounting	
DSX1 LED	**Forward optics**		530	530 mA	30K	3000 K	T1S	Type I short	T5S	Type V short	MVOLT[5]	**Shipped included**	
	30C	30 LEDs (one engine)	700	700 mA	40K	4000 K	T2S	Type II short	T5M	Type V medium	120[5]	SPA	Square pole mounting
	40C	40 LEDs (two engines)	1000	1000 mA (1 A)[2]	50K	5000 K	T2M	Type II medium	T5W	Type V wide	208[5]	RPA	Round pole mounting
	60C	60 LEDs (two engines)			AMBPC	Amber phosphor converted[3]	T3S	Type III short	BLC	Backlight control[2,4]	240[5]	WBA	Wall bracket
	Rotated optics[1]						T3M	Type III medium			277[5]	SPUMBA	Square pole universal mounting adaptor[7]
	60C	60 LEDs (two engines)					T4M	Type IV medium	LCCO	Left corner cutoff[2,4]	347[6]	RPUMBA	Round pole universal mounting adaptor[7]
							TFTM	Forward throw medium	RCCO	Right corner cutoff[2,4]	480[6]	**Shipped separately**	
							T5VS	Type V very short				KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish)[8]

Control options			
Shipped installed		PIRH1FC3V	Bi-level, motion/ambient sensor, 15–30' mounting height, ambient sensor enabled at 1fc[15]
PER	NEMA twist-lock receptacle only (no controls)[9]	BL30	Bi-level switched dimming, 30%[14,16]
PER5	Five-wire receptacle only (no controls)[9,10]	BL50	Bi-level switched dimming, 50%[14,16]
PER7	Seven-wire receptacle only (no controls)[9,10]	PNMTDD3	Part night, dim till dawn[17]
DMG	0-10V dimming driver (no controls)[11]	PNMT5D3	Part night, dim 5 hrs[17]
DCR	Dimmable and controllable via ROAM® (no controls)[12]	PNMT6D3	Part night, dim 6 hrs[17]
DS	Dual switching[13,14]	PNMT7D3	Part night, dim 7 hrs[17]
PIR	Bi-level, motion/ambient sensor, 8–15' mounting height, ambient sensor enabled at 5fc[15]	FAO	Field adjustable output[18]
PIRH	Bi-level, motion/ambient sensor, 15–30' mounting height, ambient sensor enabled at 5fc[15]		
PIR1FC3V	Bi-level, motion/ambient sensor, 8–15' mounting height, ambient sensor enabled at 1fc[15]		

Other options		Finish *(required)*	
Shipped installed		DDBXD	Dark bronze
HS	House-side shield[19]	DBLXD	Black
WTB	Utility terminal block[20]	DNAXD	Natural aluminum
SF	Single fuse (120, 277, 347V)[21]	DWHXD	White
DF	Double fuse (208, 240, 480V)[21]	DDBTXD	Textured dark bronze
L90	Left rotated optics[22]	DBLBXD	Textured black
R90	Right rotated optics[22]	DNATXD	Textured natural aluminum
BS	Bird spikes[23]	DWHGXD	Textured white

Accessories

Ordered and shipped separately.

Controls & Shields

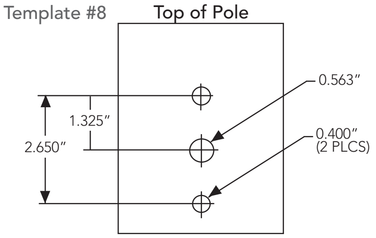
DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V)[24]
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V)[24]
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V)[24]
DSHORT SBK U	Shorting cap[24]
DSX1HS 30C U	House-side shield for 30 LED unit[19]
DSX1HS 40C U	House-side shield for 40 LED unit[19]
DSX1HS 60C U	House-side shield for 60 LED unit[19]
PUMBA DDBXD U*	Square and round pole universal mounting bracket (specify finish)[25]
KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish)[8]
DSX1BS U	Bird spikes

For more control options, visit DTL and ROAM online.

NOTES

1 Rotated optics available with 60C only.
2 Not available AMBPC.
3 Only available with 530mA or 700mA.
4 Not available with HS.
5 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120V, 208V, 240V or 277V options only when ordering with fusing (SF, DF options).
6 Not available with single board, 530mA product (30C 530 or 60C 530 DS). Not available with BL30, BL50 or PNMT options.
7 Existing drilled pole only. Available as a separate combination accessory; for retrofit use only: PUMBA (finish) U; 1.5 G vibration load rating per ANCI C136.31.
8 Must order fixture with SPA option. Must be ordered as a separate accessory; see Accessories information. For use with 2-3/8" mast arm (not included).
9 Photocell ordered and shipped as a separate line item from Acuity Brands Controls. See accessories. Not available with DS option.
10 If ROAM® node required, it must be ordered and shipped as a separate line item from Acuity Brands Controls. Not available with DCR. Node with integral dimming.
11 DMG option for 347V or 480V requires 1000mA.
12 Specifies a ROAM® enabled luminaire with 0-10V dimming capability; PER option required. Additional hardware and services required for ROAM® deployment; must be purchased separately. Call 1-800-442-6745 or email: sales@roamservices.net. N/A with PIR options, DS, PER5, PER7, BL30, BL50 or PNMT options. Node without integral dimming.
13 Requires 40C or 60C. Provides 50/50 luminaire operation via two independent drivers on two separate circuits. N/A with PER, DCR, WTB, PIR or PIRH.
14 Requires an additional switched circuit.
15 PIR and PIR1FC3V specify the SensorSwitch SBGR-10-ODP control; PIRH and PIRH1FC3V specify the SensorSwitch SBGR-6-ODP control; see Outdoor Control Technical Guide for details. Dimming driver standard. Not available with PER5 or PER7. Ambient sensor disabled when ordered with DCR. Separate on/off required.
16 Dimming driver standard. MVOLT only. Not available with 347V, 480V, DCR, DS, PER5, PER7 or PNMT options. Not available with PIR1FC3V or PIRH1FC3V.
17 Dimming driver standard. MVOLT only. Not available with 347V, 480V, DCR, DS, PER5, PER7, BL30 or BL50. Not available with PIR1FC3V or PIRH1FC3V. Separate on/off required.
18 Dimming driver standard. Not available with PER5, PER7, DMG, DCR, DS, BL30, BL50 or PNMT, PIR, PIRH, PIR1FC3V or PIRH1FC3V.
19 Not available with BLC, LCCO and RCCO distribution. Also available as a separate accessory; see Accessories information.
20 WTB not available with DS.
21 Single fuse (SF) requires 120V, 277V or 347V. Double fuse (DF) requires 208V, 240V or 480V.
22 Available with 60 LEDs (60C option) only.
23 Also available as a separate accessory; see accessories information.
24 Requires luminaire to be specified with PER option. Ordered and shipped as a separate line item from Acuity Brands Controls.
25 For retrofit use only.

Drilling



DSX1 shares a unique drilling pattern with the AERIS™ family. Specify this drilling pattern when specifying poles, per the table below.

DM19AS	Single unit	**DM29AS**	2 at 90° *
DM28AS	2 at 180°	**DM39AS**	3 at 90° *
DM49AS	4 at 90° *	**DM32AS**	3 at 120° **

Example: SSA 20 4C **DM19AS** DDBXD

Visit Lithonia Lighting's POLES CENTRAL to see our wide selection of poles, accessories and educational tools.

**Round pole top must be 3.25" O.D. minimum.*

***For round pole mounting (RPA) only.*

Tenon Mounting Slipfitter **

Tenon O.D.	Single Unit	2 at 180°	2 at 90°	3 at 120°	3 at 90°	4 at 90°
2-3/8"	AST20-190	AST20-280	AST20-290	AST20-320	AST20-390	AST20-490
2-7/8"	AST25-190	AST25-280	AST25-290	AST25-320	AST25-390	AST25-490
4"	AST35-190	AST35-280	AST35-290	AST35-320	AST35-390	AST35-490

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's D-Series Area Size 1 homepage.

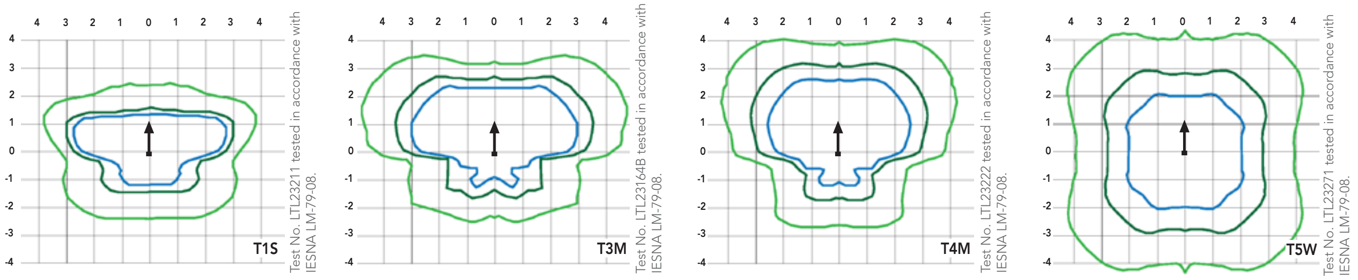
Isofootcandle plots for the DSX1 LED 60C 1000 40K. Distances are in units of mounting height (20').

LEGEND

🟩 0.1 fc

🟩 0.5 fc

🟦 1.0 fc



Performance Data

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	**77°F**	**1.00**
30°C	86°F	1.00
40°C	104°F	0.99

Electrical Load

			Current (A)					
Number of LEDs	Drive Current (mA)	System Watts	120	208	240	277	347	480
30	530	52	0.52	0.30	0.26	0.23	--	--
	700	68	0.68	0.39	0.34	0.30	0.24	0.17
	1000	105	1.03	0.59	0.51	0.45	0.36	0.26
40	530	68	0.67	0.39	0.34	0.29	0.23	0.17
	700	89	0.89	0.51	0.44	0.38	0.31	0.22
	1000	138	1.35	0.78	0.67	0.58	0.47	0.34
60	530	99	0.97	0.56	0.48	0.42	0.34	0.24
	700	131	1.29	0.74	0.65	0.56	0.45	0.32
	1000	209	1.98	1.14	0.99	0.86	0.69	0.50

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	DSX1 LED 60C 1000			
	1.0	0.98	0.96	0.91
	DSX1 LED 60C 700			
	1.0	0.99	0.99	0.99

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
30C (30 LEDs)	530 mA	52 W	T1S	5,948	1	0	1	114	6,387	1	0	1	123	6,427	1	0	1	124	3,640	1	0	1	70
			T2S	6,132	1	0	1	118	6,585	2	0	2	127	6,626	2	0	2	127	3,813	1	0	1	73
			T2M	5,992	1	0	2	115	6,434	1	0	2	124	6,475	1	0	2	125	3,689	1	0	1	71
			T3S	5,985	1	0	1	115	6,427	1	0	2	124	6,467	1	0	2	124	3,770	1	0	1	73
			T3M	6,039	1	0	2	116	6,485	1	0	2	125	6,525	1	0	2	125	3,752	1	0	1	72
			T4M	6,121	1	0	2	118	6,573	1	0	2	126	6,614	1	0	2	127	3,758	1	0	1	72
			TFTM	6,030	1	0	2	116	6,475	1	0	2	125	6,515	1	0	2	125	3,701	1	0	1	71
			T5VS	6,370	2	0	0	123	6,840	2	0	0	132	6,883	2	0	0	132	3,928	2	0	0	76
			T5S	6,417	2	0	0	123	6,890	2	0	0	133	6,933	2	0	0	133	3,881	2	0	0	75
			T5M	6,428	3	0	1	124	6,902	3	0	1	133	6,945	3	0	1	134	3,930	2	0	1	76
			T5W	6,334	3	0	1	122	6,801	3	0	1	131	6,844	3	0	1	132	3,820	3	0	1	73
			BLC	4,735	1	0	1	91	5,085	1	0	2	98	5,116	1	0	1	98					
			LCCO	4,600	1	0	2	88	4,940	1	0	2	95	4,971	1	0	2	96					
			RCCO	4,600	1	0	2	88	4,940	1	0	2	95	4,971	1	0	2	96					
	700 mA	68 W	T1S	7,554	1	0	1	111	8,112	2	0	2	119	8,163	2	0	2	120	4,561	1	0	1	67
			T2S	7,789	2	0	2	115	8,364	2	0	2	123	8,416	2	0	2	124	4,777	1	0	1	70
			T2M	7,610	1	0	2	112	8,172	2	0	2	120	8,223	2	0	2	121	4,622	1	0	2	68
			T3S	7,601	1	0	2	112	8,162	2	0	2	120	8,213	2	0	2	121	4,724	1	0	1	69
			T3M	7,670	1	0	2	113	8,236	2	0	2	121	8,288	2	0	2	122	4,701	1	0	2	69
			T4M	7,774	1	0	2	114	8,348	2	0	2	123	8,400	2	0	2	124	4,709	1	0	2	69
			TFTM	7,658	1	0	2	113	8,223	1	0	2	121	8,275	1	0	2	122	4,638	1	0	2	68
			T5VS	8,090	2	0	0	119	8,687	3	0	1	128	8,742	3	0	1	129	4,922	2	0	0	72
			T5S	8,150	2	0	0	120	8,751	3	0	0	129	8,806	3	0	0	130	4,863	2	0	0	72
			T5M	8,164	3	0	1	120	8,767	3	0	2	129	8,821	3	0	2	130	4,924	3	0	1	72
			T5W	8,044	3	0	1	118	8,638	3	0	2	127	8,692	3	0	2	128	4,787	3	0	1	70
			BLC	6,028	1	0	2	89	6,473	1	0	2	95	6,514	1	0	2	96					
			LCCO	5,856	1	0	2	86	6,289	1	0	2	92	6,328	1	0	2	93					
			RCCO	5,856	1	0	2	86	6,289	1	0	2	92	6,328	1	0	2	93					
	1000 mA	105 W	T1S	10,331	2	0	2	98	11,094	2	0	2	106	11,163	2	0	2	106					
			T2S	10,652	2	0	2	101	11,438	2	0	2	109	11,510	2	0	2	110					
			T2M	10,408	2	0	2	99	11,176	2	0	3	106	11,246	2	0	3	107					
			T3S	10,395	2	0	2	99	11,163	2	0	2	106	11,233	2	0	2	107					
			T3M	10,490	2	0	2	100	11,264	2	0	2	107	11,335	2	0	2	108					
			T4M	10,632	2	0	2	101	11,417	2	0	2	109	11,488	2	0	2	109					
			TFTM	10,473	2	0	2	100	11,247	2	0	3	107	11,317	2	0	3	108					
			T5VS	11,064	3	0	1	105	11,881	3	0	1	113	11,955	3	0	1	114					
			T5S	11,145	3	0	1	106	11,968	3	0	1	114	12,043	3	0	1	115					
			T5M	11,165	3	0	2	106	11,989	4	0	2	114	12,064	4	0	2	115					
			T5W	11,001	3	0	2	105	11,813	4	0	2	113	11,887	4	0	2	113					
			BLC	7,960	1	0	2	76	8,548	1	0	2	81	8,601	1	0	2	82					
			LCCO	7,734	1	0	2	74	8,305	1	0	2	79	8,357	1	0	2	80					
			RCCO	7,734	1	0	2	74	8,305	1	0	2	79	8,357	1	0	2	80					

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
40C (40 LEDs)	530 mA	68 W	T1S	7,861	1	0	1	116	8,441	2	0	2	124	8,494	2	0	2	125	4,794	1	0	1	71
			T2S	8,105	2	0	2	119	8,704	2	0	2	128	8,758	2	0	2	129	5,021	1	0	1	74
			T2M	7,920	2	0	2	116	8,504	2	0	2	125	8,557	2	0	2	126	4,858	1	0	2	71
			T3S	7,910	1	0	2	116	8,494	2	0	2	125	8,547	2	0	2	126	4,966	1	0	1	73
			T3M	7,982	2	0	2	117	8,571	2	0	2	126	8,625	2	0	2	127	4,941	1	0	2	73
			T4M	8,090	1	0	2	119	8,687	2	0	2	128	8,741	2	0	2	129	4,950	1	0	2	73
			TFTM	7,969	1	0	2	117	8,558	2	0	2	126	8,611	2	0	2	127	4,875	1	0	2	72
			T5VS	8,419	2	0	0	124	9,040	3	0	1	133	9,097	3	0	1	134	5,174	2	0	0	76
			T5S	8,481	2	0	0	125	9,107	3	0	1	134	9,164	3	0	1	135	5,111	2	0	0	75
			T5M	8,496	3	0	1	125	9,123	3	0	2	134	9,180	3	0	2	135	5,175	3	0	1	76
			T5W	8,371	3	0	2	123	8,989	3	0	2	132	9,045	3	0	2	133	5,031	3	0	1	74
			BLC	6,255	1	0	2	92	6,717	1	0	2	99	6,759	1	0	2	99					
			LCCO	6,077	1	0	2	89	6,526	1	0	2	96	6,566	1	0	2	97					
			RCCO	6,077	1	0	2	89	6,526	1	0	2	96	6,566	1	0	2	97					
	700 mA	91 W	T1S	9,984	2	0	2	112	10,721	2	0	2	120	10,788	2	0	2	121	6,014	1	0	1	68
			T2S	10,294	2	0	2	116	11,054	2	0	2	124	11,123	2	0	2	125	6,299	2	0	2	71
			T2M	10,059	2	0	2	113	10,801	2	0	3	121	10,869	2	0	3	122	6,094	2	0	2	68
			T3S	10,046	2	0	2	113	10,788	2	0	2	121	10,855	2	0	2	122	6,229	1	0	2	70
			T3M	10,137	2	0	2	114	10,886	2	0	2	122	10,954	2	0	2	123	6,198	2	0	2	70
			T4M	10,275	2	0	2	115	11,033	2	0	2	124	11,102	2	0	2	125	6,209	1	0	2	70
			TFTM	10,122	2	0	2	114	10,869	2	0	2	122	10,937	2	0	2	123	6,115	1	0	2	69
			T5VS	10,693	3	0	1	120	11,482	3	0	1	129	11,554	3	0	1	130	6,490	2	0	0	73
			T5S	10,771	3	0	1	121	11,566	3	0	1	130	11,639	3	0	1	131	6,411	2	0	0	72
			T5M	10,790	3	0	2	121	11,587	4	0	2	130	11,659	4	0	2	131	6,492	3	0	1	73
			T5W	10,632	3	0	2	119	11,417	4	0	2	128	11,488	4	0	2	129	6,311	3	0	2	71
			BLC	7,963	1	0	2	89	8,551	1	0	2	96	8,605	1	0	2	97					
			LCCO	7,736	1	0	2	87	8,308	1	0	2	93	8,359	1	0	2	94					
			RCCO	7,736	1	0	2	87	8,308	1	0	2	93	8,359	1	0	2	94					
	1000 mA	138 W	T1S	13,655	2	0	2	99	14,663	3	0	3	106	14,754	3	0	3	107					
			T2S	14,079	2	0	2	102	15,118	3	0	3	110	15,212	3	0	3	110					
			T2M	13,756	2	0	3	100	14,772	3	0	3	107	14,864	3	0	3	108					
			T3S	13,739	2	0	2	100	14,754	2	0	2	107	14,846	3	0	3	108					
			T3M	13,864	2	0	2	100	14,888	3	0	3	108	14,981	3	0	3	109					
			T4M	14,052	2	0	2	102	15,090	3	0	3	109	15,184	3	0	3	110					
			TFTM	13,842	2	0	3	100	14,864	2	0	3	108	14,957	2	0	3	108					
			T5VS	14,623	3	0	1	106	15,703	4	0	1	114	15,801	4	0	1	115					
			T5S	14,731	3	0	1	107	15,818	3	0	1	115	15,917	3	0	1	115					
			T5M	14,757	4	0	2	107	15,846	4	0	2	115	15,945	4	0	2	116					
			T5W	14,540	4	0	2	105	15,614	4	0	2	113	15,711	4	0	2	114					
			BLC	10,516	1	0	2	76	11,292	1	0	2	82	11,363	1	0	2	82					
			LCCO	10,216	2	0	3	74	10,971	2	0	3	80	11,039	2	0	3	80					
			RCCO	10,216	2	0	3	74	10,971	2	0	3	80	11,039	2	0	3	80					

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
60C (60 LEDs)	530 mA	99 W	T1S	11,569	2	0	2	117	12,423	2	0	2	125	12,501	2	0	2	126	7,167	2	0	2	72
			T2S	11,928	2	0	2	120	12,809	3	0	3	129	12,889	3	0	3	130	7,507	2	0	2	76
			T2M	11,655	2	0	2	118	12,516	2	0	3	126	12,594	2	0	3	127	7,263	2	0	2	73
			T3S	11,641	2	0	2	118	12,500	2	0	2	126	12,579	2	0	2	127	7,424	2	0	2	75
			T3M	11,747	2	0	2	119	12,614	2	0	2	127	12,693	2	0	2	128	7,387	2	0	2	75
			T4M	11,906	2	0	2	120	12,785	2	0	2	129	12,865	2	0	2	130	7,400	2	0	2	75
			TFTM	11,728	2	0	2	118	12,594	2	0	3	127	12,673	2	0	3	128	7,288	1	0	2	74
			T5VS	12,390	3	0	1	125	13,305	3	0	1	134	13,388	3	0	1	135	7,734	3	0	1	78
			T5S	12,481	3	0	1	126	13,402	3	0	1	135	13,486	3	0	1	136	7,641	3	0	0	77
			T5M	12,503	3	0	2	126	13,426	4	0	2	136	13,510	4	0	2	136	7,737	3	0	2	78
			T5W	12,320	4	0	2	124	13,229	4	0	2	134	13,312	4	0	2	134	7,522	3	0	2	76
			BLC	9,212	1	0	2	93	9,892	1	0	2	100	9,954	1	0	2	101					
			LCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
			RCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
	700 mA	131 W	T1S	14,694	2	0	2	112	15,779	3	0	3	120	15,877	3	0	3	121	8,952	2	0	2	68
			T2S	15,150	3	0	3	116	16,269	3	0	3	124	16,370	3	0	3	125	9,377	2	0	2	72
			T2M	14,803	2	0	3	113	15,896	3	0	3	121	15,995	3	0	3	122	9,072	2	0	2	69
			T3S	14,785	2	0	2	113	15,877	3	0	3	121	15,976	3	0	3	122	9,273	2	0	2	71
			T3M	14,919	2	0	2	114	16,021	3	0	3	122	16,121	3	0	3	123	9,227	2	0	2	70
			T4M	15,122	2	0	2	115	16,238	3	0	3	124	16,340	3	0	3	125	9,243	2	0	2	71
			TFTM	14,896	2	0	3	114	15,996	2	0	3	122	16,096	2	0	3	123	9,103	2	0	2	69
			T5VS	15,736	3	0	1	120	16,898	4	0	1	129	17,004	4	0	1	130	9,661	3	0	1	74
			T5S	15,852	3	0	1	121	17,022	4	0	1	130	17,129	4	0	1	131	9,544	3	0	1	73
			T5M	15,880	4	0	2	121	17,052	4	0	2	130	17,159	4	0	2	131	9,665	3	0	2	74
			T5W	15,647	4	0	2	119	16,802	4	0	2	128	16,907	4	0	2	129	9,395	4	0	2	72
			BLC	11,728	1	0	2	90	12,594	1	0	2	96	12,672	3	0	3	97					
			LCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
			RCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
	1000 mA	209 W	T1S	20,095	3	0	3	96	21,579	3	0	3	103	21,714	3	0	3	104					
			T2S	20,720	3	0	3	99	22,249	3	0	3	106	22,388	3	0	3	107					
			T2M	20,245	3	0	3	97	21,740	3	0	3	104	21,876	3	0	3	105					
			T3S	20,220	3	0	3	97	21,713	3	0	3	104	21,849	3	0	3	105					
			T3M	20,404	3	0	3	98	21,910	3	0	4	105	22,047	3	0	4	105					
			T4M	20,681	3	0	3	99	22,207	3	0	4	106	22,346	3	0	4	107					
			TFTM	20,372	3	0	3	97	21,876	3	0	4	105	22,013	3	0	4	105					
			T5VS	21,521	4	0	1	103	23,110	4	0	1	111	23,254	4	0	1	111					
			T5S	21,679	4	0	1	104	23,280	4	0	1	111	23,425	4	0	1	112					
			T5M	21,717	4	0	2	104	23,321	5	0	3	112	23,466	5	0	3	112					
			T5W	21,399	4	0	3	102	22,979	5	0	3	110	23,122	5	0	3	111					
			BLC	15,487	2	0	2	74	16,630	2	0	2	80	16,734	2	0	3	80					
			LCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					
			RCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

L90 and R90 Rotated Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
60C (60 LEDs)	530 mA	99 W	T1S	11,569	2	0	2	117	12,423	2	0	2	125	12,501	2	0	2	126	7,167	2	0	2	72
			T2S	11,928	2	0	2	120	12,809	3	0	3	129	12,889	3	0	3	130	7,507	2	0	2	76
			T2M	11,655	2	0	2	118	12,516	2	0	3	126	12,594	2	0	3	127	7,263	2	0	2	73
			T3S	11,641	2	0	2	118	12,500	2	0	2	126	12,579	2	0	2	127	7,424	2	0	2	75
			T3M	11,747	2	0	2	119	12,614	2	0	2	127	12,693	2	0	2	128	7,387	2	0	2	75
			T4M	11,906	2	0	2	120	12,785	2	0	2	129	12,865	2	0	2	130	7,400	2	0	2	75
			TFTM	11,728	2	0	2	118	12,594	2	0	3	127	12,673	2	0	3	128	7,288	1	0	2	74
			T5VS	12,390	3	0	1	125	13,305	3	0	1	134	13,388	3	0	1	135	7,734	3	0	1	78
			T5S	12,481	3	0	1	126	13,402	3	0	1	135	13,486	3	0	1	136	7,641	3	0	0	77
			T5M	12,503	3	0	2	126	13,426	4	0	2	136	13,510	4	0	2	136	7,737	3	0	2	78
			T5W	12,320	4	0	2	124	13,229	4	0	2	134	13,312	4	0	2	134	7,522	3	0	2	76
			BLC	9,212	1	0	2	93	9,892	1	0	2	100	9,954	1	0	2	101					
			LCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
			RCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
	700 mA	131 W	T1S	14,694	2	0	2	112	15,779	3	0	3	120	15,877	3	0	3	121	8,952	2	0	2	68
			T2S	15,150	3	0	3	116	16,269	3	0	3	124	16,370	3	0	3	125	9,377	2	0	2	72
			T2M	14,803	2	0	3	113	15,896	3	0	3	121	15,995	3	0	3	122	9,072	2	0	2	69
			T3S	14,785	2	0	2	113	15,877	3	0	3	121	15,976	3	0	3	122	9,273	2	0	2	71
			T3M	14,919	2	0	2	114	16,021	3	0	3	122	16,121	3	0	3	123	9,227	2	0	2	70
			T4M	15,122	2	0	2	115	16,238	3	0	3	124	16,340	3	0	3	125	9,243	2	0	2	71
			TFTM	14,896	2	0	3	114	15,996	2	0	3	122	16,096	2	0	3	123	9,103	2	0	2	69
			T5VS	15,736	3	0	1	120	16,898	4	0	1	129	17,004	4	0	1	130	9,661	3	0	1	74
			T5S	15,852	3	0	1	121	17,022	4	0	1	130	17,129	4	0	1	131	9,544	3	0	1	73
			T5M	15,880	4	0	2	121	17,052	4	0	2	130	17,159	4	0	2	131	9,665	3	0	2	74
			T5W	15,647	4	0	2	119	16,802	4	0	2	128	16,907	4	0	2	129	9,395	4	0	2	72
			BLC	11,728	1	0	2	90	12,594	1	0	2	96	12,672	3	0	3	97					
			LCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
			RCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
	1000 mA	209 W	T1S	20,095	3	0	3	96	21,579	3	0	3	103	21,714	3	0	3	104					
			T2S	20,720	3	0	3	99	22,249	3	0	3	106	22,388	3	0	3	107					
			T2M	20,245	3	0	3	97	21,740	3	0	3	104	21,876	3	0	3	105					
			T3S	20,220	3	0	3	97	21,713	3	0	3	104	21,849	3	0	3	105					
			T3M	20,404	3	0	3	98	21,910	3	0	4	105	22,047	3	0	4	105					
			T4M	20,681	3	0	3	99	22,207	3	0	4	106	22,346	3	0	4	107					
			TFTM	20,372	3	0	3	97	21,876	3	0	4	105	22,013	3	0	4	105					
			T5VS	21,521	4	0	1	103	23,110	4	0	1	111	23,254	4	0	1	111					
			T5S	21,679	4	0	1	104	23,280	4	0	1	111	23,425	4	0	1	112					
			T5M	21,717	4	0	2	104	23,321	5	0	3	112	23,466	5	0	3	112					
			T5W	21,399	4	0	3	102	22,979	5	0	3	110	23,122	5	0	3	111					
			BLC	15,487	2	0	2	74	16,630	2	0	2	80	16,734	2	0	3	80					
			LCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					
			RCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					

FEATURES & SPECIFICATIONS

INTENDED USE

The sleek design of the D-Series Size 1 reflects the embedded high performance LED technology. It is ideal for many commercial and municipal applications, such as parking lots, plazas, campuses, and streetscapes.

CONSTRUCTION

Single-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance and future light engine upgrades. The LED drivers are mounted in direct contact with the casting to promote low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP65). Low EPA (1.01 ft²) for optimized pole wind loading.

FINISH

Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in both textured and non-textured finishes.

OPTICS

Precision-molded proprietary acrylic lenses are engineered for superior area lighting distribution, uniformity, and pole spacing. Light engines are available in standard 3000 K, 4000 K and 5000 K (70 CRI) or optional 3000 K (70 minimum CRI) or 5000 K (70 CRI) configurations. The D-Series Size 1 has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

ELECTRICAL

Light engine configurations consist of 30, 40 or 60 high-efficacy LEDs mounted to metal-core circuit boards to maximize heat dissipation and promote long life (up to L99/100,000 hours at 25°C). Class 1 electronic drivers are designed to have a power factor >90%, THD <20%, and an expected life of 100,000 hours with <1% failure rate. Easily serviceable 10kV or 6kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).

INSTALLATION

Included mounting block and integral arm facilitate quick and easy installation. Stainless steel bolts fasten the mounting block securely to poles and walls, enabling the D-Series Size 1 to withstand up to a 3.0 G vibration load rating per ANSI C136.31. The D-Series Size 1 utilizes the AERIS™ series pole drilling pattern (template #8). Optional terminal block, tool-less entry, and NEMA photocontrol receptacle are also available.

LISTINGS

UL Listed for wet locations. Light engines are IP66 rated; luminaire is IP65 rated. Rated for -40°C minimum ambient. U.S. Patent No. D672,492 S. International patent pending.

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

WARRANTY

5-year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

D-Series Size 1

LED Area Luminaire

DLC QPL LISTED NIGHTTIME FRIENDLY LED lighting facts LED Product Partner

Catalog Number

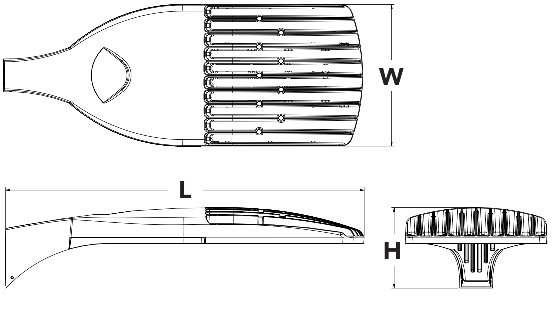
Notes

Type **TYPE SB**

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

EPA:	1.01 ft^2 (0.09 m^2)
Length:	33” (83.8 cm)
Width:	13” (33.0 cm)
Height:	7-1/2” (19.0 cm)
Weight (max):	27 lbs (12.2 kg)



Introduction

The modern styling of the D-Series is striking yet unobtrusive - making a bold, progressive statement even as it blends seamlessly with its environment.

The D-Series distills the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire. The outstanding photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. It is ideal for replacing up to 750W metal halide in pedestrian and area lighting applications with typical energy savings of 65% and expected service life of over 100,000 hours.

Ordering Information

EXAMPLE: DSX1 LED 60C 1000 40K T3M MVOLT SPA DDBXD

DSX1LED						
Series	**LEDs**	**Drive current**	**Color temperature**	**Distribution**	**Voltage**	**Mounting**
DSX1 LED	**Forward optics** 30C 30 LEDs (one engine) 40C 40 LEDs (two engines) 60C 60 LEDs (two engines) **Rotated optics**[1] 60C 60 LEDs (two engines)	530 530 mA 700 700 mA 1000 1000 mA (1 A)[2]	30K 3000 K 40K 4000 K 50K 5000 K AMBPC Amber phosphor converted[3]	T1S Type I short T2S Type II short T2M Type II medium T3S Type III short T3M Type III medium T4M Type IV medium TFTM Forward throw medium T5VS Type V very short T5S Type V short T5M Type V medium T5W Type V wide BLC Backlight control[2,4] LCCO Left corner cutoff[2,4] RCCO Right corner cutoff[2,4]	MVOLT[5] 120[5] 208[5] 240[5] 277[5] 347[6] 480[6]	**Shipped included** SPA Square pole mounting RPA Round pole mounting WBA Wall bracket SPUMBA Square pole universal mounting adaptor[7] RPUMBA Round pole universal mounting adaptor[7] **Shipped separately** KMA8 DDBXD U Mast arm mounting bracket adaptor (specify finish)[8]

Control options		**Other options**	**Finish** *(required)*
Shipped installed PER NEMA twist-lock receptacle only (no controls)[9] PER5 Five-wire receptacle only (no controls)[9,10] PER7 Seven-wire receptacle only (no controls)[9,10] DMG 0-10V dimming driver (no controls)[11] DCR Dimmable and controllable via ROAM® (no controls)[12] DS Dual switching[13,14] PIR Bi-level, motion/ambient sensor, 8-15’ mounting height, ambient sensor enabled at 5fc[15] PIRH Bi-level, motion/ambient sensor, 15-30’ mounting height, ambient sensor enabled at 5fc[15] PIR1FC3V Bi-level, motion/ambient sensor, 8-15’ mounting height, ambient sensor enabled at 1fc[15]	PIRH1FC3V Bi-level, motion/ambient sensor, 15-30’ mounting height, ambient sensor enabled at 1fc[15] BL30 Bi-level switched dimming, 30%[14,16] BL50 Bi-level switched dimming, 50%[14,16] PNMTDD3 Part night, dim till dawn[17] PNMT5D3 Part night, dim 5 hrs[17] PNMT6D3 Part night, dim 6 hrs[17] PNMT7D3 Part night, dim 7 hrs[17] FAO Field adjustable output[18]	**Shipped installed** HS House-side shield[19] WTB Utility terminal block[20] SF Single fuse (120, 277, 347V)[21] DF Double fuse (208, 240, 480V)[21] L90 Left rotated optics[22] R90 Right rotated optics[22] BS Bird spikes[23]	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DDBTXD Textured dark bronze DBLBXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white

Accessories

Ordered and shipped separately.

Controls & Shields

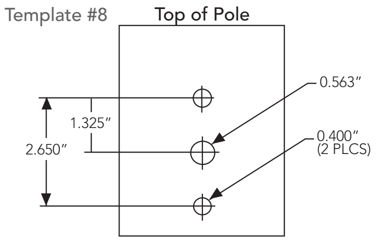
DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V)[24]
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V)[24]
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V)[24]
DSHORT SBK U	Shorting cap[24]
DSX1HS 30C U	House-side shield for 30 LED unit[19]
DSX1HS 40C U	House-side shield for 40 LED unit[19]
DSX1HS 60C U	House-side shield for 60 LED unit[19]
PUMBA DDBXD U*	Square and round pole universal mounting bracket (specify finish)[25]
KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish)[8]
DSX1BS U	Bird spikes

For more control options, visit DTL and ROAM online.

NOTES

1 Rotated optics available with 60C only.
2 Not available AMBPC.
3 Only available with 530mA or 700mA.
4 Not available with HS.
5 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120V, 208V, 240V or 277V options only when ordering with fusing (SF, DF options).
6 Not available with single board, 530mA product (30C 530 or 60C 530 DS). Not available with BL30, BL50 or PNMT options.
7 Existing drilled pole only. Available as a separate combination accessory; for retrofit use only: PUMBA (finish) U; 1.5 G vibration load rating per ANCI C136.31.
8 Must order fixture with SPA option. Must be ordered as a separate accessory; see Accessories information. For use with 2-3/8” mast arm (not included).
9 Photocell ordered and shipped as a separate line item from Acuity Brands Controls. See accessories. Not available with DS option.
10 If ROAM® node required, it must be ordered and shipped as a separate line item from Acuity Brands Controls. Not available with DCR. Node with integral dimming.
11 DMG option for 347V or 480V requires 1000mA.
12 Specifies a ROAM® enabled luminaire with 0-10V dimming capability; PER option required. Additional hardware and services required for ROAM® deployment; must be purchased separately. Call 1-800-442-6745 or email: sales@roamservices.net. N/A with PIR options, DS, PER5, PER7, BL30, BL50 or PNMT options. Node without integral dimming.
13 Requires 40C or 60C. Provides 50/50 luminaire operation via two independent drivers on two separate circuits. N/A with PER, DCR, WTB, PIR or PIRH.
14 Requires an additional switched circuit.
15 PIR and PIR1FC3V specify the SensorSwitch SBGR-10-ODP control; PIRH and PIRH1FC3V specify the SensorSwitch SBGR-6-ODP control; see Outdoor Control Technical Guide for details. Dimming driver standard. Not available with PER5 or PER7. Ambient sensor disabled when ordered with DCR. Separate on/off required.
16 Dimming driver standard. MVOLT only. Not available with 347V, 480V, DCR, DS, PER5, PER7 or PNMT options. Not available with PIR1FC3V or PIRH1FC3V.
17 Dimming driver standard. MVOLT only. Not available with 347V, 480V, DCR, DS, PER5, PER7, BL30 or BL50. Not available with PIR1FC3V or PIRH1FC3V. Separate on/off required.
18 Dimming driver standard. Not available with PER5, PER7, DMG, DCR, DS, BL30, BL50 or PNMT, PIR, PIRH, PIR1FC3V or PIRH1FC3V.
19 Not available with BLC, LCCO and RCCO distribution. Also available as a separate accessory; see Accessories information.
20 WTB not available with DS.
21 Single fuse (SF) requires 120V, 277V or 347V. Double fuse (DF) requires 208V, 240V or 480V.
22 Available with 60 LEDs (60C option) only.
23 Also available as a separate accessory; see accessories information.
24 Requires luminaire to be specified with PER option. Ordered and shipped as a separate line item from Acuity Brands Controls.
25 For retrofit use only.

Drilling



DSX1 shares a unique drilling pattern with the AERIS™ family. Specify this drilling pattern when specifying poles, per the table below.

DM19AS	Single unit	**DM29AS**	2 at 90° *
DM28AS	2 at 180°	**DM39AS**	3 at 90° *
DM49AS	4 at 90° *	**DM32AS**	3 at 120° **

Example: SSA 20 4C **DM19AS** DDBXD

Visit Lithonia Lighting’s POLES CENTRAL to see our wide selection of poles, accessories and educational tools.

**Round pole top must be 3.25” O.D. minimum.*

***For round pole mounting (RPA) only.*

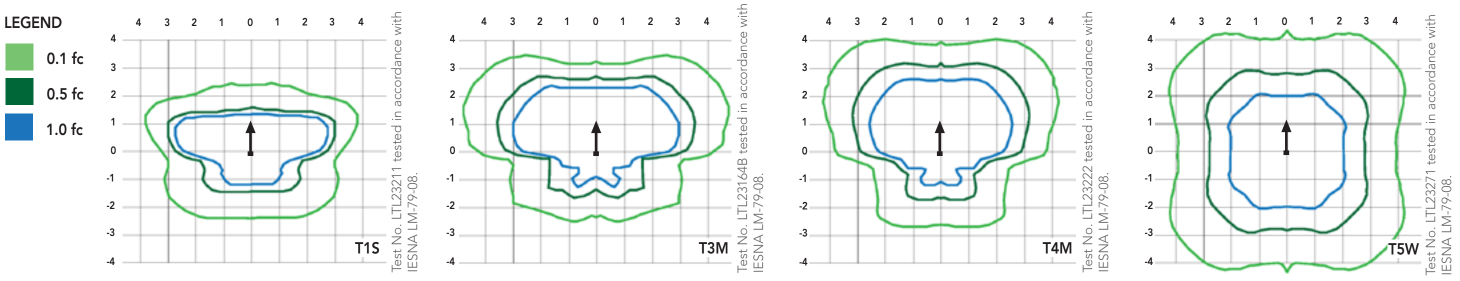
Tenon Mounting Slipfitter **

Tenon O.D.	Single Unit	2 at 180°	2 at 90°	3 at 120°	3 at 90°	4 at 90°
2-3/8”	AST20-190	AST20-280	AST20-290	AST20-320	AST20-390	AST20-490
2-7/8”	AST25-190	AST25-280	AST25-290	AST25-320	AST25-390	AST25-490
4”	AST35-190	AST35-280	AST35-290	AST35-320	AST35-390	AST35-490

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting’s D-Series Area Size 1 homepage.

Isofootcandle plots for the DSX1 LED 60C 1000 40K. Distances are in units of mounting height (20’).



Performance Data

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	**77°F**	**1.00**
30°C	86°F	1.00
40°C	104°F	0.99

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	DSX1 LED 60C 1000			
	1.0	0.98	0.96	0.91
	DSX1 LED 60C 700			
	1.0	0.99	0.99	0.99

Electrical Load

			Current (A)					
Number of LEDs	Drive Current (mA)	System Watts	120	208	240	277	347	480
30	530	52	0.52	0.30	0.26	0.23	--	--
	700	68	0.68	0.39	0.34	0.30	0.24	0.17
	1000	105	1.03	0.59	0.51	0.45	0.36	0.26
40	530	68	0.67	0.39	0.34	0.29	0.23	0.17
	700	89	0.89	0.51	0.44	0.38	0.31	0.22
	1000	138	1.35	0.78	0.67	0.58	0.47	0.34
60	530	99	0.97	0.56	0.48	0.42	0.34	0.24
	700	131	1.29	0.74	0.65	0.56	0.45	0.32
	1000	209	1.98	1.14	0.99	0.86	0.69	0.50

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
30C (30 LEDs)	530 mA	52 W	T1S	5,948	1	0	1	114	6,387	1	0	1	123	6,427	1	0	1	124	3,640	1	0	1	70
			T2S	6,132	1	0	1	118	6,585	2	0	2	127	6,626	2	0	2	127	3,813	1	0	1	73
			T2M	5,992	1	0	2	115	6,434	1	0	2	124	6,475	1	0	2	125	3,689	1	0	1	71
			T3S	5,985	1	0	1	115	6,427	1	0	2	124	6,467	1	0	2	124	3,770	1	0	1	73
			T3M	6,039	1	0	2	116	6,485	1	0	2	125	6,525	1	0	2	125	3,752	1	0	1	72
			T4M	6,121	1	0	2	118	6,573	1	0	2	126	6,614	1	0	2	127	3,758	1	0	1	72
			TFTM	6,030	1	0	2	116	6,475	1	0	2	125	6,515	1	0	2	125	3,701	1	0	1	71
			T5VS	6,370	2	0	0	123	6,840	2	0	0	132	6,883	2	0	0	132	3,928	2	0	0	76
			T5S	6,417	2	0	0	123	6,890	2	0	0	133	6,933	2	0	0	133	3,881	2	0	0	75
			T5M	6,428	3	0	1	124	6,902	3	0	1	133	6,945	3	0	1	134	3,930	2	0	1	76
			T5W	6,334	3	0	1	122	6,801	3	0	1	131	6,844	3	0	1	132	3,820	3	0	1	73
			BLC	4,735	1	0	1	91	5,085	1	0	2	98	5,116	1	0	1	98					
			LCCO	4,600	1	0	2	88	4,940	1	0	2	95	4,971	1	0	2	96					
			RCCO	4,600	1	0	2	88	4,940	1	0	2	95	4,971	1	0	2	96					
	700 mA	68 W	T1S	7,554	1	0	1	111	8,112	2	0	2	119	8,163	2	0	2	120	4,561	1	0	1	67
			T2S	7,789	2	0	2	115	8,364	2	0	2	123	8,416	2	0	2	124	4,777	1	0	1	70
			T2M	7,610	1	0	2	112	8,172	2	0	2	120	8,223	2	0	2	121	4,622	1	0	2	68
			T3S	7,601	1	0	2	112	8,162	2	0	2	120	8,213	2	0	2	121	4,724	1	0	1	69
			T3M	7,670	1	0	2	113	8,236	2	0	2	121	8,288	2	0	2	122	4,701	1	0	2	69
			T4M	7,774	1	0	2	114	8,348	2	0	2	123	8,400	2	0	2	124	4,709	1	0	2	69
			TFTM	7,658	1	0	2	113	8,223	1	0	2	121	8,275	1	0	2	122	4,638	1	0	2	68
			T5VS	8,090	2	0	0	119	8,687	3	0	1	128	8,742	3	0	1	129	4,922	2	0	0	72
			T5S	8,150	2	0	0	120	8,751	3	0	0	129	8,806	3	0	0	130	4,863	2	0	0	72
			T5M	8,164	3	0	1	120	8,767	3	0	2	129	8,821	3	0	2	130	4,924	3	0	1	72
			T5W	8,044	3	0	1	118	8,638	3	0	2	127	8,692	3	0	2	128	4,787	3	0	1	70
			BLC	6,028	1	0	2	89	6,473	1	0	2	95	6,514	1	0	2	96					
			LCCO	5,856	1	0	2	86	6,289	1	0	2	92	6,328	1	0	2	93					
			RCCO	5,856	1	0	2	86	6,289	1	0	2	92	6,328	1	0	2	93					
	1000 mA	105 W	T1S	10,331	2	0	2	98	11,094	2	0	2	106	11,163	2	0	2	106					
			T2S	10,652	2	0	2	101	11,438	2	0	2	109	11,510	2	0	2	110					
			T2M	10,408	2	0	2	99	11,176	2	0	3	106	11,246	2	0	3	107					
			T3S	10,395	2	0	2	99	11,163	2	0	2	106	11,233	2	0	2	107					
			T3M	10,490	2	0	2	100	11,264	2	0	2	107	11,335	2	0	2	108					
			T4M	10,632	2	0	2	101	11,417	2	0	2	109	11,488	2	0	2	109					
			TFTM	10,473	2	0	2	100	11,247	2	0	3	107	11,317	2	0	3	108					
			T5VS	11,064	3	0	1	105	11,881	3	0	1	113	11,955	3	0	1	114					
			T5S	11,145	3	0	1	106	11,968	3	0	1	114	12,043	3	0	1	115					
			T5M	11,165	3	0	2	106	11,989	4	0	2	114	12,064	4	0	2	115					
			T5W	11,001	3	0	2	105	11,813	4	0	2	113	11,887	4	0	2	113					
			BLC	7,960	1	0	2	76	8,548	1	0	2	81	8,601	1	0	2	82					
			LCCO	7,734	1	0	2	74	8,305	1	0	2	79	8,357	1	0	2	80					
			RCCO	7,734	1	0	2	74	8,305	1	0	2	79	8,357	1	0	2	80					

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
40C (40 LEDs)	530 mA	68 W	T1S	7,861	1	0	1	116	8,441	2	0	2	124	8,494	2	0	2	125	4,794	1	0	1	71
			T2S	8,105	2	0	2	119	8,704	2	0	2	128	8,758	2	0	2	129	5,021	1	0	1	74
			T2M	7,920	2	0	2	116	8,504	2	0	2	125	8,557	2	0	2	126	4,858	1	0	2	71
			T3S	7,910	1	0	2	116	8,494	2	0	2	125	8,547	2	0	2	126	4,966	1	0	1	73
			T3M	7,982	2	0	2	117	8,571	2	0	2	126	8,625	2	0	2	127	4,941	1	0	2	73
			T4M	8,090	1	0	2	119	8,687	2	0	2	128	8,741	2	0	2	129	4,950	1	0	2	73
			TFTM	7,969	1	0	2	117	8,558	2	0	2	126	8,611	2	0	2	127	4,875	1	0	2	72
			T5VS	8,419	2	0	0	124	9,040	3	0	1	133	9,097	3	0	1	134	5,174	2	0	0	76
			T5S	8,481	2	0	0	125	9,107	3	0	1	134	9,164	3	0	1	135	5,111	2	0	0	75
			T5M	8,496	3	0	1	125	9,123	3	0	2	134	9,180	3	0	2	135	5,175	3	0	1	76
			T5W	8,371	3	0	2	123	8,989	3	0	2	132	9,045	3	0	2	133	5,031	3	0	1	74
			BLC	6,255	1	0	2	92	6,717	1	0	2	99	6,759	1	0	2	99					
			LCCO	6,077	1	0	2	89	6,526	1	0	2	96	6,566	1	0	2	97					
			RCCO	6,077	1	0	2	89	6,526	1	0	2	96	6,566	1	0	2	97					
	700 mA	91 W	T1S	9,984	2	0	2	112	10,721	2	0	2	120	10,788	2	0	2	121	6,014	1	0	1	68
			T2S	10,294	2	0	2	116	11,054	2	0	2	124	11,123	2	0	2	125	6,299	2	0	2	71
			T2M	10,059	2	0	2	113	10,801	2	0	3	121	10,869	2	0	3	122	6,094	2	0	2	68
			T3S	10,046	2	0	2	113	10,788	2	0	2	121	10,855	2	0	2	122	6,229	1	0	2	70
			T3M	10,137	2	0	2	114	10,886	2	0	2	122	10,954	2	0	2	123	6,198	2	0	2	70
			T4M	10,275	2	0	2	115	11,033	2	0	2	124	11,102	2	0	2	125	6,209	1	0	2	70
			TFTM	10,122	2	0	2	114	10,869	2	0	2	122	10,937	2	0	2	123	6,115	1	0	2	69
			T5VS	10,693	3	0	1	120	11,482	3	0	1	129	11,554	3	0	1	130	6,490	2	0	0	73
			T5S	10,771	3	0	1	121	11,566	3	0	1	130	11,639	3	0	1	131	6,411	2	0	0	72
			T5M	10,790	3	0	2	121	11,587	4	0	2	130	11,659	4	0	2	131	6,492	3	0	1	73
			T5W	10,632	3	0	2	119	11,417	4	0	2	128	11,488	4	0	2	129	6,311	3	0	2	71
			BLC	7,963	1	0	2	89	8,551	1	0	2	96	8,605	1	0	2	97					
			LCCO	7,736	1	0	2	87	8,308	1	0	2	93	8,359	1	0	2	94					
			RCCO	7,736	1	0	2	87	8,308	1	0	2	93	8,359	1	0	2	94					
	1000 mA	138 W	T1S	13,655	2	0	2	99	14,663	3	0	3	106	14,754	3	0	3	107					
			T2S	14,079	2	0	2	102	15,118	3	0	3	110	15,212	3	0	3	110					
			T2M	13,756	2	0	3	100	14,772	3	0	3	107	14,864	3	0	3	108					
			T3S	13,739	2	0	2	100	14,754	2	0	2	107	14,846	3	0	3	108					
			T3M	13,864	2	0	2	100	14,888	3	0	3	108	14,981	3	0	3	109					
			T4M	14,052	2	0	2	102	15,090	3	0	3	109	15,184	3	0	3	110					
			TFTM	13,842	2	0	3	100	14,864	2	0	3	108	14,957	2	0	3	108					
			T5VS	14,623	3	0	1	106	15,703	4	0	1	114	15,801	4	0	1	115					
			T5S	14,731	3	0	1	107	15,818	3	0	1	115	15,917	3	0	1	115					
			T5M	14,757	4	0	2	107	15,846	4	0	2	115	15,945	4	0	2	116					
			T5W	14,540	4	0	2	105	15,614	4	0	2	113	15,711	4	0	2	114					
			BLC	10,516	1	0	2	76	11,292	1	0	2	82	11,363	1	0	2	82					
			LCCO	10,216	2	0	3	74	10,971	2	0	3	80	11,039	2	0	3	80					
			RCCO	10,216	2	0	3	74	10,971	2	0	3	80	11,039	2	0	3	80					

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
60C (60 LEDs)	530 mA	99 W	T1S	11,569	2	0	2	117	12,423	2	0	2	125	12,501	2	0	2	126	7,167	2	0	2	72
			T2S	11,928	2	0	2	120	12,809	3	0	3	129	12,889	3	0	3	130	7,507	2	0	2	76
			T2M	11,655	2	0	2	118	12,516	2	0	3	126	12,594	2	0	3	127	7,263	2	0	2	73
			T3S	11,641	2	0	2	118	12,500	2	0	2	126	12,579	2	0	2	127	7,424	2	0	2	75
			T3M	11,747	2	0	2	119	12,614	2	0	2	127	12,693	2	0	2	128	7,387	2	0	2	75
			T4M	11,906	2	0	2	120	12,785	2	0	2	129	12,865	2	0	2	130	7,400	2	0	2	75
			TFTM	11,728	2	0	2	118	12,594	2	0	3	127	12,673	2	0	3	128	7,288	1	0	2	74
			T5VS	12,390	3	0	1	125	13,305	3	0	1	134	13,388	3	0	1	135	7,734	3	0	1	78
			T5S	12,481	3	0	1	126	13,402	3	0	1	135	13,486	3	0	1	136	7,641	3	0	0	77
			T5M	12,503	3	0	2	126	13,426	4	0	2	136	13,510	4	0	2	136	7,737	3	0	2	78
			T5W	12,320	4	0	2	124	13,229	4	0	2	134	13,312	4	0	2	134	7,522	3	0	2	76
			BLC	9,212	1	0	2	93	9,892	1	0	2	100	9,954	1	0	2	101					
			LCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
			RCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
	700 mA	131 W	T1S	14,694	2	0	2	112	15,779	3	0	3	120	15,877	3	0	3	121	8,952	2	0	2	68
			T2S	15,150	3	0	3	116	16,269	3	0	3	124	16,370	3	0	3	125	9,377	2	0	2	72
			T2M	14,803	2	0	3	113	15,896	3	0	3	121	15,995	3	0	3	122	9,072	2	0	2	69
			T3S	14,785	2	0	2	113	15,877	3	0	3	121	15,976	3	0	3	122	9,273	2	0	2	71
			T3M	14,919	2	0	2	114	16,021	3	0	3	122	16,121	3	0	3	123	9,227	2	0	2	70
			T4M	15,122	2	0	2	115	16,238	3	0	3	124	16,340	3	0	3	125	9,243	2	0	2	71
			TFTM	14,896	2	0	3	114	15,996	2	0	3	122	16,096	2	0	3	123	9,103	2	0	2	69
			T5VS	15,736	3	0	1	120	16,898	4	0	1	129	17,004	4	0	1	130	9,661	3	0	1	74
			T5S	15,852	3	0	1	121	17,022	4	0	1	130	17,129	4	0	1	131	9,544	3	0	1	73
			T5M	15,880	4	0	2	121	17,052	4	0	2	130	17,159	4	0	2	131	9,665	3	0	2	74
			T5W	15,647	4	0	2	119	16,802	4	0	2	128	16,907	4	0	2	129	9,395	4	0	2	72
			BLC	11,728	1	0	2	90	12,594	1	0	2	96	12,672	3	0	3	97					
			LCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
			RCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
	1000 mA	209 W	T1S	20,095	3	0	3	96	21,579	3	0	3	103	21,714	3	0	3	104					
			T2S	20,720	3	0	3	99	22,249	3	0	3	106	22,388	3	0	3	107					
			T2M	20,245	3	0	3	97	21,740	3	0	3	104	21,876	3	0	3	105					
			T3S	20,220	3	0	3	97	21,713	3	0	3	104	21,849	3	0	3	105					
			T3M	20,404	3	0	3	98	21,910	3	0	4	105	22,047	3	0	4	105					
			T4M	20,681	3	0	3	99	22,207	3	0	4	106	22,346	3	0	4	107					
			TFTM	20,372	3	0	3	97	21,876	3	0	4	105	22,013	3	0	4	105					
			T5VS	21,521	4	0	1	103	23,110	4	0	1	111	23,254	4	0	1	111					
			T5S	21,679	4	0	1	104	23,280	4	0	1	111	23,425	4	0	1	112					
			T5M	21,717	4	0	2	104	23,321	5	0	3	112	23,466	5	0	3	112					
			T5W	21,399	4	0	3	102	22,979	5	0	3	110	23,122	5	0	3	111					
			BLC	15,487	2	0	2	74	16,630	2	0	2	80	16,734	2	0	3	80					
			LCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					
			RCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

L90 and R90 Rotated Optics

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)					AMBPC (Amber Phosphor Converted)				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
60C (60 LEDs)	530 mA	99 W	T1S	11,569	2	0	2	117	12,423	2	0	2	125	12,501	2	0	2	126	7,167	2	0	2	72
			T2S	11,928	2	0	2	120	12,809	3	0	3	129	12,889	3	0	3	130	7,507	2	0	2	76
			T2M	11,655	2	0	2	118	12,516	2	0	3	126	12,594	2	0	3	127	7,263	2	0	2	73
			T3S	11,641	2	0	2	118	12,500	2	0	2	126	12,579	2	0	2	127	7,424	2	0	2	75
			T3M	11,747	2	0	2	119	12,614	2	0	2	127	12,693	2	0	2	128	7,387	2	0	2	75
			T4M	11,906	2	0	2	120	12,785	2	0	2	129	12,865	2	0	2	130	7,400	2	0	2	75
			TFTM	11,728	2	0	2	118	12,594	2	0	3	127	12,673	2	0	3	128	7,288	1	0	2	74
			T5VS	12,390	3	0	1	125	13,305	3	0	1	134	13,388	3	0	1	135	7,734	3	0	1	78
			T5S	12,481	3	0	1	126	13,402	3	0	1	135	13,486	3	0	1	136	7,641	3	0	0	77
			T5M	12,503	3	0	2	126	13,426	4	0	2	136	13,510	4	0	2	136	7,737	3	0	2	78
			T5W	12,320	4	0	2	124	13,229	4	0	2	134	13,312	4	0	2	134	7,522	3	0	2	76
			BLC	9,212	1	0	2	93	9,892	1	0	2	100	9,954	1	0	2	101					
			LCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
			RCCO	8,950	1	0	2	90	9,611	2	0	2	97	9,671	2	0	2	98					
	700 mA	131 W	T1S	14,694	2	0	2	112	15,779	3	0	3	120	15,877	3	0	3	121	8,952	2	0	2	68
			T2S	15,150	3	0	3	116	16,269	3	0	3	124	16,370	3	0	3	125	9,377	2	0	2	72
			T2M	14,803	2	0	3	113	15,896	3	0	3	121	15,995	3	0	3	122	9,072	2	0	2	69
			T3S	14,785	2	0	2	113	15,877	3	0	3	121	15,976	3	0	3	122	9,273	2	0	2	71
			T3M	14,919	2	0	2	114	16,021	3	0	3	122	16,121	3	0	3	123	9,227	2	0	2	70
			T4M	15,122	2	0	2	115	16,238	3	0	3	124	16,340	3	0	3	125	9,243	2	0	2	71
			TFTM	14,896	2	0	3	114	15,996	2	0	3	122	16,096	2	0	3	123	9,103	2	0	2	69
			T5VS	15,736	3	0	1	120	16,898	4	0	1	129	17,004	4	0	1	130	9,661	3	0	1	74
			T5S	15,852	3	0	1	121	17,022	4	0	1	130	17,129	4	0	1	131	9,544	3	0	1	73
			T5M	15,880	4	0	2	121	17,052	4	0	2	130	17,159	4	0	2	131	9,665	3	0	2	74
			T5W	15,647	4	0	2	119	16,802	4	0	2	128	16,907	4	0	2	129	9,395	4	0	2	72
			BLC	11,728	1	0	2	90	12,594	1	0	2	96	12,672	3	0	3	97					
			LCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
			RCCO	11,394	2	0	3	87	12,235	2	0	3	93	12,311	2	0	3	94					
	1000 mA	209 W	T1S	20,095	3	0	3	96	21,579	3	0	3	103	21,714	3	0	3	104					
			T2S	20,720	3	0	3	99	22,249	3	0	3	106	22,388	3	0	3	107					
			T2M	20,245	3	0	3	97	21,740	3	0	3	104	21,876	3	0	3	105					
			T3S	20,220	3	0	3	97	21,713	3	0	3	104	21,849	3	0	3	105					
			T3M	20,404	3	0	3	98	21,910	3	0	4	105	22,047	3	0	4	105					
			T4M	20,681	3	0	3	99	22,207	3	0	4	106	22,346	3	0	4	107					
			TFTM	20,372	3	0	3	97	21,876	3	0	4	105	22,013	3	0	4	105					
			T5VS	21,521	4	0	1	103	23,110	4	0	1	111	23,254	4	0	1	111					
			T5S	21,679	4	0	1	104	23,280	4	0	1	111	23,425	4	0	1	112					
			T5M	21,717	4	0	2	104	23,321	5	0	3	112	23,466	5	0	3	112					
			T5W	21,399	4	0	3	102	22,979	5	0	3	110	23,122	5	0	3	111					
			BLC	15,487	2	0	2	74	16,630	2	0	2	80	16,734	2	0	3	80					
			LCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					
			RCCO	15,046	2	0	3	72	16,157	2	0	3	77	16,258	2	0	3	78					

FEATURES & SPECIFICATIONS

INTENDED USE
The sleek design of the D-Series Size 1 reflects the embedded high performance LED technology. It is ideal for many commercial and municipal applications, such as parking lots, plazas, campuses, and streetscapes.

CONSTRUCTION
Single-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance and future light engine upgrades. The LED drivers are mounted in direct contact with the casting to promote low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP65). Low EPA (1.01 ft²) for optimized pole wind loading.

FINISH
Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in both textured and non-textured finishes.

OPTICS
Precision-molded proprietary acrylic lenses are engineered for superior area lighting distribution, uniformity, and pole spacing. Light engines are available in standard 3000 K, 4000 K and 5000 K (70 CRI) or optional 3000 K (70 minimum CRI) or 5000 K (70 CRI) configurations. The D-Series Size 1 has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

ELECTRICAL
Light engine configurations consist of 30, 40 or 60 high-efficacy LEDs mounted to metal-core circuit boards to maximize heat dissipation and promote long life (up to L99/100,000 hours at 25°C). Class 1 electronic drivers are designed to have a power factor >90%, THD <20%, and an expected life of 100,000 hours with <1% failure rate. Easily serviceable 10kV or 6kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).

INSTALLATION
Included mounting block and integral arm facilitate quick and easy installation. Stainless steel bolts fasten the mounting block securely to poles and walls, enabling the D-Series Size 1 to withstand up to a 3.0 G vibration load rating per ANSI C136.31. The D-Series Size 1 utilizes the AERIS™ series pole drilling pattern (template #8). Optional terminal block, tool-less entry, and NEMA photocontrol receptacle are also available.

LISTINGS
UL Listed for wet locations. Light engines are IP66 rated; luminaire is IP65 rated. Rated for -40°C minimum ambient. U.S. Patent No. D672,492 S. International patent pending.

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

WARRANTY
5-year limited warranty. Complete warranty terms located at
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

LED pole-top luminaires with asymmetric wide beam light distribution

Type: **TYPE SC**
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:

Housing/fitter: Die-cast aluminum construction. The luminaire slip fits a 3" O.D. pole top or tenon and is secured by six (6) socket head stainless steel screws threaded into stainless steel inserts. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: Clear acrylic diffuser with textured acrylic optic and pure anodized aluminum reflector held in place by die-cast aluminum frame and stainless steel rod. Fully gasketed for weather tight operation using a molded silcone gasket.

Electrical: 32.0W LED luminaire, 38.0 total system watts, -30°C start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. LED module(s) are available from factory for easy replacement. Standard LED color temperature is 4000K with a >80 CRI. Available in 3000K (>80 CRI); add suffix K3 to order.
Note: LEDs supplied with luminaire. Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

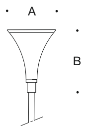
Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. Available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

CSA certified to U.S. and Canadian standards, suitable for wet locations. Protection class IP65

Weight: 19.0 lbs.

Effective Projection Area (EPA): 1.6 ft²

Luminaire Lumens: 2274



Asymmetrical wide beam pole-top luminaires · **clear diffuser**

	Lamp	A	B
77 151	32.0 W LED	20⅛	19⅛

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 FAX (805) 566-9474 www.bega-us.com

Updated 03/16

WPLED52N

LED 52W Wallpacks. 3 cutoff options. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 17.6 lbs

Project:

Type: TYPE SD

Prepared By:

Date:

Driver Info

Type:	Constant Current
120V:	0.51A
208V:	0.33A
240V:	0.29A
277V:	0.24A
Input Watts:	60W
Efficiency:	87%

LED Info

Watts:	52W
Color Temp:	4000K
Color Accuracy:	82 CRI
L70 Lifespan:	100000
Lumens:	4,584
Efficacy:	76 LPW

Technical Specifications

Listings

UL Listing:

Suitable for wet locations.

IESNA LM-79 & IESNA LM-80 Testing:

RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

DLC Listed:

This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.
DLC Product Code: P00001742

Optical

Lumen Maintenance:

100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

Replacement:

The WPLED52 replaces 250W HID Wallpacks.

BUG Rating:

B0 U2 G3

LED Characteristics

LEDs:

Two (2) multi-chip, high-output, long-life LEDs.

Color Consistency:

3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:

LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Electrical

Drivers:

Two drivers, constant current, 720mA, Class 2, 100 - 277V, 50 - 60 Hz, 100 - 277VAC .8 Amps.

THD:

13.0% at 120V

Surge Protection:

6kV

Construction

Ambient Temperature:

Suitable for use in 40°C ambient temperatures.

Cold Weather Starting:

The minimum starting temperature is -40°C/-40°F

Thermal Management:

Cast aluminum Thermal Management system for optimal heat sinking. The WPLED is designed for cool operation, most efficient output and maximum LED life by minimizing LED junction temperature.

Housing:

Precision die cast aluminum housing, lens frame.

Mounting:

Die-cast aluminum wall bracket with (5) 1/2" conduit openings with plugs. Two-piece bracket with tether for ease of installation and wiring.

Arm:

Die-cast aluminum with wiring access plate.

Cutoff:

Standard (15°)

Reflector:

Specular vacuum-metallized polycarbonate

Gaskets:

High temperature silicone.

Lens:

Tempered glass

Finish:

Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Green Technology:

WPLEDs are Mercury and UV free.

Other

California Title 24:

See WPLED52/BL for a 2013 California Title 24 compliant product. Any additional component requirements will be listed in the Title 24 section under technical specifications on the product page.

Technical Specifications (continued)

Other

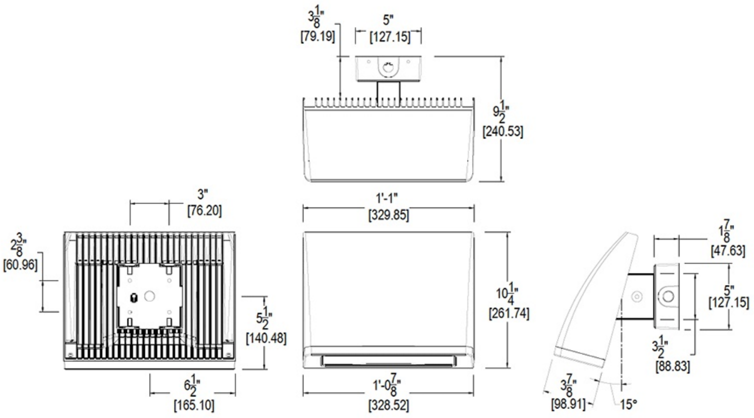
Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Patents:

The WPLED design is protected by patents in the U.S. Pat D653,377, Canada Pat. 142252, China Pat. ZL201130356930.8, and Mexico Pat. 36921 and pending patent in TW.

Dimensions



Features

- High performance LED light engine
- Maintains 70% of initial lumens at 100,000 hours
- Weatherproof high temperature silicone gaskets
- Superior heat sinking with die cast aluminum housing and external fins
- Replaces 250W MH
- Traditional wallpack look from the front
- 3 cutoff options
- 5-year warranty

Ordering Matrix

Family	Cutoff	Watts	Color Temp	Finish	Voltage	Photocell	Bi-Level	Dimming
WPLED								
	= Standard	**52** = 52W	= 5000K (Cool)	= Bronze	= 120-277V	= Photocell	= No Bi-Level	= No Dimming
	C = Cutoff		**N** = 4000K (Neutral)	**W** = White	**/480** = 480V	**/PCS** = 120V Swivel	**/BL** = Bi-Level	**/D10** = Dimmable
	FC = Full Cutoff		**Y** = 3000K (Warm)			**/PCS2** = 277V Swivel		
						/PCS4 = 480V Swivel		