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**FOREST GROVE PLANNING COMMISSION MEETING**  
**COMMUNITY AUDITORIUM, 1915 MAIN STREET**  
**MONDAY, FEBRUARY 6, 2017-- 7:00 P.M.**

**PLANNING COMMISSION**

Tom Beck, Chair

Lisa Nakajima  
Carolyn Hymes  
Dale Smith

Hugo Rojas  
Phil Ruder, Vice Chair  
Sebastian B. Lawler

The Planning Commission welcomes your attendance and participation. If you wish to speak on an agenda item, please feel free to do so. However, in fairness to others, we respectfully ask that you observe the following:

- \* Please follow sign-in procedures on the table by the entrance to the auditorium.
- \* Please state your name and address clearly for the record.
- \* Groups or organizations are asked to designate one speaker in the interest of time and to avoid repetition.
- \* When more than one citizen is heard on any matter, please keep your comments to five minutes and avoid repetition in your remarks. Careful attention to the previous speaker's points will help in this regard.
- \* The Planning Commission carefully considers all the facts before a decision is made. Brief statements are most helpful in reaching a decision based on sound judgment.

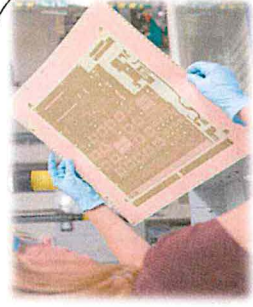
Planning Commission meetings are electronically recorded and are handicap accessible. Assistive Listening Devices (ALD) or qualified sign language interpreters are available for persons with impaired hearing or speech. For any special accommodations, please contact the City Recorder at 503.992.3235, at least 48 hours prior to the meeting.

**AGENDA**

- (1.) Roll Call
- (2.) Public Meeting
  1. Public Comment Period for Non-Agenda Items
  2. Public Hearing: None Scheduled
  3. Action Item: None Scheduled
  4. **Work Session Items: Westside Planning Project – Infrastructure & Funding Approach**
- (3) Business Meeting
  1. Approval of Minutes
  2. Reports from Commissioners/Subcommittees
  3. Director's Report
  4. Announce next meeting
  5. Adjourn







# Westside Planning Work Session Infrastructure and Financing

Planning Commission Meeting

February 6, 2017

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## Forest Grove Westside Planning Project Area





## Westside Plan

- Develop Refinement Plan for the area
- Obtained \$133,000 Metro Community Planning and Development Grant – received funding in 2014
- Grant for consultant technical assistance
  - SCJ Alliance – lead consultant, transportation, infrastructure, natural resources
  - Urbswork – public input (focus groups and charrettes)
  - PBS Engineering and Environmental - geotech
  - FCS Group – financing
- Staff prepare plan and necessary amendments to existing documents (Comp Plan, TSP)

## Process to Date

### **Public** (Focus on Land Use)

- Stakeholder Interviews
- Two Planning Charrettes
- Planning Commission Work Session – July 6, 2015

### **Technical** (Focus on Infrastructure)

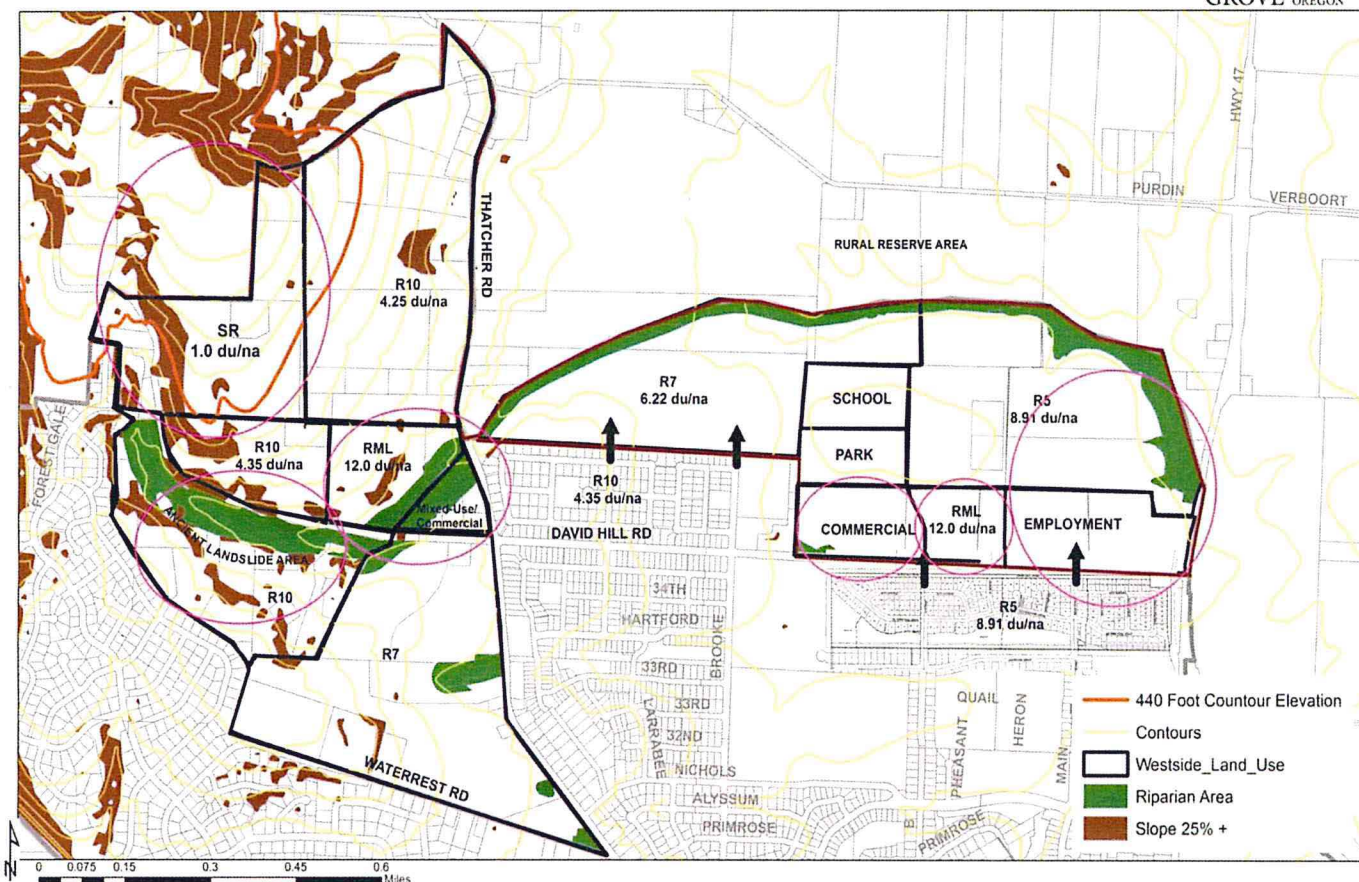
- Background Analysis (on City website)
  - Infrastructure
  - Natural Resources
  - Transportation
  - Geologic and Geotech
- Infrastructure and Traffic Analysis (on City website)
- Technical Advisory Committee meetings
- Financial Strategy for Infrastructure



# Planning Commission

## Development Issues – July 6, 2015

### WESTSIDE PLANNING PROJECT



#### Both Areas

- Complete neighborhoods
- Commercial leakage

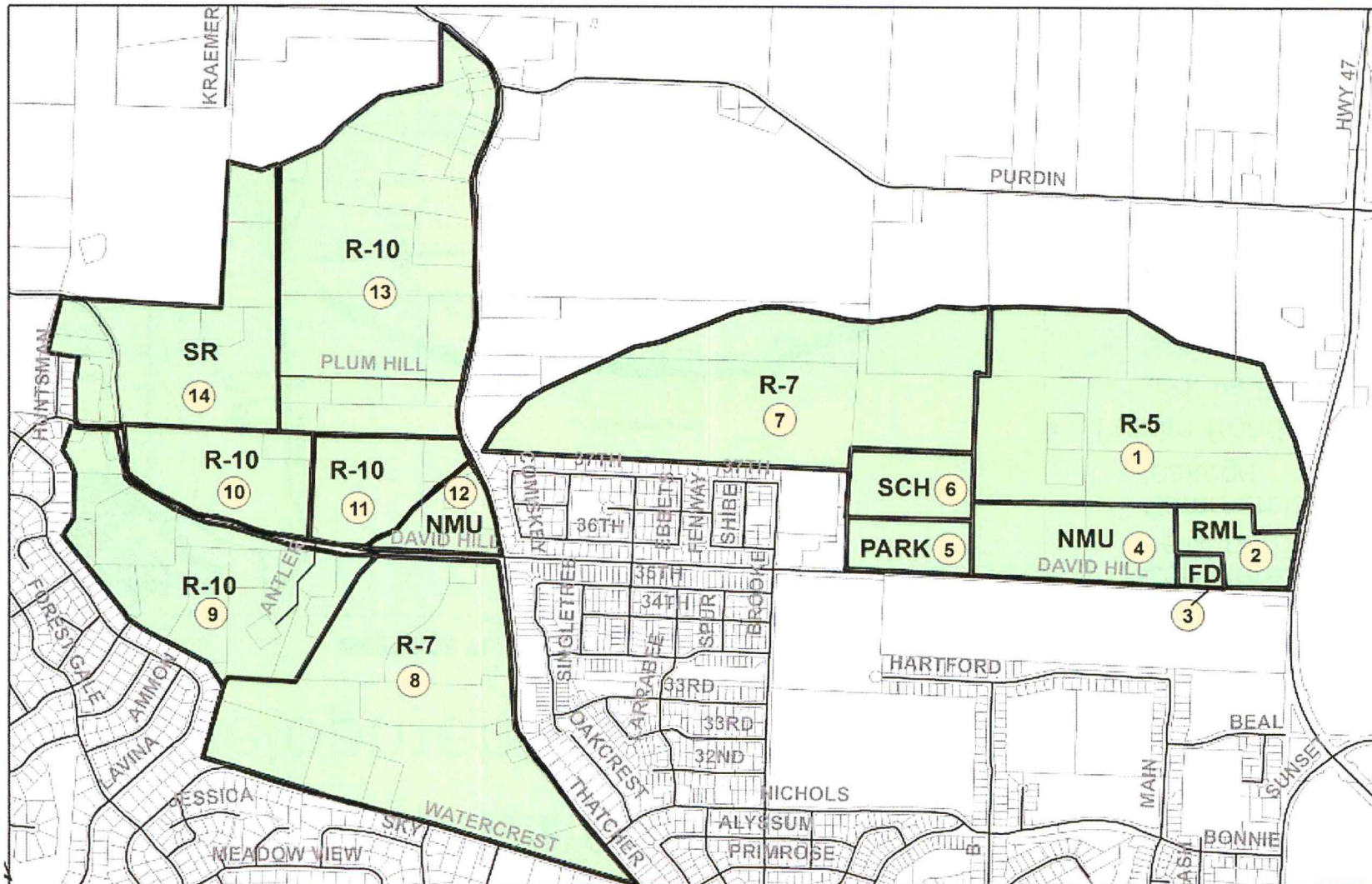
#### Purdin Road

- Ind. vs Res
- School, Parks

#### David Hill

- Landslide
- Slope and Circulation
- Suburban Residential (1 unit per acre)/R-10 (4.35 units per acre)
- View from Town Center/Clustering

# Planning Commission Direction to Staff





## Westside Planning Area Dwelling Unit Yield Estimate Planning Commission Recommendation

| Analysis Zone | Area                              | Gross Area (ac.) | Developable Area (ac.) | Net Area (ac.)       | Slope Deduction | Current Dwelling Yield | New Dwelling Yield |
|---------------|-----------------------------------|------------------|------------------------|----------------------|-----------------|------------------------|--------------------|
| 1             | Purdin (R-5)                      | 86.18            | 71.60                  | 57.28                | 0%              | 2                      | 498                |
| 2             | Purdin (RML)                      | 10.82            | 10.82                  | 8.66                 | 0%              | 0                      | 103                |
| 3             | Fire Station (FD)                 | 2.40             | 2.40                   | 2.40                 | 0%              | 0                      | 0                  |
| 4             | Purdin (Mixed-Use/Commercial)     | 24.63            | 24.63                  | 19.73 <sup>(1)</sup> | 0%              | 0                      | 140                |
| 5             | Purdin (Park)                     | 6.00             | 6.00                   | 6.00                 | 0%              | 0                      | 0                  |
| 6             | Purdin (School)                   | 10.00            | 10.00                  | 10.00                | 0%              | 0                      | 0                  |
| 7             | Purdin (R-7)                      | 98.62            | 87.02                  | 69.62                | 0%              | 3                      | 433                |
|               | <b>Subtotal - Purdin</b>          | <b>238.65</b>    | <b>212.47</b>          | <b>173.69</b>        |                 | <b>5</b>               | <b>1,174</b>       |
| 8             | Watercrest (R-7)                  | 99.75            | 70.63 <sup>(2)</sup>   | 56.50                | 10%             | 221                    | 316                |
| 9             | South of David Hill (R-10)        | 57.38            | 12.99                  | 10.39                | 20%             | 36                     | 36                 |
| 10            | North of David Hill - West (R-10) | 24.30            | 17.73                  | 14.18                | 15%             | 52                     | 52                 |
| 11            | North of David Hill - East (R-10) | 21.42            | 15.06                  | 12.05                | 15%             | 44                     | 44                 |
| 12            | North David Hill (MU-Com)         | 8.50             | 3.60                   | 2.90                 | 0%              | 12                     | 4                  |
| 13            | Thatcher (R-10)                   | 98.66            | 95.81                  | 76.65                | 10%             | 300                    | 300                |
| 14            | David Hill Suburban Residential   | 43.12            | 35.62                  | 28.50                | 15%             | 24                     | 24                 |
|               | <b>Subtotal - David Hill</b>      | <b>353.13</b>    | <b>251.44</b>          | <b>201.17</b>        |                 | <b>689</b>             | <b>776</b>         |
|               | <b>Grand Total</b>                | <b>591.78</b>    | <b>463.91</b>          | <b>374.86</b>        |                 | <b>694</b>             | <b>1,950</b>       |

1. Assuming 50% of the Mixed-Use Commercial area develops as commercial this area could accommodate approximately 107,400 square feet of retail space.
2. The land area within Thatcher Park and Thatcher Woods has been deducted from the land area. This deduction is approximately 25.18 acres.

# Traffic Analysis

## Westside PM Peak Hour Trip Generation Estimates

Based on "Worst Case" Land Uses as of  
8/4/15

| Zone Area                       | Trip Ends    | Daily Trips |
|---------------------------------|--------------|-------------|
| 1 Purdin (Business Park)        | 275          |             |
| 2 Purdin (RML)                  | 112          |             |
| 3 Purdin (Retail Commercial)    | 641          |             |
| 4 Purdin (Park)                 | 38           |             |
| 5 Purdin (Elementary School)    | 79           |             |
| 6 Purdin (R5)                   | 494          |             |
| 7 Purdin (R7)                   | 314          |             |
| <b>Sub-Total Purdin</b>         | <b>1,953</b> |             |
| 8 Watercrest (R7)               | 316          |             |
| 9 South of David Hill Rd (R10)  | 36           |             |
| 10 North of David Hill Rd (R10) | 52           |             |
| 11 David Hill Village (R10)     | 122          |             |
| 12 David Hill Village (Comm)    | 36           |             |
| 12 David Hill Village (Res)     | 2            |             |
| 13 Thatcher (R10)               | 300          |             |
| 14 David Hill (R10)             | 105          |             |
| Sub-Total David Hill            | 969          |             |
| <b>TOTALS</b>                   | <b>2,922</b> |             |

Based on "Worst Case" Land Uses as of  
10/26/15

| Zone Area                      | Trip Ends    | Daily Trips |
|--------------------------------|--------------|-------------|
| 1 Purdin (R5)                  | 590          |             |
| 2 Fire Station                 | 6            |             |
| 3 Purdin (Residential)         | 221          |             |
| 3 Purdin (Retail Commercial)   | 173          |             |
| 4 Purdin (Park)                | 38           |             |
| 5 Purdin (Elementary School)   | 79           |             |
| 6 Purdin (R7)                  | 386          |             |
| <b>Sub-Total Purdin</b>        | <b>1,493</b> |             |
| 7 Watercrest (R7)              | 316          |             |
| 8 South of David Hill Rd (R10) | 36           |             |
| 9 North of David Hill Rd (R10) | 52           |             |
| 10 David Hill Village (R10)    | 44           |             |
| 11 David Hill Village (Comm)   | 41           |             |
| 11 David Hill Village (Res)    | 2            |             |
| 12 Thatcher (R10)              | 300          |             |
| 13 David Hill (R10)            | 105          |             |
| Sub-Total David Hill           | 896          |             |
| <b>TOTALS</b>                  | <b>2,388</b> |             |

Based on Planning Commission Scenario

| Zone Area                      | Trip Ends    | Daily Trips |
|--------------------------------|--------------|-------------|
| 1 Purdin (R5)                  | 498          |             |
| 2 Purdin (RML)                 | 103          |             |
| 3 Fire Station                 | 6            |             |
| 4 Purdin (MU/Commercial)       | 398          |             |
| 4 Purdin (Residential)         | 140          |             |
| 5 Purdin (Park)                | 21           |             |
| 6 Purdin (Elementary School)   | 79           |             |
| 7 Purdin (R7)                  | 433          |             |
| <b>Sub-Total Purdin</b>        | <b>1,678</b> |             |
| 8 Watercrest (R7)              | 316          |             |
| 9 South of David Hill Rd (R10) | 36           |             |
| 10 David Hill (R10)            | 52           |             |
| 11 David Hill (MU-RML)         | 44           |             |
| 12 David Hill Village (MU/C)   | 2            |             |
| 13 Thatcher (R10)              | 300          |             |
| 14 David Hill (SR)             | 24           |             |
| Sub-Total David Hill           | 774          |             |
| <b>Totals</b>                  | <b>2,452</b> |             |



# Traffic Analysis

- Worse Case 10/26/15 was used
- Purdin Road Area Not Considered in 2014 Transportation System Plan Update
- Potential Significant Impact on Highway 47 round-a-bouts at David Hill Road and Purdin/Verboort Road

# Infrastructure

- Types
  - Roads
  - Sewer
  - Water
  - Stormwater
- Focus
  - Area wide needs
  - Not specific properties
- Development Assumptions
  - 2,054 dwellings vs. PC Version of 1,950 units

# Major Street System

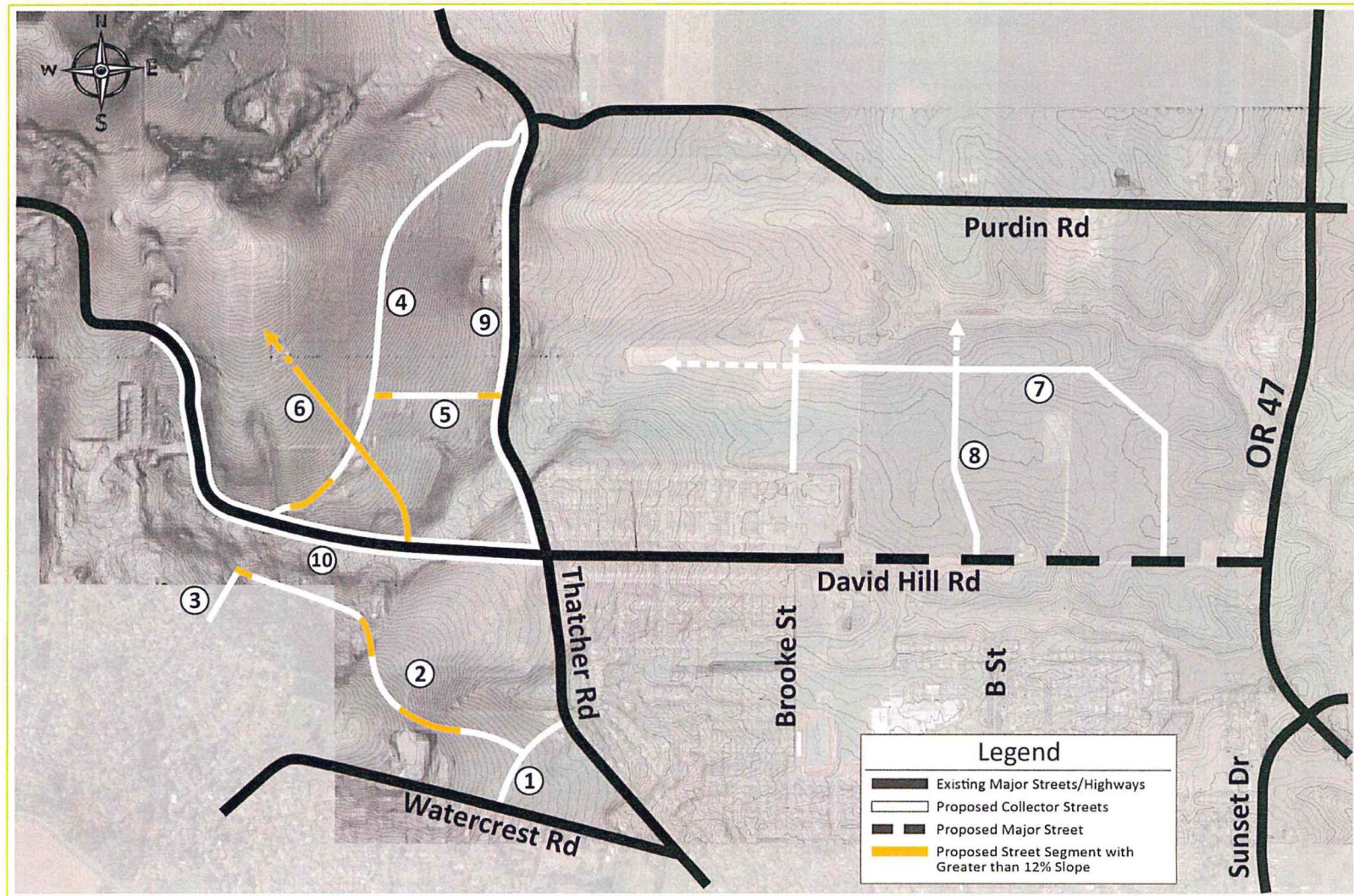


Figure 3  
Proposed Street System

Westside Planning Project  
Forest Grove, OR



# Major Sewer System

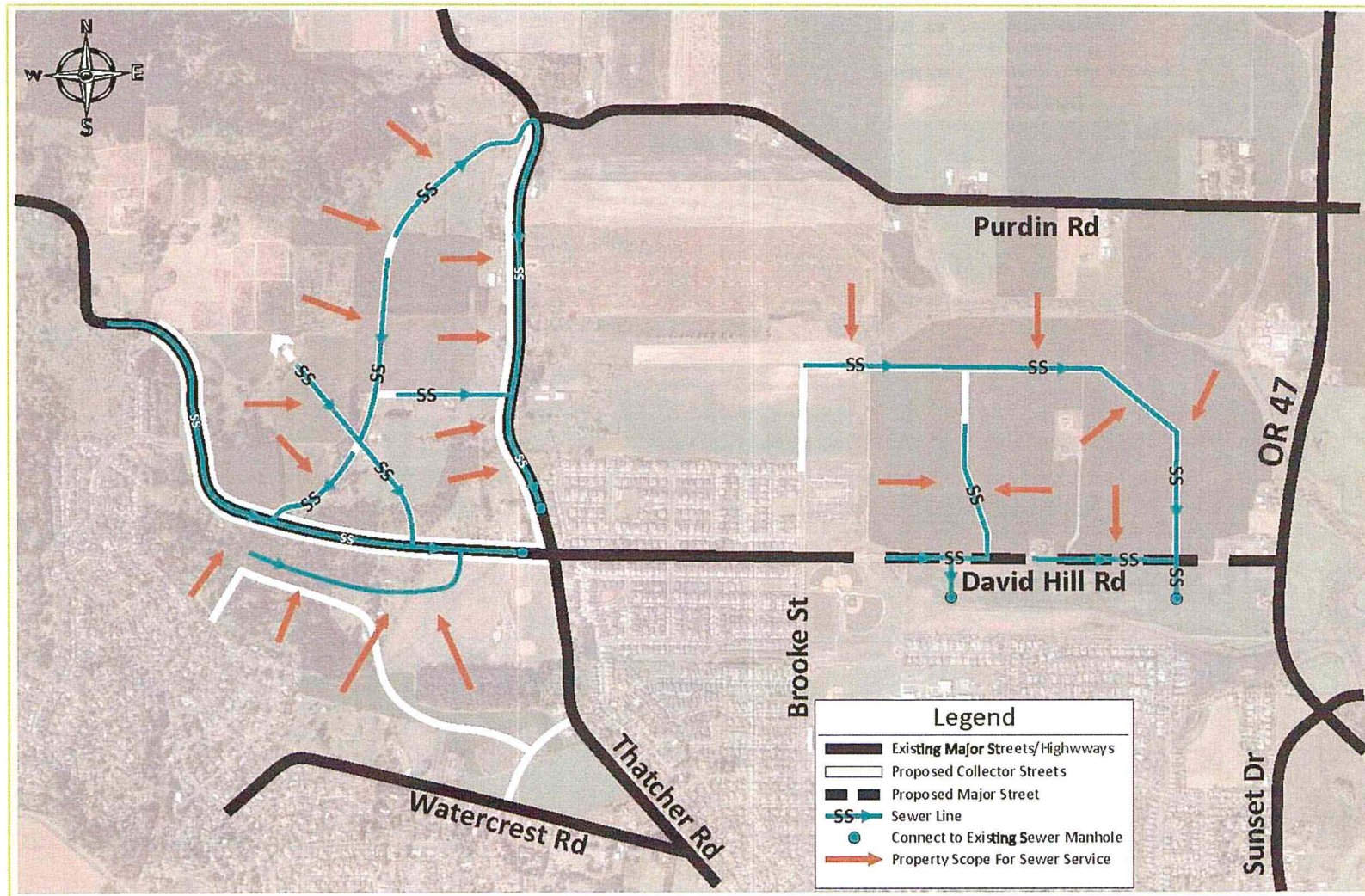


Figure 4  
Sewer Utilities

Westside Planning Project  
Forest Grove, OR



# Stormwater

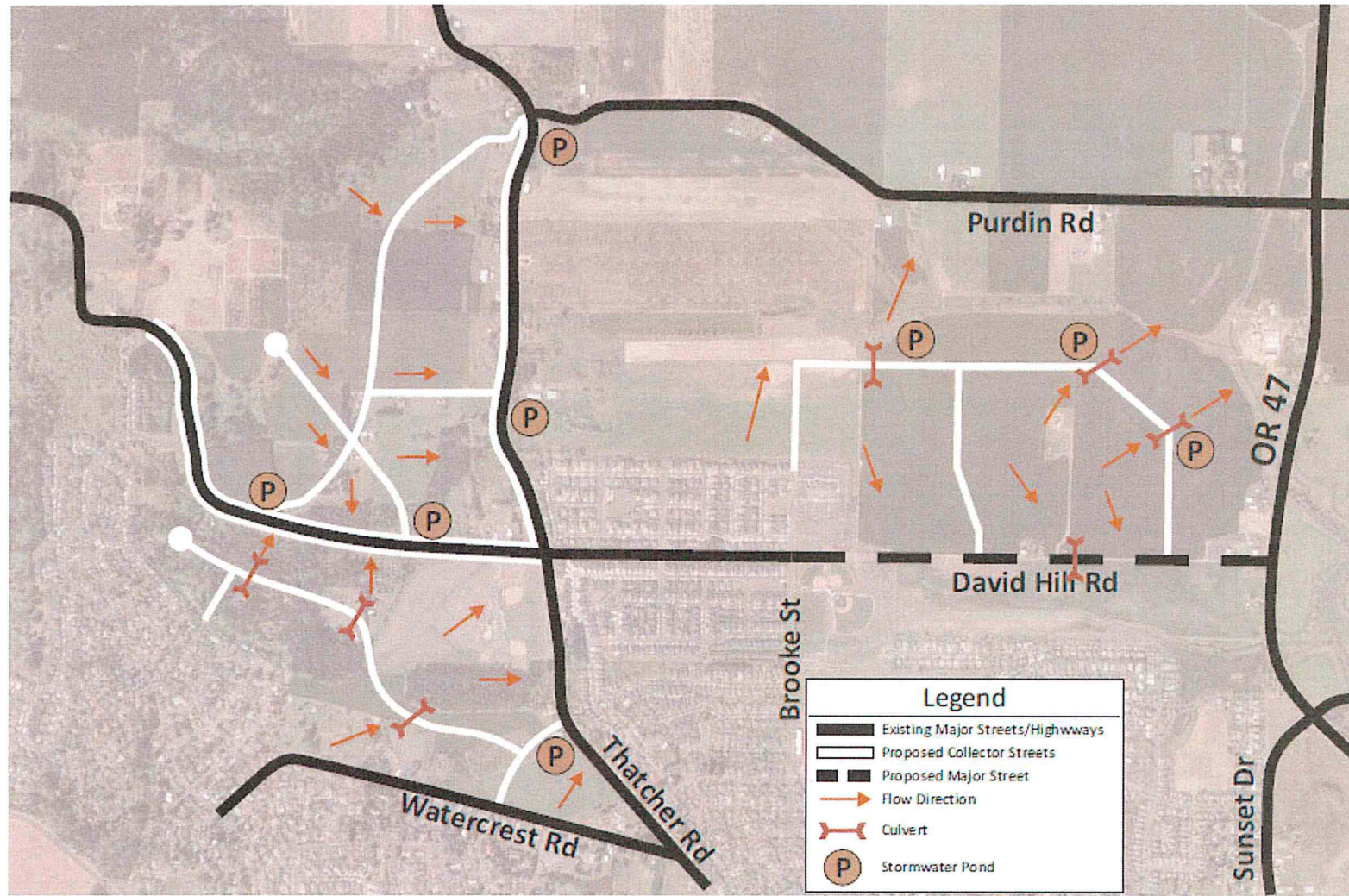
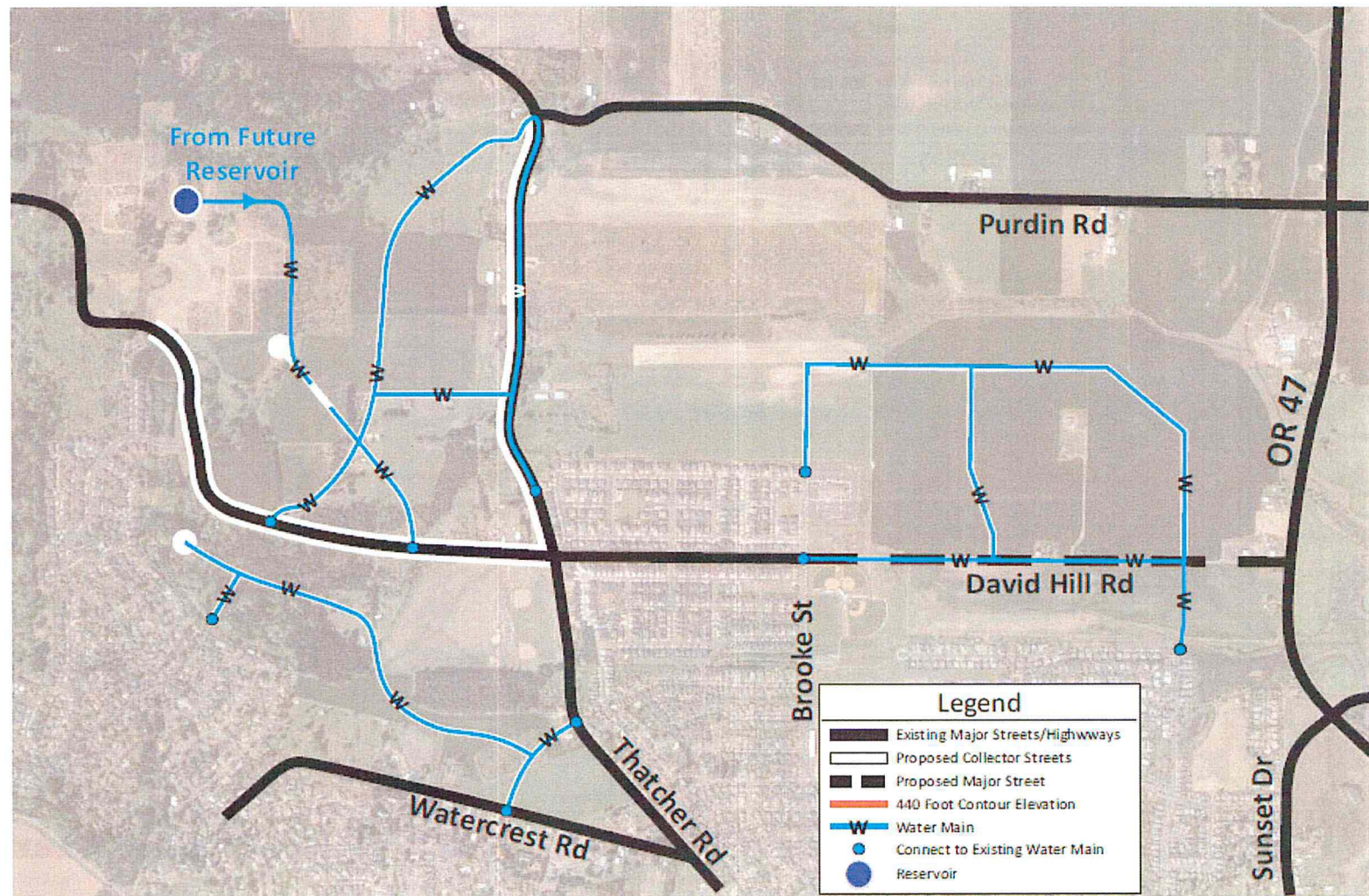


Figure 5  
Stormwater Utilities

Westside Planning Project  
Forest Grove, OR



# Water





## Total Costs

- Roads \$30,230,800
- Sewer \$ 3,635,600
- Stormwater \$ 1,575,000
- Water \$ 8,533,000 (for WS Plan)
- Parks \$ 6,600,000
- Total Costs \$50,573,400
- *Overall Water System Cost - \$23,504,427*

## Cost by Area

|               | David Hill        | Purdin             |
|---------------|-------------------|--------------------|
| • Roads       | \$23,880,900      | \$6,349,900        |
| • Sewer       | \$ 2,480,600      | \$1,155,000        |
| • Stormwater  | \$ 1,067,500      | \$ 507,500         |
| • Water       | \$ 6,855,500      | \$1,677,600        |
| • Parks       | <u>\$ 648,000</u> | <u>\$3,000,000</u> |
| • Total Costs | \$37,884,500      | \$12,690,000       |



## Use of SDC's

- SDC Elements
  - Cover system-wide costs from cumulative development
  - SDC's imposed by multiple jurisdictions
  - Paid at building permit for individual building construction
    - Incremental
    - Difficult to fund improvements needing up front funding
- SDC Coverage
  - What percentage of SDC's collected does the City want to use for improvements within the Westside Planning Area? 100%; 40%; 18%
  - Where current SDC's don't cover costs, what alternative method should be considered to pay for improvements?
    - Supplementary SDC's
    - Utility Fee
    - Local Option Levy
    - Local Improvement District/Reimbursement District

## Consultant Recommendations

- Transportation
  - Use 40% of existing SDC's
  - Establish supplementary SDC of \$11,369 plus administrative fee
- Water System\*
  - Use 100% of existing SDC's
- Sewer System\*
  - 100% for both areas
  - Supplementary SDC of \$1,427 for David Hill
- Stormwater
  - 100% of SDC
  - \$7 per month supplemental stormwater rate surcharge phased in over 5 years
  - City may establish reimbursement district if surcharge is insufficient
- Parks
  - 100% of existing SDC's
- Market Feasible for higher fees



## Short Term Improvements David Hill Area

- Property with most interest developing early are farthest from existing services, particularly sewer; those properties closest to existing services are not
- Relatively small parcels makes it difficult to absorb offsite improvement costs
- Thatcher Road Improvement - \$1,454,000
- 0.5 mg water reservoir (WS fair share) - \$875,000  
(overall cost of \$4,182,500)
- Sewer lines – DH and Thatcher roads - \$1,128,750  
\$3,457,750  
(overall cost of \$6,765,250)
- Minimum Improvements:
  - David Hill Sewer Line (700 feet) \$460,000  
(Line costs plus contingencies)

## Westside Plan Required Decisions

- All decisions require Planning Commission recommendation and City Council adoption by ordinance:
  - Adoption of Westside Area Refinement Plan
  - Comp Plan amendment (map and text amendment)
  - Transportation System Plan amendment (circulation system and cross sections, project list)
  - Zoning Map Amendment
  - Development Code Amendment – geo-tech requirements, road slope standards



## Westside Plan Next Steps

- March to April – Planning Commission public hearings for Westside Plan recommendation
- May to June – City Council public hearing for Westside Plan adoption
- Submittal to DLCD and Metro
- Remainder 2017 – Adoption of Implementation Measures
  - Revised SDC's
  - City Financing of initial improvements (if needed)
  - Master Plan amendments (Water, Sewer and Stormwater)





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CITY RECORDER USE ONLY:

AGENDA ITEM #: \_\_\_\_\_

FINAL ACTION: \_\_\_\_\_

## PLANNING COMMISSION STAFF REPORT

**TO:** *Planning Commission*

**FROM:** *Jon Holan, Community Development Director*

**MEETING DATE:** *January 17, 2017*

**PROJECT TEAM:** *Rob Foster, Public Works Director; Richard Blackmun, Special Projects Engineer; Dan Riordan, Senior Planner*

**SUBJECT TITLE:** *Westside Planning Infrastructure and Funding Approach*

**ACTION REQUESTED:**

|                          |                  |                          |               |                                     |                      |
|--------------------------|------------------|--------------------------|---------------|-------------------------------------|----------------------|
| <input type="checkbox"/> | <b>Ordinance</b> | <input type="checkbox"/> | <b>Motion</b> | <input checked="" type="checkbox"/> | <b>Informational</b> |
|--------------------------|------------------|--------------------------|---------------|-------------------------------------|----------------------|

*X all that apply*

**ISSUE STATEMENT:** The next major step in developing the Westside Plan is to identify the infrastructure (major roads, sanitary sewer, stormwater/drainage, water system, and parks) needed to support development and develop an approach to pay for it. The purpose of this work session is to review two documents prepared by the consultants on these two matters, take in public input and provide any direction as found appropriate by the Commission. Also included is the Transportation analysis provided by the consultants and is included here for information. Its findings will be addressed as part of addressing the Transportation Planning Rule requirements through the Plan adoption process.

**BACKGROUND:** The last Planning Commission work session was held on July 7, 2015 to provide direction on a potential land use direction for the Westside Planning area. The primary purpose of this action was to provide direction on planning for infrastructure needs. Once those needs were identified, a funding approach was developed. Attached are the Infrastructure Memo dated June 24, 2016 (Attachment A) and Westside Planning Area Funding Approach dated December, 2016 (Attachment B) for your review.

It should be noted that there are some differences in the infrastructure needs between the two documents. First, developing these two documents has been an iterative process as needs continued to be refined after the June 24<sup>th</sup> memo was prepared. Second, City Engineering staff conducted a greater study on the reservoir needs for the Westside Planning area, David Hill Urban Reserve and citywide as part of developing the funding approach document.

### **ANALYSIS:**

#### **INFRASTRUCTURE**

Infrastructure needs were developed by the consultants after assistance by staff and the Technical Advisory Committee, in particular Clean Water Services related to sewer and storm drainage. The



analysis focused on the skeleton system needed to accommodate future growth for transportation, sewer, water and stormwater (Park facilities were added later to the Funding analysis once the Parks Master Plan was well through the process).

The needs are based on a slightly higher number of planned units than the unit yield for the Planning Commission land use direction (2054 units vs. 1950 units). The purpose of this is to allow the Commission and City Council some flexibility in adjusting land uses through the public hearing process.

The following is a summary for each:

*Transportation:*

The purpose of the transportation infrastructure analysis was to identify the needed "grid" system for major roadways for the Westside area. These major roadway systems are composed of the collector network needed for traffic circulation for both the David Hill and Purdin Road areas. Identification of the collector street network is necessary to establish the policy basis for requiring dedication of right-of-way through the development review process. This approach is further needed to amend the Transportation System Plan (TSP) to comply with the Regional Transportation Plan (RTP). Section 3.08.110 B of the RTP Functional Plan requires:

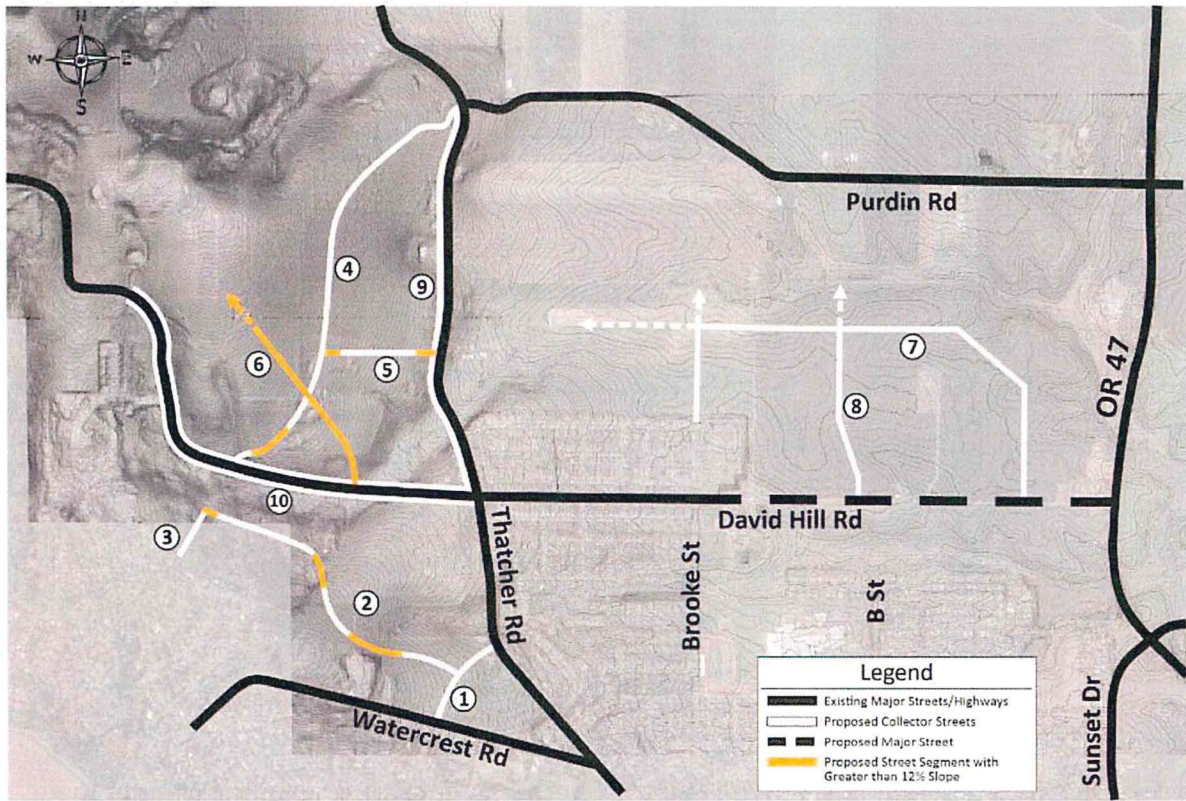
"To improve connectivity of the region's arterial system, each city and county shall incorporate into its TSP a network of four-lane major arterial streets at one-mile spacing and two-lane minor arterial streets or collector streets at half-mile spacing to the extent practicable considering the following:

1. Existing topography;
2. Rail lines;
3. Freeways;
4. Pre-existing development;
5. Leases, easements or covenants in place prior to May 1, 1995; and
6. The requirements of Titles 3 and 13 of the Urban Growth Management Functional Plan (UGMFP)."

The City currently does not meet this standard due to the lack of planned roads in the David Hill area. Also, proper road planning for the Purdin Road area is necessary to meet this requirement. Metro has granted the City of Forest Grove a deferral to meet the road system requirements in the RTP until completion of the Westside Planning effort.

The proposed collector road system for the Westside Planning area is intended to address the RTP requirements and is depicted on the following map:

**Figure 1 – Proposed Collector Street System**



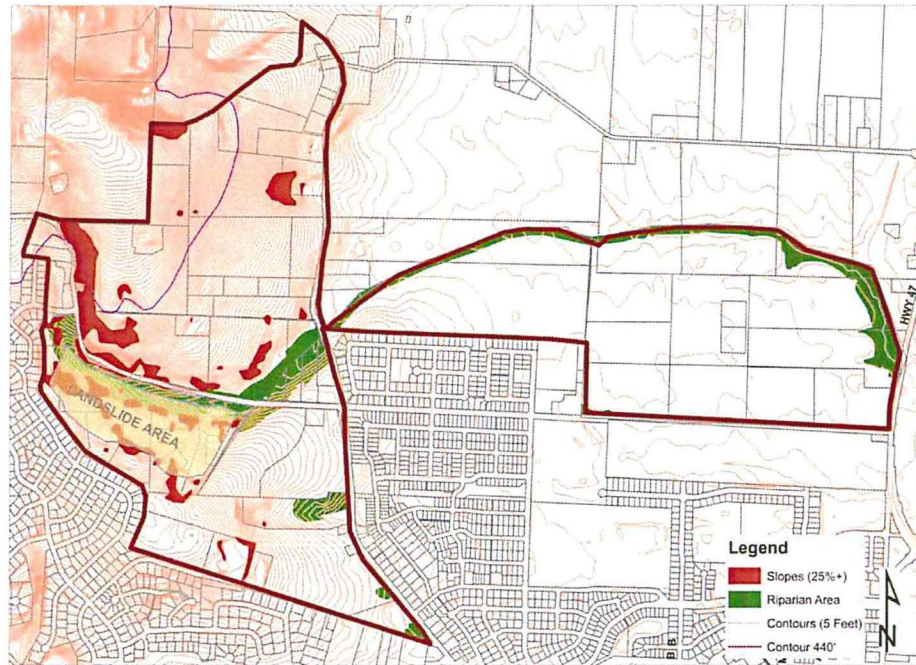
The map identifies conceptual locations rather than specific alignments. Alignments will be predicated on development applications taking into account engineering considerations. Road 6 is intended to remain a cul-de-sac until development in the David Hill Urban Reserve area occurs. Road 7 could be extended to Thatcher Road if the intervening area is removed from Rural Reserve in the future. Road 8 (extension of Road 8) and the extension of Brooke Street (part of Road 7) could also be extended to Purdin Road if the Rural Reserve designation is removed.

The main road issue with the David Hill area is topographic constraints. Figure 2 below illustrates the slopes for the area.



**Figure 2 - Slope Map**

Westside Planning Project



As can be seen from the map, the entire David Hill area has substantial slopes with the most challenging matter being the steep slopes (over 25%) along David Hill Road. In further analysis, there are four particular issues with roads and slopes in the David Hill area:

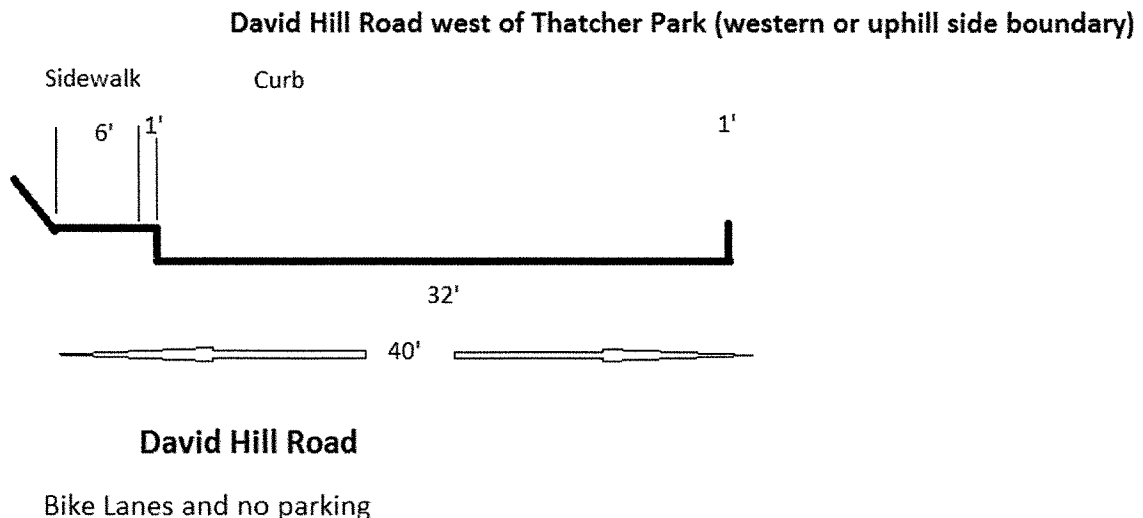
1. Getting access off of David Hill Road – To establish a roadway to serve as a backbone to the David Hill area, a collector connecting David Hill Road to Thatcher Road in the vicinity of Purdin Road is important. As can be seen from Figure 2, the uphill slopes along David Hill Road are greater than 25%. However, the placement of the road where shown in Figure 1 appears feasible based on development pre-applications staff has held on properties in the area.
2. Getting access off of Thatcher Road in the vicinity of Purdin Road – Although not over 25% slope, it appears that connecting a road from the area to Thatcher Road in this area will require some analysis as part of any further work (e.g. development application, road studies, etc.) due to slopes.
3. City road standards for slopes – Development Code Section 10.8.610 M. specifies that collectors not exceed 12% slope (Figure 1 shows the location of street segments exceeding that standard). However, the Development Code provides for some flexibility in strict adherence to street standards considering unacceptable adverse impacts to natural features including steep slopes (Section 10.8.610(6)) and the City has approved collectors up to 15% for a distance not exceeding 150 feet (portions of Forest Gale Drive). The Infrastructure analysis indicates that Roads 2, 4, 5, and 6 on Figure 1 would exceed the 12% with slopes



up to 15%. For Road 2, the length is estimated to be 1250 feet total in three segments. Road 4 would be 15% for about a 600 foot portion. Road 5 would have slopes ranging from 12% to 15%. Road 6 is assumed to be 15%. To achieve 12%, about 240,000 cubic yards of added cut and fill would be required.

As shown for Road 6, to achieve a 12% slope for any of these roadways, additional cut and fill would be required at a higher cost. Staff will be recommending an amendment to the City road standards to accommodate this situation. Further, the City Engineer indicates that any section above 12% and exceeding 250 foot distance should be constructed of concrete. Asphalt has a tendency to slide on that steep of slopes over that distance. The cost for concrete has been incorporated in the cost estimates.

4. David Hill Road Cross-Section – Due to the steep terrain, it is proposed that David Hill Road west of Thatcher Road have its own cross-section standard adopted in the Transportation System Plan (TSP). This cross-section would maintain a 32 foot wide street with no parking on both sides and a sidewalk on one side of the street. This would be accommodated on a 40 foot wide right-of-way. The intent would be to minimize grading in these steep slope areas. The current right-of-width for David Hill Road west of Thatcher Road within the UGB is 60 feet. Additional right-of-way may be needed for slope easements due to grading. This would be determined as part of specific development proceeds. The smaller David Hill Road cross-section could potentially be used for other collector roads with similar slope constraints.

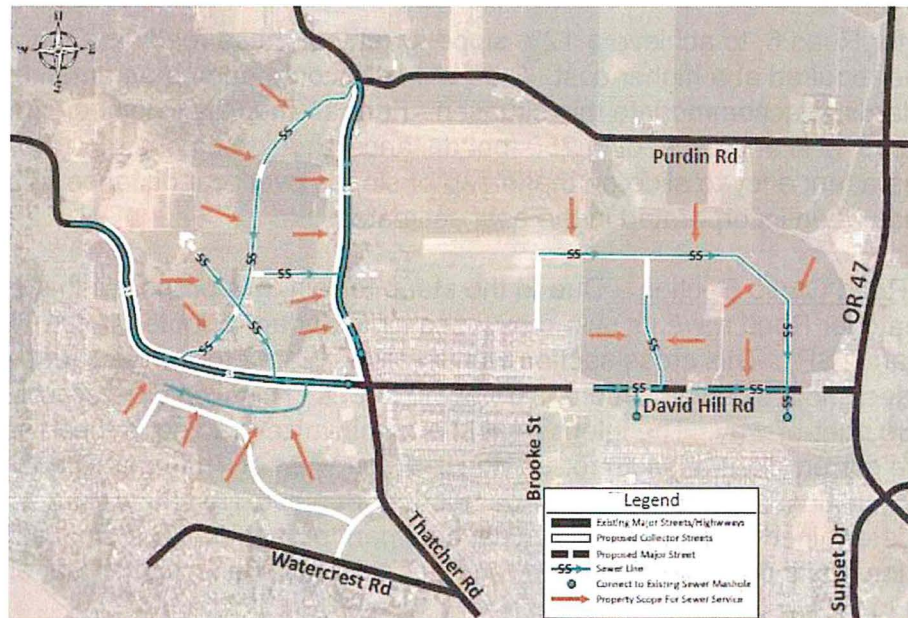


#### Sewer:

Currently, all sewer lines less than 21 inches in diameter are the responsibility of the City of Forest Grove while those lines that are larger are maintained by Clean Water Services (CWS). Anticipated revised agreements lower that division to lines 12 inches or less are the City's responsibility while larger lines (greater than 12 inches) are CWS responsibility. For the Westside

Planning area, all proposed sewer lines are 12 inch diameter or less. This makes these lines the responsibility of Forest Grove regardless of the agreement.

**Figure 3 - Proposed Sewer System Improvements**



Overall, the sewer layout follows the proposed roadways. It is designed to capture sewer flows from development on a gravity basis.

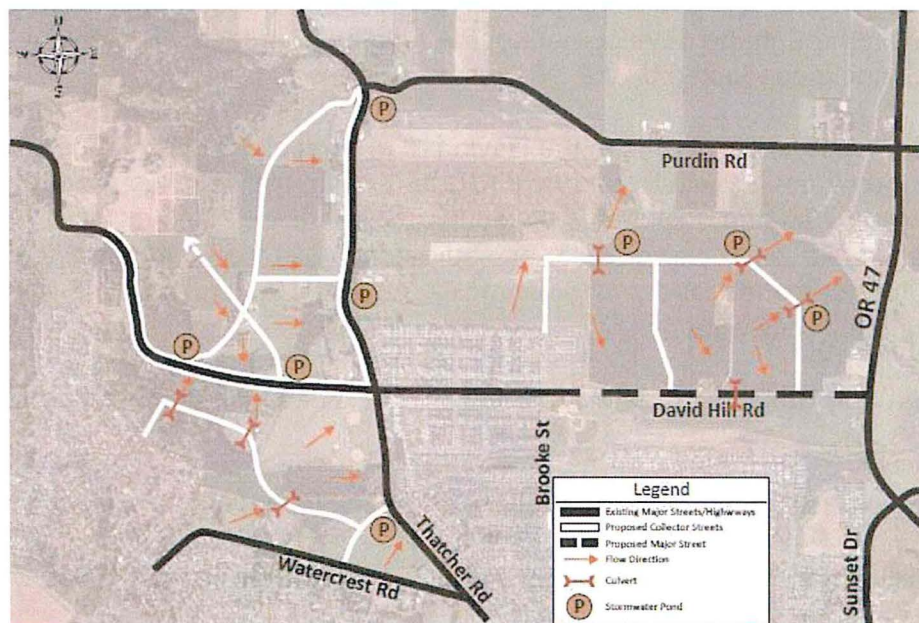
One aspect of the sewer lines is how it connects to major sewer trunk lines at Council Creek. For the northern portions of the David Hill area, the conveyance of the sewer could be achieved in two different ways. One option considered was to install a sewer trunk line in the Rural Reserve parallel and south of Purdin Road to provide a direct connection to major line at Council Creek. The other option was to install a sewer line along Thatcher Road to connect to the existing sewer line at David Hill. This option was selected because it could utilize existing sewer lines at David Hill Road which have adequate capacity. This avoids constructing redundant sewer lines through Rural Reserve areas. To implement this option, Thatcher Road will have to be slightly elevated (for a distance of 800 feet) to allow the sewer line to span the creek where Thatcher Road crosses the creek north of David Hill Road. Cost estimates include this improvement.

### *Stormwater*

Stormwater facilities are for the proposed collector street system discussed above and illustrated in Figure 4 below. As a result, the facilities are located adjacent to the street system. Stormwater facilities for development will require additional facilities. The facilities are intended to meet anticipated future CWS requirements and will require careful design in the David Hill area due to slopes.



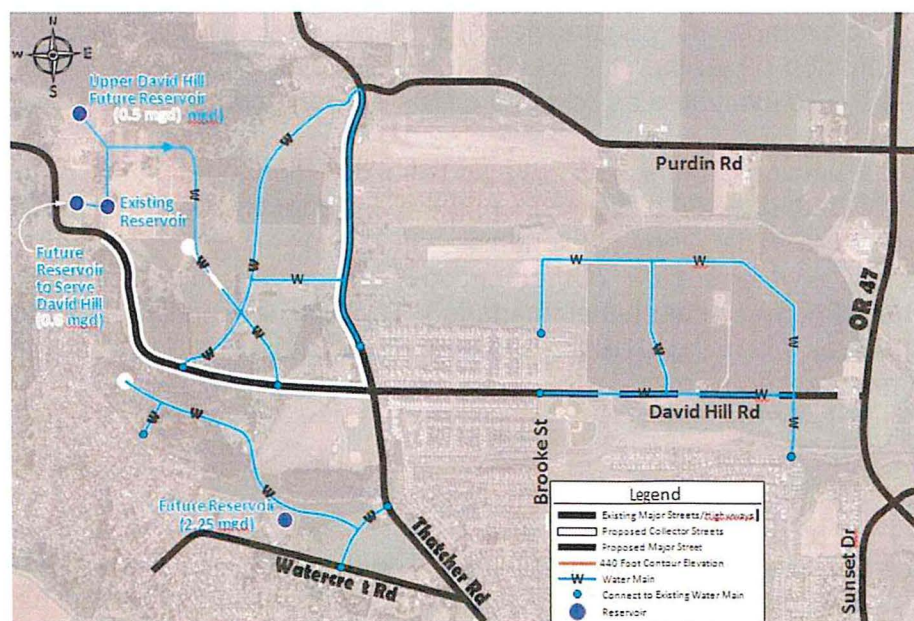
**Figure 4 - Proposed Stormwater System**



### Water System

The water system layout and needed reservoirs are depicted in Figure 5 below.

**Figure 5 - Proposed Water System**



The major issue is the need for reservoirs which has proceeded through an iterative process by the Engineering Division through the development of the funding approach. There were three aspects to the reservoir planning conducted by the Division as follows:

- Needed reservoirs to serve land in the David Hill area at elevations higher than the 440 foot contour in the Urban Growth Boundary (UGB and within the planning area) and the Urban Reserve Area (URA and outside the planning area);
- Needed reservoirs in the intermediate pressure zone (240 foot to 440 foot elevation) to address future demands; and
- Cumulative future city wide needs.

The needs are primarily based on meeting needed fire flows because domestic needs are not as great.

To address the needs described above, the following reservoirs have been identified:

- One 0.5 million gallon (mg) reservoir for the David Hill UGB between 440 to 615 foot elevation;
- One 0.5 mg reservoir for the David Hill URA between 190 to 615 foot elevation;
- Two 0.3 mg reservoirs for the David Hill UGB between 250 to 440 foot elevation (based on current Water Master Plan – if the 0.5 mg reservoir for the UGB was expanded to 0.6 mg, these two 0.3 mg reservoirs would not be necessary); and
- One 2.25 mg reservoir at the Water Treatment plant to serve citywide needs.

These reservoir needs could be further modified when the Water Master Plan is anticipated to be updated in 2018. For example, the construction of a 1.0 mg reservoir to serve both the UGB and URA could be constructed rather than the two 0.5 mg reservoirs. However, other issues such as water turnover need to be evaluated as part of the Master Plan update.

One other note, the Planning Commission gave an initial direction to retain the Suburban Residential District with the caveat of reconsidering the designation depending on the difference in cost for the infrastructure. The alternative land use would be R-10 zoning. The one infrastructure cost which would vary is water supply. (Other infrastructure costs would essentially not change due to the small number of homes under either scenario.) The Engineering Division has determined the per unit cost for the area within the UGB for Suburban Residential and R10 zoning based on the cost for a 1.0 mg reservoir as follows:

- SR (24 units) \$5,000 per unit
- R10 (105 units) \$4,700 per unit

The difference of \$300 per unit is considered minor. The reason for the slight difference is due to the difference in storage needs for the different zone designations. The revenue difference would

be pro-rated through other development either in the UGB below 440 foot elevation or in the URA. Because of the small number of units under both scenarios, neither option would trigger a lower reservoir storage need. Thus, the small difference in cost indicates that there is no basis to select one designation over the other based on differences in infrastructure costs.

### *Parks*

Parks was not assessed in the infrastructure costs since the Parks Master Plan was developed and adopted later in the process. Based on the Parks Plan, there are three projects within the Westside Planning area as follows. These parks, the area of benefit and total costs are as follows:

- |                                           |                  |             |
|-------------------------------------------|------------------|-------------|
| • Improvements to Thatcher Park           | Citywide         | \$3,400,000 |
| • Improvements to the Dog Park            | Citywide         | \$ 200,000  |
| • Development of Purdin Neighborhood Park | Purdin Road Area | \$3,000,000 |

The development costs for the Purdin Neighborhood Park includes property acquisition as well as development costs.

### *Schools*

School costs were also not assessed in the infrastructure analysis. This is because the cost is the responsibility of the Forest Grove School District and is not considered a development cost (i.e. no developer SDC's are charged for new school development although a Construction Excise Tax is collected for each new residential (\$1 per square foot) and non-residential (\$0.50 per square foot) development). The update to the Comprehensive Plan shows a need for a new elementary school over the 20 year planning period for the city. Since the largest future growth in the City is in the Westside Planning area, a site has been designated for an elementary school. If the District determines to accommodate that need in another way, then the City would reevaluate the appropriate land use designation for the site.

## **FUNDING APPROACH**

The funding approach is developed for two purposes. First, it recommends an approach to fund the various area-wide infrastructure improvements. Second, it tests the funding demands to determine if they are financially feasible. These costs are in current dollars and should be considered "worst-case". As funding mechanisms are established, different approaches may reduce some of the costs to be financed.

The assessment evaluated the current costs for needed improvements as developed in the infrastructure analysis (with the exception of the reservoirs) and comparing the costs to adopted System Development Charges (SDC). This revealed where additional funding would be needed to determine true development costs.



*One caveat pertains to the use of TDT to these roadways. TDT funds can only be used for those roadways on the County's TDT list of road projects. With the exception of David Hill Road and Thatcher Road, none of these proposed roadways are on this list. The first step in that process is to incorporate them in the City's TSP projects. Then the City will have to propose their incorporation into the TDT project list to be eligible for use of TDT funds.*

### *Funding Framework (Section II)*

The assessment first reviewed nine different funding tools used in Oregon as follows:

- SDC's
- Transportation Development Tax (TDT) – like an SDC but technically a tax
- Utility Fee
- Local Option Levy for Capital Improvements
- Local Improvement District (LID)
- Reimbursement District
- Urban Renewal District (Tax Increment Financing)
- Debt Financing
- Public Improvement Agreements

### *Capital Costs (Section III)*

The analysis then summarized the capital costs for infrastructure improvements for the Westside Planning Area (Figure 5 below). It includes costs broken down into a possible short-term investment and longer term funding.

**Figure 6 - Summary of Infrastructure Costs**

| Westside Planning Area Infrastructure Cost Assumptions                                                                                 |                            |                           |                             |                       |                       |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------|-----------------------------|-----------------------|-----------------------|
|                                                                                                                                        | Short Term<br>Public Costs | Long Term<br>Public Costs | Total Local<br>Public Costs | Number of<br>Projects | Avg. Cost per<br>Acre |
| Transportation <sup>1</sup>                                                                                                            | \$1,454,000                | \$28,776,800              | \$30,230,800                | 11                    | \$80,734              |
| Water                                                                                                                                  | 875,000                    | 7,658,000                 | 8,533,000                   | 13                    | \$22,788              |
| Sewer                                                                                                                                  | 1,128,750                  | 2,506,850                 | 3,635,600                   | 8                     | \$9,709               |
| Stormwater                                                                                                                             | 0                          | 1,575,000                 | 1,575,000                   | 12                    | \$4,206               |
| Parks <sup>2</sup>                                                                                                                     | 0                          | 3,648,000                 | 3,648,000                   | 3                     | \$9,742               |
| <b>Total</b>                                                                                                                           | <b>\$3,457,750</b>         | <b>\$43,760,650</b>       | <b>\$47,622,400</b>         | <b>47</b>             | <b>\$127,779</b>      |
| <b>Source:</b> Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. |                            |                           |                             |                       |                       |
| <sup>1</sup> Costs for transportation include only the collector road network and do not include local residential streets             |                            |                           |                             |                       |                       |
| <sup>2</sup> Parks costs are for the Westside Planning area only.                                                                      |                            |                           |                             |                       |                       |

The analysis then summarizes the current funding framework which are System Development Charges collected for various facilities. Figure 6 below provides a summary of the charges the analysis used and reflects the City share where divided between the City and CWS. It should be

noted that the TDT rate is blended between single-family detached (\$8,278 per unit) and single family attached (\$4,951 per unit for condominium and townhouses). The share of sewer SDC's reflects an anticipated change in revenue sharing between Forest Grove and CWS.

**Figure 7 - Current SDC's**

| SDCs Charged in Forest Grove per Dwelling         |                     |                    |
|---------------------------------------------------|---------------------|--------------------|
| Infrastructure Type (with Oversight Jurisdiction) | Total Rate Per Unit | City Share of Rate |
| Transportation (Washington Co)*                   | \$7,914             | \$7,914            |
| Water (City)                                      | \$5,478             | \$5,478            |
| Sewer (CWS)                                       | \$5,300             | \$212              |
| Stormwater (City)                                 | \$510               | \$510              |
| Parks (City)                                      | \$3,000             | \$3,000            |

Source: Clean Water Services, Washington County, and City of Forest Grove, compiled by FCS GROUP.

\*Reflects blended rate of TDT which accounts for single family detached (~89% of development) and single family attached (~11% of development).

#### *Funding Evaluation (Section IV)*

In this section of the analysis, it first evaluated the various funding tools identified above based on five criteria:

- Equity
- Reliability of Funds
- Market Acceptance
- Ease of Implementation
- Ability to Address Costs

Based on this assessment, four tools were identified to be considered further including:

- Development Agreements
- Utility Agreements (Area Specific)
- SDC's (Area specific)
- Local Improvement Districts

The analysis in Section IV then focused on the various costs for each infrastructure type (transportation, water, sewer, stormwater and parks). Consideration was given to the amount of revenue from current SDC's be used including use of 18, 40 and 100 percent of the SDC's collected. Eighteen percent reflects the Westside Planning Area share of future population growth for the entire city. Forty percent reflects the Westside Planning Area percentage of total citywide housing growth for the next 20 years.



**Figure 8 - Summary of Infrastructure Costs and Deficits**

|                                                                                                                                                                                                                                                                          | Cost         | SDC (100%)   | Net (+/(-))    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|----------------|
| • Collectors                                                                                                                                                                                                                                                             | \$30,230,800 | \$16,254,437 | (\$13,976,363) |
| • Sewer                                                                                                                                                                                                                                                                  | \$ 3,635,600 | \$435,448    | (\$3,200,152)  |
| • Stormwater                                                                                                                                                                                                                                                             | \$ 1,575,000 | \$1,047,540  | (\$527,460)    |
| • Water                                                                                                                                                                                                                                                                  | \$ 8,533,000 | \$11,251,812 | \$2,718,812    |
| • Parks                                                                                                                                                                                                                                                                  | \$ 3,648,000 | \$ 6,162,000 | \$2,514,000    |
| <ul style="list-style-type: none"> <li>Note: Cannot commingle SDC's amongst infrastructure types, i.e., cannot use Parks SDC's for Water facilities.</li> <li>Assumes 100% of SDC's collected from Westside Planning Area are used in Westside Planning Area.</li> </ul> |              |              |                |

Figure 7 is based on the use of 100% of the SDC's collected to pay for infrastructure costs. However, the purpose of SDC's is pay for area wide system improvements. Further, some SDC's revenues (i.e. water) collected are used in part to pay for existing system improvements. Thus, the use of 100% of the SDC's received from development in the Westside Planning area may not appropriate for certain improvements. The recommendation to cover costs in the financing program is as follows:

- Transportation (Collectors)
  - Use 40% of SDC's from new development in Westside (\$6,501,775)
  - Establish supplementary SDC as follows:

**Figure 9 - Proposed SDC's by Unit Type**

| Existing and Proposed Transportation Charges in Forest Grove by Dwelling Type | Current TDT | Proposed Area SDC (prelim.) | Total (prelim.) |
|-------------------------------------------------------------------------------|-------------|-----------------------------|-----------------|
| Single Family Detached                                                        | \$8,278     | \$12,084                    | \$20,362        |
| Apartment                                                                     | \$5,415     | \$7,905                     | \$13,320        |
| Condo/Townhouse                                                               | \$4,951     | \$7,227                     | \$12,178        |

- This set of SDC's is anticipated to generate \$23,729,862 – Total: \$30,231,637
- Sewer System
  - 100% SDC from development in both areas
  - Supplementary SDC of \$1,427 for David Hill
- Stormwater
  - 100% of SDC from development in both areas
  - \$7/month stormwater rate surcharge phased in over 5 years to finance deficit

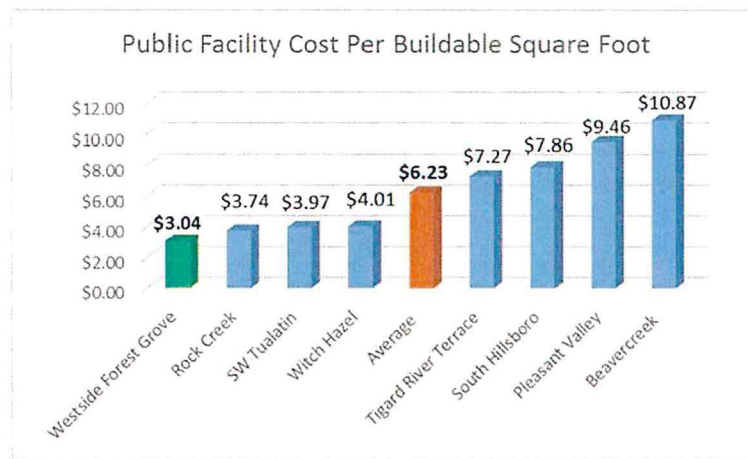


- City may establish reimbursement district if surcharge is insufficient
- Water System
  - 100% of SDC's
- Parks
  - 100% of SDC's

### *Market Considerations (Section V)*

The analysis concludes with an evaluation to determine if the proposed financing scheme is market feasible. The first consideration is the cost of the infrastructure improvements on a buildable square foot basis and comparing those costs with other urbanizing areas in the region, which is shown in Figure 9.

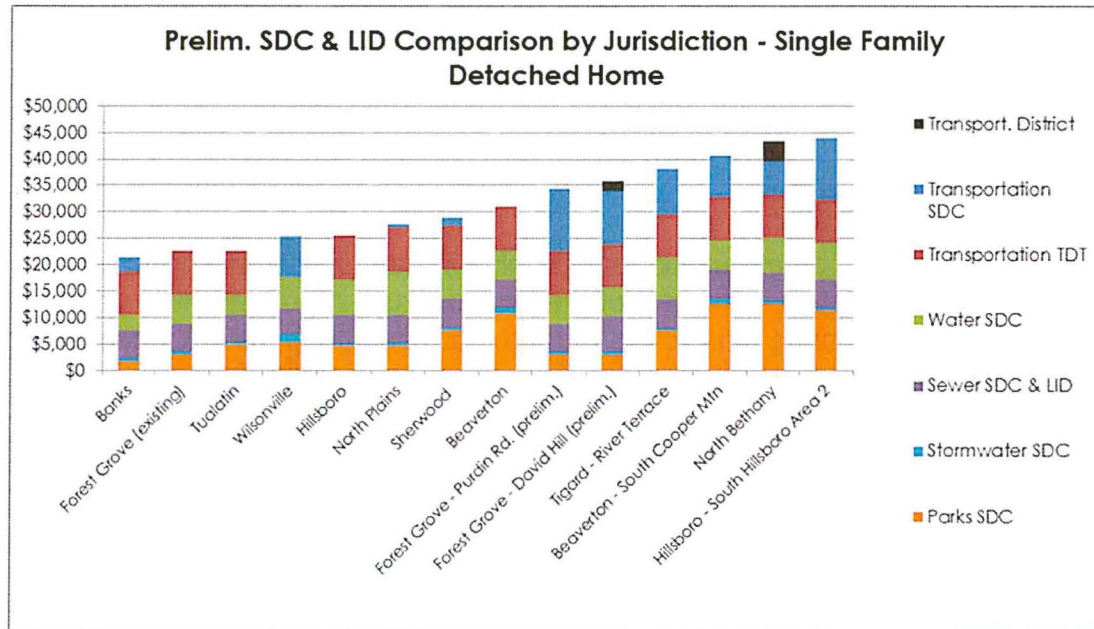
**Figure 10 - Comparison of Major Infrastructure Cost per Square Feet of Buildable Land Area**



**Source:** analysis by FCS Group using assumptions contained in adopted concept plans and funding strategies for each area; adjusted to 2016 dollars.

As can be seen from the figure, development costs for the Westside Planning Area compares favorably with other developing areas.

The next focus was to compare existing and proposed SDC's for the Westside Planning Area to SDC's for other areas in the region. Figures 10 and 11 provide a table and graphic on the comparisons.

**Figure 11 - SDC & LID Comparison by Jurisdiction**

Source: analysis by FCS Group as of August 2016.

**Figure 12 - Table of SDC's & LID Costs by Jurisdiction**

| Jurisdiction                        | Parks SDC | Stormwater SDC | Sewer SDC & LID | Water SDC | Transportation TDT | Transportation SDC | Transport District | Total    |
|-------------------------------------|-----------|----------------|-----------------|-----------|--------------------|--------------------|--------------------|----------|
| Banks                               | 1,800     | 510            | 5,300           | 2,825     | 8,278              | 2,704              | -                  | 21,417   |
| Forest Grove (existing)             | 3,000     | 510            | 5,300           | 5,478     | 8,278              | -                  | -                  | 22,566   |
| Tualatin                            | 4,786     | 510            | 5,300           | 3,754     | 8,278              | -                  | -                  | 22,628   |
| Wilsonville                         | 5,374     | 1,628          | 4,849           | 5,842     | -                  | 7,695              | -                  | 25,388   |
| Hillsboro                           | 4,647     | 510            | 5,300           | 6,830     | 8,278              | -                  | -                  | 25,565   |
| North Plains                        | 4,725     | 510            | 5,300           | 8,169     | 8,278              | 638                | -                  | 27,620   |
| Sherwood                            | 7,669     | 621            | 5,295           | 5,592     | 8,278              | 1,506              | -                  | 28,961   |
| Beaverton                           | 10,800    | 1,104          | 5,300           | 5,512     | 8,278              | -                  | -                  | 30,994   |
| Forest Grove - Purdin Rd. (prelim.) | 3,000     | 510            | 5,300           | 5,478     | 8,278              | 12,084             | -                  | 34,650   |
| Forest Grove - David Hill (prelim.) | 3,000     | 510            | 6,727           | 5,478     | 8,278              | 10,084             | 2,000              | 36,077   |
| Tigard - River Terrace              | 7,566     | 510            | 5,300           | 7,917     | 8,278              | 8,489              | -                  | 38,060   |
| Beaverton - South Cooper Mtn        | 12,624    | 1,104          | 5,300           | 5,512     | 8,278              | 7,725              | -                  | 40,543   |
| North Bethany                       | 12,645    | 510            | 5,300           | 6,687     | 8,278              | 6,113              | 3,750              | 43,283   |
| Hillsboro - South Hillsboro Area 2  | \$11,433  | \$510          | \$5,300         | \$6,830   | \$8,278            | \$11,731           | -                  | \$44,082 |

Source: survey conducted by FCS GROUP as of August 2016.

The analysis concludes that if the City implemented the recommended funding approach, the overall SDCs (and LID charges) would increase by approximately \$13,400 per single family dwelling within the Westside Planning Area. The resulting Westside Planning Area SDCs would be similar to the new overlay areas for South Hillsboro, Tigard River Terrace, Beaverton South Cooper Mountain, and North Bethany.

The analysis concludes by comparing the total assessments per single family detached dwelling for Forest Grove, Westside Planning Area, and new developing areas of South Cooper Mountain and



South Hillsboro. This comparison is shown in Figure 12 below and it shows that the proposed total charges for the Westside Planning Area compares favorably with these other developing areas in Washington County.

**Figure 13 - Comparison of SDC for Single Family Detached Dwellings**

| Total SDC & LID assessments per Single Family Detached Dwelling |                                                                              |                                                                  |                                                    |
|-----------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------|
|                                                                 | Current/<br>Proposed SDCs &<br>LIDs per Sq.Ft. of<br>Floor Area <sup>1</sup> | Expected<br>Home Sales<br>Price per<br>Square Foot <sup>**</sup> | SDCs & LIDs<br>as a % of<br>Current Sales<br>Price |
| Forest Grove (existing)                                         | \$9.03                                                                       | \$140.72                                                         | 6.4%                                               |
| Beaverton - South Cooper Mountain                               | \$16.22                                                                      | \$199.98                                                         | 8.1%                                               |
| Forest Grove - Westside Planning Area                           | \$14.43                                                                      | \$161.83                                                         | 8.9%                                               |
| Hillsboro - South Hillsboro                                     | \$17.63                                                                      | \$171.76                                                         | 10.3%                                              |

Note 1: Assumes 2,500 square foot house and assumes 15% price per square foot premium for housing in new master planned areas.

Note 2: Reflects sales price for homes built since 2010.

Compiled by FCS GROUP based on Zillow.com data.

### *Up-Front Improvements*

The City could consider an option to construct certain improvements in early years. One of the biggest challenges for the David Hill area is to construct initial improvements to facilitate development. Based on interest expressed to date, initial interest in development is up David Hill with about a 700 foot distance to the nearest existing sewer line. Parcel sizes are relative small and not yielding sufficient number of units for any one development project to fund the extension of offsite improvements. There is potentially a similar situation along Thatcher Road although, with the exception of one approved project (Green Grove Co-Op project), staff has not observed any development interests at this time. The following are a proposed and minimum list of possible improvements:

**Figure 14 - Up Front Improvement Costs**

|                                          |                                 |
|------------------------------------------|---------------------------------|
| Proposed Up Front Improvements           |                                 |
| • Thatcher Road Improvement              | - \$1,454,000                   |
| • 0.5 mg water reservoir (WS fair share) | - \$875,000                     |
|                                          | (overall cost of \$4,182,500)   |
| • Sewer lines – DH and Thatcher roads -  | \$1,128,750                     |
|                                          | \$3,457,750                     |
|                                          | (overall cost of \$6,765,250)   |
| Minimum Improvements                     |                                 |
| • David Hill Road Sewer Line (700 feet)  | \$460,000                       |
|                                          | (Line costs plus contingencies) |

More discussion on this approach is needed including property owners acceptance, risk to the City, other completing obligations and method to finance if this option is pursued.

#### *Costs by Area*

Appendix A if the Funding Strategy breaks down the cost and revenue received for each area of the Westside Planning area. The capital costs are not equal between the David Hill and Purdin Road areas. Figure 14 below summarizes those costs and estimated revenue from existing SDC's for each area. It suggests that the City could consider different approaches for financing improvements for each area. The total infrastructure cost for each area is \$34,932,500 for the David Hill area and \$12,690,000 for the Purdin Road area.



**Figure 15 - Summary of Capital Costs for David Hill and Purdin Road Areas**

| Summary of Capital Infrastructure Costs and Expected Funding Gap Under Status Quo |                 |                  |                |
|-----------------------------------------------------------------------------------|-----------------|------------------|----------------|
| Transportation Element                                                            |                 |                  |                |
|                                                                                   | David Hill Area | Purdin Road Area | Combined Areas |
| <b>Total Costs</b>                                                                |                 |                  |                |
| Total Costs                                                                       | \$23,880,900    | \$6,349,900      | \$30,230,800   |
| Net Revenue Based on Current TDT*                                                 | \$6,781,915     | \$9,472,522      | \$16,254,437   |
| Remaining Costs                                                                   | \$17,098,985    | -\$3,122,622     | \$13,976,363   |
| Water Element                                                                     |                 |                  |                |
|                                                                                   | David Hill Area | Purdin Road Area | Combined Areas |
| <b>Total Costs</b>                                                                |                 |                  |                |
| Total Costs                                                                       | \$6,855,500     | \$1,677,600      | \$8,533,100    |
| Net Revenue Based on Current SDC*                                                 | \$4,694,646     | \$6,557,166      | \$11,251,812   |
| Remaining Costs                                                                   | \$2,160,854     | -\$4,879,566     | -\$2,718,712   |
| Sanitary Sewer Element                                                            |                 |                  |                |
|                                                                                   | David Hill Area | Purdin Road Area | Combined Areas |
| <b>Total Costs</b>                                                                |                 |                  |                |
| Total Costs                                                                       | \$2,480,600     | \$1,155,000      | \$3,635,600    |
| Net Revenue Based on Current SDC*                                                 | \$181,684       | \$253,764        | \$435,448      |
| Remaining Costs                                                                   | \$2,298,916     | \$901,236        | \$3,200,152    |
| Stormwater Element                                                                |                 |                  |                |
|                                                                                   | David Hill Area | Purdin Road Area | Combined Areas |
| <b>Total Costs</b>                                                                |                 |                  |                |
| Total Costs                                                                       | \$1,067,500     | \$507,500        | \$1,575,000    |
| Net Revenue Based on Current SDC*                                                 | \$436,824       | \$610,716        | \$1,047,540    |
| Remaining Costs                                                                   | \$630,676       | -\$103,216       | \$1,533,098    |
| Parks Element                                                                     |                 |                  |                |
|                                                                                   | David Hill Area | Purdin Road Area | Combined Areas |
| <b>Total Costs</b>                                                                |                 |                  |                |
| Total Costs                                                                       | \$648,000       | \$3,000,000      | \$3,648,000    |
| Net Revenue Based on Current SDC*                                                 | \$2,571,000     | \$3,591,000      | \$6,162,000    |
| Remaining Costs                                                                   | -\$1,923,000    | -\$591,000       | -\$2,514,000   |

\* revenues are based on residential development only and conservatively excludes additional long-term SDC revenue from retail, schools and parks.



## **CONCLUSIONS OF INFRASTRUCTURE AND FUNDING APPROACH**

The analysis provided in the Infrastructure Analysis and Funding Approach reveals the following conclusions and questions:

- The conclusions in the two reports are consultant analysis and recommendations. Further discussion of the approach with property owners, developers and the City needs to be made before being implemented. These will be pursued once the Area Plan has been adopted and an overall policy base has been established.
- Infrastructure needed to develop the Westside Planning Area includes collector street system, sewer, water, stormwater, and parks.
- Road improvements identified in this analysis needs to be added to the City's Transportation System Plan (TSP) and the Transportation Development Tax (TDT) projects list to allow use of TDT in the Westside Planning Area.
- Total Infrastructure cost for the Westside Planning Area is \$47,622,500.
  - These costs vary between the David Hill (\$34,932,500) and Purdin Road (\$12,690,000) areas.
- Current SDC revenue could fund water and parks improvements with residual revenues to fund other related improvements in the community.
- Current SDC revenue would be deficient to entirely fund needed road, sewer and stormwater improvements.
- To address deficiencies, the recommendation is to primarily use supplemental SDC's with a monthly fee for stormwater over a 5 year period.
- The overall approach recommended by the consultant is less on a square footage basis than other developing areas in Washington County and is considered feasible.
- Further evaluations needed to be made in establishing a funding program include:
  - Water reservoirs development which would be the focus of the Water Master Plan update in 2018;
  - What percent of existing SDC's should be used to fund improvements?
  - Should up-front improvements be considered?

## **TRANSPORTATION ANALYSIS**

The consultants also prepared an analysis on the area roadways as a result of full build out of the Westside Planning Area (see Attachment 3). This analysis considered a "worse case" land use scenario including 2,132 dwellings and 126,500 square feet of non-residential space. This compares with 1,950 dwellings and 172,000 square feet of non-residential space under the Planning Commission land use direction. (Both alternatives include 65,000 square feet for an elementary school.) A comparison of the overall Average Daily Trips (ADT) for the two scenarios would be 23,219 for the worse-case scenario and 24,155 for the Planning Commission alternative. The analysis, however, is based on peak hourly trips rather than ADT. This results in a difference of 64 more two way trips for the Planning Commission scenario. This is not a significant, particularly considering that these trips would be distributed over the entire circulation system.

The following table is the current TSP analysis for the area roads. While this analysis includes the David Hill area for development, it does not include the added traffic from the Purdin Road area since the Purdin area was not yet added to the urban growth boundary by the Oregon Legislature. Further, the assessment was based on no traffic circles for the David Hill and Purdin road intersections with Highway 47.

**Figure 16 - 2035 Transportation Impacts from Current TSP**

| No.                               | Intersection                   | Operational Standard | Level of Service (LOS) <sup>1</sup> | Average Delay* (Seconds) | Volume / Capacity (V/C) |
|-----------------------------------|--------------------------------|----------------------|-------------------------------------|--------------------------|-------------------------|
| <i>Unsignalized Intersections</i> |                                |                      |                                     |                          |                         |
| 1                                 | Thatcher Road/Watercrest Road  | LOS E/0.99           | A/C                                 | 17.2 <sup>2</sup>        | 0.09 <sup>2</sup>       |
| 2                                 | Gales Creek Road/Thatcher Road | LOS E/0.99           | A/B                                 | 11.6 <sup>2</sup>        | 0.24 <sup>2</sup>       |
| 3                                 | Highway 47/Verboort & Purdin   | V/C=0.99             | A/F                                 | >200 <sup>2</sup>        | >2.00 <sup>2,3</sup>    |
| 5                                 | Highway 47/Martin Road         | V/C=0.99             | A/F                                 | >200 <sup>2</sup>        | >2.00 <sup>2</sup>      |
| 7                                 | Highway 47/David Hill Road     | V/C=0.99             | -/F                                 | >200 <sup>2</sup>        | 1.54 <sup>2,4</sup>     |
| <i>Signalized Intersections</i>   |                                |                      |                                     |                          |                         |
| 4                                 | Highway 47/Sunset Drive        | V/C=0.99             | B                                   | 16.1                     | 0.50                    |
| 6                                 | Pacific Avenue/Quince Street   | V/C=0.99             | D                                   | 53.4                     | 0.97                    |

\* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

<sup>1</sup> Oregon Highway Plan, Policy Element, Table 7, Oregon Department of Transportation, 1999.

<sup>2</sup> Washington County 2020 Transportation System Plan, Washington County, 2002.

This compares with the impacts and analysis provided in the document as a result of the Westside Planning Area. Keep in mind that these impacts would occur at full development of both the David Hill and Purdin Road areas and is anticipated by the Year 2035 or about 20 years in the future.



**Figure 17 - 2035 Transportation Impacts including the Westside Planning Area**

| No.                               | Intersection                   | Operational Standard | Level of Service (LOS) <sup>1</sup> | Average Delay* (Seconds) | Volume / Capacity (V/C) |
|-----------------------------------|--------------------------------|----------------------|-------------------------------------|--------------------------|-------------------------|
| <i>Unsignalized Intersections</i> |                                |                      |                                     |                          |                         |
| 1                                 | Thatcher Road/Watercrest Road  | LOS E/0.99           | A/C                                 | 21.8 <sup>2</sup>        | 0.15 <sup>2</sup>       |
| 2                                 | Gales Creek Road/Thatcher Road | LOS E/0.99           | A/B                                 | 10.8 <sup>2</sup>        | 0.21 <sup>2</sup>       |
| 5                                 | Highway 47/Martin Road         | V/C=0.99             | -/F                                 | 158.8 <sup>2</sup>       | 1.21 <sup>2</sup>       |
| <i>Roundabouts</i>                |                                |                      |                                     |                          |                         |
| 3                                 | Highway 47/Verboort & Purdin   | V/C=0.99             | F                                   | 87.4 <sup>2,3</sup>      | 1.34 <sup>2,3</sup>     |
| 7                                 | Highway 47/David Hill Road     | V/C=0.99             | F                                   | 91.4 <sup>2,3</sup>      | 1.33 <sup>2,3</sup>     |
| <i>Signalized Intersections</i>   |                                |                      |                                     |                          |                         |
| 4                                 | Highway 47/Sunset Drive        | V/C=0.99             | C                                   | 33.4                     | 0.60                    |
| 6                                 | Pacific Avenue/Quince Street   | V/C=0.99             | E                                   | 65.5                     | 0.99                    |

\* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Pending single lane roundabout intersection improvements are assumed here.

This analysis assumes the installation of the roundabouts at the David Hill and Purdin road intersections with Highway 47. As stated the analysis conclusions, the impact on the two roundabouts may require further channelization. Impacts at Martin Road is an issue regardless of the Westside Planning Area and will require further study to develop the appropriate solution.

The Oregon Transportation Planning Rule (TPR) requires coordination between land use plans and transportation plans. Under the TPR, when an amendment to a comprehensive plan is proposed a determination must be made by the local jurisdiction as to whether land uses allowed by the plan will significantly impact an existing transportation facility. Impact is measured at the end of the planning period identified in the adopted TSP. For Forest Grove this is 2035. Further discussion with ODOT is needed to address potential traffic impacts from the land uses in the Purdin Road planning area on the Highway 47 intersections with David Hill Road and Purdin Road since there will be a significant impact. The issue is whether this impact will occur before 2035 and if so how the impact will be mitigated (i.e. adding channelization to the roundabouts).

#### **ATTACHMENTS:**

- A. Memo - Final Revised Westside Water, Sewer and Stormwater Infrastructure Analysis dated June 24, 2016
- B. Westside Planning Area Funding Approach dated December, 2016
- C. 2035 PM Peak Hour Traffic Operations Analysis of "Worst Case" Land Use Alternative dated November 2, 2015

Forest Grove, Oregon



## WESTSIDE PLANNING AREA FUNDING APPROACH

December, 2016





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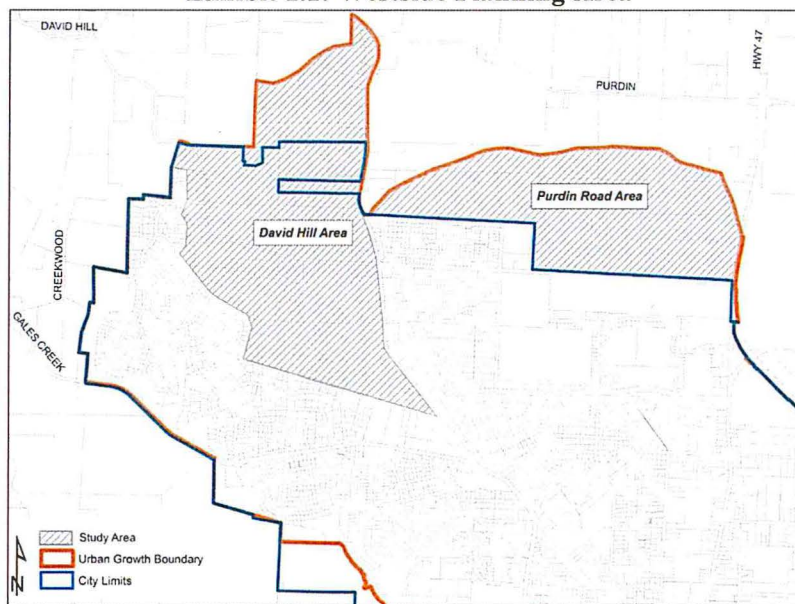
## SECTION I: INTRODUCTION

This section describes the context and project approach upon which the body of this report is based.

### A. PURPOSE

This Funding Approach document is intended to provide a course of action for the City to consider funding techniques that foster development within the Westside Planning Area (Area). The City of Forest Grove (City) has been working on a land use and infrastructure framework that will enable annexation of unincorporated areas known as the David Hill and Purdin Road areas. **Exhibit 1.1** shows the Westside Planning Area.

**Exhibit 1.1: Westside Planning Area**



The David Hill/Gales Creek planning area (also known as the David Hill planning area) has been included in the Forest Grove Urban Growth Boundary (UGB) for several years. According to forecasts prepared by Metro for regional planning purposes, it is anticipated that approximately 90% of the David Hill planning area could be developed by 2025. Purdin Road was included in the UGB in 2014 but is largely rural and has not yet been fully planned. For analysis purposes, it is assumed that the Westside Planning Area (including both David Hill and Purdin Road areas) will be fully developed over a 20-year time frame.



## B. BACKGROUND

The City of Forest Grove (population 23,080 in 2015) is currently the 22<sup>nd</sup> largest city in Oregon and is at the west side boundary of the Metro regional planning area. Forest Grove was incorporated in 1872 and is located within 20 miles of Portland and 10 miles from Oregon's Silicon Forest (Hillsboro and unincorporated WA County).

The goal of the Westside Planning effort is to provide a land use framework and financing plan to promote a well-planned, mixed-use community. At build-out, the Area is zoned to accommodate approximately 2,050 dwellings and approximately 61,500 gross square feet of leasable commercial space. In addition, an elementary school site, a community park, and a fire station are planned in the Area. **Exhibit 1.2** shows the total buildout assumptions in acres and units.

**Exhibit 1.2**

| <b>Exhibit 1.2: Westside Planning Area Growth Forecast - Buildout</b> |                  |               |              |                               |              |              |              |
|-----------------------------------------------------------------------|------------------|---------------|--------------|-------------------------------|--------------|--------------|--------------|
|                                                                       |                  | <b>Purdin</b> |              | <b>David Hill/Gales Creek</b> |              | <b>Total</b> |              |
|                                                                       | <b>Unit Type</b> | <b>Acres</b>  | <b>Units</b> | <b>Acres</b>                  | <b>Units</b> | <b>Acres</b> | <b>Units</b> |
| <b>Single Family Detached</b>                                         | Dwelling Units   | 125.64        | 976          | 198.27                        | 853          | 323.91       | 1,829        |
| <b>Single Family Attached</b>                                         | Dwelling Units   | 18.50         | 221          | 0.00                          | 4            | 18.50        | 225          |
| <b>Retail</b>                                                         | 1,000 SF         | 4.20          | 46.5         | 2.90                          | 15.0         | 7.10         | 61.5         |
| <b>School</b>                                                         | 1,000 SF         | 11.96         | 65.0         | 0.00                          | 0.0          | 11.96        | 65.0         |
| <b>Park Acres</b>                                                     | Acres            | 10.98         | --           | 0.00                          | 0.0          | 10.98        | --           |
| <b>Fire Station</b>                                                   | Employees        | 2.00          | 3.0          | 0.00                          | 0.0          | 2.00         | 3.0          |
| <b>Total</b>                                                          |                  | 173.28        |              | 201.17                        |              | 374.45       |              |

**Source:** Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP.

The dwelling unit growth assumptions provided above reflect estimates from the "Infrastructure Analysis" which reflects permitted zone density levels. The projected dwelling count, 2,054 in total, is higher than the Planning Commission recommendation of 1,895 units. The higher dwelling count is relied upon by engineers to ensure that the planned roads and infrastructure are designed to handle total allowable site development. In addition to infrastructure planning, the higher development forecasts also assume there will be flexibility through the public hearing review process to modify the land use designations to reflect current market and site development conditions. For example, the Infrastructure Analysis assumes the R-10 (Residential – 10,000 square foot lot size) zone is applied above the 440 foot elevation while the Planning Commission recommendation for that area is Suburban Residential, 1 unit per acre.

Aligning the growth forecast with project costs is critical to maintaining a rational nexus between the planned growth and the capital project costs contained in the local system development charge (SDC) methodology.

## C. PROJECT APPROACH

Following this Introduction, there are four main sections in this report:

- **Funding Framework (Section II).** In this section, potential funding sources for transportation, water, sewer, stormwater, and parks capital facilities are identified.

- **Capital Costs (Section III).** This section documents capital improvement costs for public facilities required to serve the Westside Planning Area.
- **Funding Evaluation & Recommendations (Section IV).** This section includes an evaluation of potential funding sources to be considered for the Westside Planning Area. This section also includes recommends new funding sources needed to pay for facilities needed to serve future development in the Westside Planning Area.
- **Market Considerations (Section V).** This final section discusses comparable development costs, SDCs, and home sales prices in and around the greater Portland Metro Region, with particular emphasis on Washington County.

While this report focuses on transportation, water, sewer, parks and stormwater capital facilities, the City intends to work with regional service providers to implement separate funding strategies for power/communication and other services.

## SECTION II: FUNDING FRAMEWORK

---

This section identifies funding tools and techniques that are often used in Oregon.

When capital improvements are funded or financed by the local jurisdiction, service provider(s), or through development agreement(s) the funding options used in Washington County include:

- ♦ System Development Charge (SDC)
- ♦ Transportation Development Tax (TDT)
- ♦ Utility Fee
- ♦ Local Option Levy
- ♦ Local Improvement District (LID)
- ♦ Reimbursement District
- ♦ Urban Renewal District (Tax Increment Financing)
- ♦ Debt Financing
- ♦ Public Improvement Agreements

A summary of these local options is provided below. The preferred mix of funding and financing requires careful consideration of the timing of development and the phasing of specific projects so that public facilities can be provided in a manner that is generally concurrent with expected levels of market activity or absorption. Please refer to **Section IV** for an evaluation of potential funding sources.

### A. SYSTEM DEVELOPMENT CHARGES

Oregon Revised Statutes (ORS) 223.297 to 223.314 authorize local governments to establish system development charges (SDCs), one-time fees on new development usually paid at the time of building permit issuance. SDCs are intended to recover a fair share of the capital improvements, including the cost of existing and planned facilities that provide capacity to serve future growth.

ORS 223.299 defines “capital improvements” as facilities or assets used for:

- ♦ Water supply, treatment, and distribution;
- ♦ Waste water collection, transmission, treatment, and disposal;
- ♦ Drainage and flood control;
- ♦ Transportation; and
- ♦ Parks and recreation.

If the required public facilities are included as a “qualified public improvement” per ORS 223.309, then the local government must have an ordinance or resolution that establishes or modifies an



improvement fee to provide credit against such fee for the construction of a qualified public improvement.

The City of Forest Grove currently charges SDCs for water and parks. The transportation, sewer, and stormwater SDCs are based on Washington County or Clean Water Services (CWS) methodologies.

## B. TRANSPORTATION DEVELOPMENT TAX

Washington County implemented the Transportation Development Tax (TDT), a countywide tax consistent with SDC law, on all development within the County. The City of Forest Grove can use TDT revenues on transportation projects that are included in the TDT project list.

Approved by Washington County voters on November 4, 2008 (Measure No. 34-164), the TDT replaced the previous fee, known as the Traffic Impact Fee. The TDT went into effect on July 1, 2009. Because Forest Grove is located within Washington County, the city may decide to use Washington County Transportation Development Tax (TDT) revenues for roadway improvements that add capacity.

## C. UTILITY FEES

Utility rates are a common way to raise local revenues for required infrastructure facilities and operations. They require approval and adoption by the city or service district as well as meet state and local regulations. Utility fees are paid for by customers within the service area and typically are included in monthly or bi-monthly utility bills for other services. Forest Grove currently imposes utility fees for sewer, water, and electrical services.

## D. LOCAL OPTION LEVY

After full annexation of the Westside Planning Area, the City could adopt a resolution that would advance an election by voters (within the planning area or the city at large) to establish a local option levy for ad valorem taxes to fund capital improvements. The City can choose to use the levy for two types of costs, operational and capital costs. An operational levy is valid for 5 years and a capital levy for 10 years. Local option levies would have to be reapproved by voters in the future. Issues with tax compression may also arise under Measures 5 and 50, which limit taxable amounts local jurisdictions may assess each year. The City currently has a local option levy for operations.

## E. LOCAL IMPROVEMENT DISTRICT

Cities in Oregon have the statutory authority to establish local improvement districts (LIDs) and levy special assessments on the benefited property to pay for improvements. These assessments are payable in annual installments for up to 30 years. LIDs are generally used for capital improvement projects that benefit numerous large tenants and/or private property owners.

The primary advantage of LIDs from the city's perspective is the ability to obtain a consistent level of revenue early in the development process. An LID can also provide the developer a certain degree of financial flexibility compared to SDCs. Financial intermediaries such as banks now view LIDs as a more reliable funding source than others (such as SDCs) and are more apt to provide loans based on future LID revenue streams.

## F. REIMBURSEMENT DISTRICT

Similar to LIDs, cities can negotiate advance financing arrangements with developers where a developer or city agrees to front capital improvements/investment within a designated reimbursement district. The party that advances the financing is then partially reimbursed as new land use development approvals are granted within the district over a period that usually extends up to 15 years. With reimbursement districts there is no guarantee that future revenues will be as steady and reliable as with the LID or property tax assessments.

## H. URBAN RENEWAL DISTRICT (URD)

The City currently has an urban renewal district (URD) in place that includes the Town Center and Pacific Avenue/19<sup>th</sup> Avenue corridor between the Town Center and generally Quince Street. There may be an opportunity to utilize funding from the creation of a new URD in the Westside Planning Area provided appropriate findings could be met. In many cases, URD funds are combined with other local funding sources to leverage non-local grants or loans to pay for needed infrastructure improvements. Additional analysis is required to determine whether a URD for the Westside Planning area is a viable option.

## I. PUBLIC DEBT FINANCING

The City may incur debt to pay for capital facilities, such as roads, stormwater facilities, parks and other projects in areas annexed by the City. The most typical forms of financing public infrastructure are through bonds or loans. Bonds are a common means of financing projects whose benefits are not confined to a single local district. General obligation (GO) bonds are advantageous because their debt service is funded by a property tax levy that is outside the limits of Measure 5. While GO bonds require voter approval, revenue bonds and full faith and credit bonds do not.

Revenue bonds require an ongoing source of revenue that can be pledged to payment of debt service. A utility fee or local option levy and LID payments could serve this purpose. A reserve requirement on revenue bonds would commit the City to maintain a bond reserve, which could be used to meet payments in the event pledged revenues fall short. This reserve is often set at the least of (a) 10 percent of the issue price of all new and outstanding parity bonds, (b) maximum annual debt service on all new and outstanding parity bonds, and (c) 1.25 times average annual debt service on all new and outstanding parity bonds. The reserve requirement is dictated by the terms of the bond resolution.

A hybrid of these two bond types is the full faith and credit bonds. This type of bond represents an unsecured claim on all the revenue streams of an agency without the pledge of any particular revenue stream. Full faith and credit bonds do not require voter approval and they are not subject to debt service coverage requirements. However, like revenue bonds, an ongoing source of revenue would need to be pledged to protect the City's general fund from added risk.

The city may also utilize state loans to fund strategic capital facilities. State loan funds available from Business Oregon currently include the Special Public Works Fund and the Oregon Bond Bank. Special Public Works funds are available on a competitive basis to public jurisdictions and can fund projects up to \$3.0 million in size but require well-secured loan guarantees from the applicants.

## G. PUBLIC IMPROVEMENT AGREEMENTS

Forest Grove uses “Public Improvement Agreements” in cases where a developer is required to construct public facilities to city standard as a condition of development. The agreement also provides assurances to the City and to the developer that the regulations that apply will not change during the term of the agreement. Agreements usually identify provisions for reservation or dedication of land for public purposes; responsibilities for providing infrastructure and services; and construction expenditure provisions for public facility investments.



## SECTION III: CAPITAL COSTS

---

This section describes Westside Planning Area public infrastructure capital costs. The capital costs are not comprehensive and reflect project improvements that will be ‘conditioned on approval of new development’ within the Area. For transportation, this generally includes collector facilities and excludes local neighborhood streets (which are also required to serve new development). For sanitary sewer and water facilities, this includes trunk line improvements and pump stations. Stormwater facilities cost elements reflect the projects needed to address water run off attributed to new transportation facilities and their impervious surface area. Finally, parks facilities are those identified in the Parks Master Plan that benefit the Westside Planning Area.

It should be noted that additional facilities will be required to handle on-site development impacts. Local neighborhood streets, water lines (connecting with trunk lines) and sewer lines below 12 inch diameter are expected to be constructed at the expense of developers.

### A. CAPITAL COST SUMMARY

The City has identified infrastructure costs for transportation, water, sewer, stormwater, and parks facilities in the Westside Planning Area. **Exhibit 3.1** summarizes the total project costs by infrastructure type which equates to approximately \$47.6 million, or about \$127,179 per acre (\$2.92 per SF of land area). Please refer to **Appendix A** for a summary of expected project costs and potential revenues under the current SDC rate structure by planning subarea (David Hill and Purdin Road).

A short-term investment of approximately \$3.5 million is required to serve the David Hill area before development can occur.

Transportation is a large portion of total costs at \$30.2 million. The next most expensive requirement is water at \$8.5 million. It is assumed that the sanitary sewer facilities will cost \$3.6 million, Stormwater facilities estimated at \$1.6 million, and parks facilities estimated at \$3.6 million. Please see **Section V** for detailed project infrastructure improvement and cost assumptions.

**Exhibit 3.1**

| Westside Planning Area Infrastructure Cost Assumptions                                                                          |                            |                           |                             |                       |                       |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------|-----------------------------|-----------------------|-----------------------|
|                                                                                                                                 | Short Term<br>Public Costs | Long Term<br>Public Costs | Total Local<br>Public Costs | Number of<br>Projects | Avg. Cost per<br>Acre |
| Transportation <sup>1</sup>                                                                                                     | \$1,454,000                | \$28,776,800              | \$30,230,800                | 11                    | \$80,734              |
| Water                                                                                                                           | 875,000                    | 7,658,000                 | 8,533,000                   | 13                    | \$22,788              |
| Sewer                                                                                                                           | 1,128,750                  | 2,506,850                 | 3,635,600                   | 8                     | \$9,709               |
| Stormwater                                                                                                                      | 0                          | 1,575,000                 | 1,575,000                   | 12                    | \$4,206               |
| Parks <sup>2</sup>                                                                                                              | 0                          | 3,648,000                 | 3,648,000                   | 3                     | \$9,742               |
| <b>Total</b>                                                                                                                    | <b>\$3,457,750</b>         | <b>\$43,760,650</b>       | <b>\$47,622,400</b>         | <b>47</b>             | <b>\$127,779</b>      |
| Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. |                            |                           |                             |                       |                       |
| <sup>1</sup> Costs for transportation include only the collector road network and do not include local residential streets      |                            |                           |                             |                       |                       |
| <sup>2</sup> Parks costs are applicable only in the Purdin Road area.                                                           |                            |                           |                             |                       |                       |

## B. CURRENT FUNDING FRAMEWORK

Major annexation areas require significant levels of capital investments in public infrastructure facilities. This section identifies the current funding framework for transportation, wastewater, water, and stormwater facilities.

- ♦ **Transportation:** The City currently charges the Washington County Transportation Development Tax, a countywide one-time tax on development.
- ♦ **Water:** The City currently owns and operates its own utility. The utility charges utility rates and levies system development charges (SDCs).
- ♦ **Sewer:** Clean Water Services (CWS) is the service provider for the City and the city has responsibility for maintaining gravity lines 12 inches or less in diameter. CWS sets the rates and SDCs, of which the City receives a portion. The City currently receives 20% of the revenue from the SDC and 80% goes to CWS. After July 2018, the City's share will drop to 4% of the SDC fee. We assume that the City will receive 4% of the SDC revenue. The City maintains an additional local sewer surcharge in addition to the CWS rates.
  - For all sewer pipes 8 inches or smaller in diameter, the City requires developers to build for local facilities. For pipes between 8 and 12 inches, it has been the City's policy to reimburse the developer for oversizing the line. In this analysis, we assume the City discontinues its reimbursement policy.
- ♦ **Stormwater:** Clean Water Services (CWS) is the service provider for the City and the City has responsibility for maintaining local stormwater quality/quantity facilities. CWS sets the rates and SDCs, of which the City receives a portion. The City receives shared stormwater SDCs similar to sewer. The City maintains an additional local stormwater surcharge fee to the CWS rates.
- ♦ **Parks:** The City currently charges an SDC to fund future parks and recreation facilities.

See **Exhibit 3.2** for a summary of current SDC rates and the City share of each rate. We have included only single family dwelling charges because, while multifamily units are levied a lower SDC, it is unclear how many will be constructed.

### Exhibit 3.2

| SDCs Charged in Forest Grove per Dwelling         |                     |                    |
|---------------------------------------------------|---------------------|--------------------|
| Infrastructure Type (with Oversight Jurisdiction) | Total Rate Per Unit | City Share of Rate |
| Transportation (Washington Co)*                   | \$7,914             | \$7,914            |
| Water (City)                                      | \$5,478             | \$5,478            |
| Sewer (CWS)                                       | \$5,300             | \$212              |
| Stormwater (City)                                 | \$510               | \$510              |
| Parks (City)                                      | \$3,000             | \$3,000            |

**Source:** Clean Water Services, Washington County, and City of Forest Grove, compiled by FCS GROUP.

\*Reflects blended rate of TDT which accounts for single family detached (~89% of development) and single family attached (~11% of development).

If we assume that the existing (status quo) SDCs are the only source of funding for Westside Planning Area infrastructure, we would expect the City to collect adequate revenues *over time* to meet capital requirements for water, sewer, and parks, but not enough revenues for transportation or stormwater facilities (see **Exhibit 3.3**).

Because major public facility improvements are needed before significant levels of development can be approved, and the fact that SDC revenues accrue with new development, the “pay as you go” approach is not a feasible solution for funding short-term capital projects.

Other local policy questions to address include:

- ♦ Should all development impact fees (SDC and TDT revenues) collected from development in the Westside Planning Area be dedicated to projects located in this plan district?
- ♦ What is the timing of revenues in relationship with the planned schedule of capital expenditures? If capital facilities are needed before development occurs and SDC revenues are collected in subsequent years, how will the City be able to advance fund the planned infrastructure?
- ♦ What funding alternatives should the City adopt to provide adequate funding in the short-term and long-term, particularly for transportation and stormwater facilities which are projected to have a major funding gap without adoption of new funding sources.
- ♦ Do certain capital projects have limited benefits to either Purdin Road or David Hill, the two components of the Westside Planning area?

These and other policy considerations are discussed in the next section.



**Exhibit 3.3**

| Potential Revenue from Current SDCs Compared with Project Costs                                          |                        |                     |                         |                          |                          |
|----------------------------------------------------------------------------------------------------------|------------------------|---------------------|-------------------------|--------------------------|--------------------------|
|                                                                                                          | Net New Dwelling Units | City Share of Rates | Total Projected Revenue | Total Local Public Costs | Total Local Public Costs |
| Transportation                                                                                           | 2,054                  | \$7,914             | \$16,254,437            | \$30,230,800             | (\$13,976,363)           |
| Water                                                                                                    | 2,054                  | \$5,478             | \$11,251,812            | \$8,533,000              | \$2,718,812              |
| Sewer                                                                                                    | 2,054                  | \$212               | \$435,448               | \$3,635,600              | (\$3,200,152)            |
| Stormwater                                                                                               | 2,054                  | \$510               | \$1,047,540             | \$1,575,000              | (\$527,460)              |
| Parks                                                                                                    | 2,054                  | \$3,000             | \$6,162,000             | \$3,648,000              | \$2,514,000              |
| <b>Source:</b> Clean Water Services, Washington County, and City of Forest Grove, compiled by FCS GROUP. |                        |                     |                         |                          |                          |
| <b>Note:</b> Multifamily dwelling SDCs are approximately 70% of single family SDCs.                      |                        |                     |                         |                          |                          |

## B.1 Funding Scenarios

Three funding scenarios were evaluated that would dedicate varying levels of current SDC/TDT revenue to the Westside Planning Area: 18%, 40%, and 100%. The range in percentages reflects a low-end, high-end and middle range scenario. The 18% scenario reflects the estimated share of future growth (in population) of Westside Planning Area compared to current citywide population. The 100% scenario assumes that all SDC/TDT revenues collected in the Westside Planning Area are dedicated to projects in the Area. The 40% SDC/TDT allocation scenario represents an assumption that reflects the West Side Planning Area's share of total city-wide housing growth forecasts for the City of Forest Grove over the next 20 years.

## SECTION IV: FUNDING EVALUATION

---

This section provides an evaluation of the funding tools that were identified previously.

### A. FUNDING EVALUATION CRITERIA

An evaluation of funding options for each public facility type was conducted to ascertain the relative potential for implementing the potential funding measures identified above.

#### A.1 Equity

Equity is defined herein as the equitable distribution of cost/risk among three categories: existing city residents, future West Planning Area residents, and current developers/property owners.

A score was assigned to each funding scenario ranging from low cost/risk (3) to high cost/risk (1). The overall equity score for each funding scenario was determined based upon the average of the scores awarded in this category.

#### A.2 Reliability of Funds

Reliability of funds is an important consideration, especially if debt is used to advance funding for improvements. Funding sources such as SDCs and Reimbursement Districts do not generate a predictable revenue stream and have poor reliability scores. Secured revenue bonds, special districts, and LIDs tend to be far more reliable and less risky to the agency that takes on debt. A score of 1 (low) to 3 (high) was assigned to each funding scenario based on how reliable the funds were in each scenario.

#### A.3 Market Acceptance

Adequate public facilities must be provided (and funded) before major private development can occur. The ability for the public or private sector to fund necessary infrastructure to accommodate new private development is an important consideration. If there is an over reliance on private developers/property owners to fund all necessary public infrastructure, the development costs per unit of net development (housing units or commercial floor area) may drive up costs to a level that exceeds supportable market prices. However, if new public facilities are funded primarily using SDCs or General Funds, it is likely that the city would not invest in these facilities until adequate capital reserves are established which could take many years. A score of 1 (low) to 3 (high) was assigned to each funding scenario based on the relative potential it would have to facility development within the near-term, six years.

#### A.4 Ease of Implementation

Ease of Implementation refers to the process and administrative cost required to implement the funding sources identified. Some funding sources, such as utility rates and SDCs, do not require

public votes to enact and therefore are relatively easier to implement than funding sources that require a public vote or legal formation steps (such as a new local option levy or LIDs). A score of 1 (low) to 3 (high) was assigned to each funding scenario based on the relative ease of implementation to enact the relevant funding options.

## A.5 Ability to Address Costs

Using the adopted facility master plans and the CIP, City staff was able to identify a preliminary list of facility improvements necessary to make development possible. Each improvement inherently entails additional capital costs that are to be incurred by the city, other major service providers (e.g., Washington County), or developers.

A score of 1 (low) to 3 (high) was assigned to each funding scenario based on the anticipated level of funds it would generate in comparison to the expected near-term and long-term capital cost requirements.

## A.6 Total Evaluation Score

As shown in **Exhibit 4.1**, a total score was computed for each funding scenario using the overall equity score and the scores assigned for the ability to do the following: facilitate development, implement the funding scenario, address cost. The total score was then used to rank each funding scenario. The scenarios with the highest scores are identified as the preferred funding scenario for each public facility type. **The recommended funding options include a combination of area specific SDCs, utility fee surcharges for stormwater facilities, and local improvement districts (if necessary). Development Agreements are recommended for developments involving more than 7 lots, specifying private construction of sewer and water lines under 12 inches, and land to be dedicated for public facilities.**

**Exhibit 4.1**

| Westside Plan District Evaluation of New Funding Options |        |                      |                   |                        |                                    |                                    |                            |                        |
|----------------------------------------------------------|--------|----------------------|-------------------|------------------------|------------------------------------|------------------------------------|----------------------------|------------------------|
| Funding Option                                           | Equity | Reliability of Funds | Market Acceptance | Ease of Implementation | Ability to Address Near-Term Costs | Ability to Address Long-Term Costs | Overall Score (sum of + s) | Funding Recommendation |
| Development Agreements                                   | +      | +++                  | ++                | +++                    | +++                                | ++                                 | 14                         | ✓                      |
| Utility Fees (Area Specific)                             | ++     | +++                  | +++               | ++                     | +                                  | +++                                | 14                         | ✓                      |
| SDC (Area Specific)                                      | ++     | +                    | +++               | +++                    | +                                  | +++                                | 13                         | ✓                      |
| Local Improvement District                               | ++     | +++                  | +                 | +                      | +++                                | ++                                 | 12                         | ✓                      |
| Bonding (LTGO)                                           | +      | +++                  | ++                | +                      | +++                                | +                                  | 11                         |                        |
| Utility Fees (citywide)                                  | +      | +++                  | +                 | ++                     | +                                  | +++                                | 11                         |                        |
| Local Option Levy                                        | ++     | ++                   | +                 | +                      | +                                  | +++                                | 10                         |                        |
| SDC (citywide)                                           | +      | +                    | ++                | ++                     | +                                  | +++                                | 10                         |                        |
| Reimbursement District                                   | ++     | +                    | ++                | +                      | +                                  | ++                                 | 9                          |                        |
| Urban Renewal District                                   | +      | +                    | +                 | ++                     | +                                  | ++                                 | 8                          |                        |

Notes:

+ least positive

++

+++ most positive

Source: FCS GROUP

## B. TRANSPORTATION FUNDING APPROACH

### B.1 Capital Cost Requirements

The total transportation facility cost for the projects that are required to accommodate Westside Planning Area development is estimated at \$30.2 million as shown in **Exhibit 4.2**. City staff



confirmed that these improvements are needed to serve planned growth created by trips to/from the Westside Planning Area. Hence, the capital costs should be borne by property developers and/or future property owners in the Westside Planning Area.

In the short-term (next 5-6 years) Project 9b (Thatcher Road improvements) must be constructed to provide adequate transportation to serve new growth in the David Hill area. Discussions with city staff determined that since this project will primarily benefit the David Hill area, its cost should be attributed to property developers and future property owners within the David Hill area. All other transportation projects are long term and benefit the Westside Planning Area as a whole.

#### Exhibit 4.2

| Transportation Facility Cost Estimates |                                      |                                               |                                                                                                  |                      |                       |                     |
|----------------------------------------|--------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------|-----------------------|---------------------|
| No.                                    | Street Name                          | Limits                                        | Description                                                                                      | David Hill Area Cost | Purdin Road Area Cost | Total Cost          |
| <b>Short Term Projects</b>             |                                      |                                               |                                                                                                  |                      |                       |                     |
| 9b                                     | Thatcher Road                        | David Hill Road to Purdin Road                | Full improvements to Council Creek crossing                                                      | \$1,454,000          |                       | \$1,454,000         |
| <b>Long Term Projects</b>              |                                      |                                               |                                                                                                  |                      |                       |                     |
| 1                                      | Road 1 - Gales Ck (Vista Drive)      | Watercrest Road to NW Thatcher Road           | Construct new 1,050-foot urban collector street                                                  | \$1,000,300          |                       | \$1,000,300         |
| 2                                      | Road 2 - Gales Ck                    | Area 7 to Area 8                              | Construct new 3,200-foot urban collector street                                                  | \$4,246,000          |                       | \$4,246,000         |
| 3                                      | Road 3 - Gales Ck                    | Area 8 Connector                              | Construct new 600-foot urban collector street                                                    | \$787,200            |                       | \$787,200           |
| 4                                      | Road 4 - David Hill                  | David Hill Road to Purdin Road                | Construct new 4,700-foot urban collector street                                                  | \$6,409,200          |                       | \$6,409,200         |
| 5                                      | Road 5 - David Hill (Plum Hill Road) | Area 13 Mid-Block Connection to Thatcher Road | Construct new 1,250-foot urban collector street                                                  | \$1,212,200          |                       | \$1,212,200         |
| 6                                      | Road 6 - David Hill                  | Area 13 to temporary turn-around              | Construct new 2,300-foot urban collector street                                                  | \$2,391,000          |                       | \$2,391,000         |
| 7                                      | Road 7 - Purdin                      | Brooke Street to David Hill Road              | Construct new 5,500-foot urban collector street                                                  |                      | \$4,766,200           | \$4,766,200         |
| 8                                      | Road 8 - Purdin                      | David Hill Road to Proposed Brooke Street     | Construct new 1,750-foot urban collector street                                                  |                      | \$1,583,700           | \$1,583,700         |
| 9a                                     | Road 9 - Thatcher                    | David Hill Road to Purdin Road                | Half street reconstruction, 4,050-foot 1/2 street improvements. Excluding Council Creek Crossing | \$2,437,500          |                       | \$2,039,500         |
| 10                                     | Road 10 - David Hill                 | Thatcher Road to West of Area 9               | Full street reconstruction, 5,100-foot urban collector street                                    | \$3,943,500          |                       | \$3,943,500         |
| <b>Long Term Subtotal</b>              |                                      |                                               |                                                                                                  | \$22,426,900         | \$6,349,900           | \$28,776,800        |
| <b>Total</b>                           |                                      |                                               |                                                                                                  | <b>\$23,880,900</b>  | <b>\$6,349,900</b>    | <b>\$30,230,800</b> |

Source: Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

## B.2 Funding Scenarios

Using these three scenarios described above, FCS GROUP calculated the level of funding required from the private sector necessary to cover 100% of the project costs. As mentioned previously, a new local funding source is required for the City to obtain adequate funds to construct the full transportation project list. The City also requires approximately \$1.5 million in short-term funding to construct Thatcher Road (Project 9b) improvements.

**Exhibit 4.3** shows the level of funding required based on how much TDT revenue is dedicated to the Westside Planning area. In each scenario, the total transportation capital improvement cost is \$30.2 million, but the amount of TDT revenue dedicated to improvements within the Westside Planning Area ranges from \$2.9 to \$16.3 million. Hence, the resulting transportation funding gap is expected to range from \$14 to \$27 million.

**Exhibit 4.3**

| <b>Transportation Funding Costs</b>     |                                                                            |                                                                            |                                                                             |
|-----------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|                                         | <b>18% of Existing TDT<br/>Dedicated to<br/>Westside Planning<br/>Area</b> | <b>40% of Existing<br/>TDT Dedicated to<br/>Westside Planning<br/>Area</b> | <b>100% of Existing<br/>TDT Dedicated to<br/>Westside<br/>Planning Area</b> |
| <b>Total Costs</b>                      | <b>\$30,230,800</b>                                                        | <b>\$30,230,800</b>                                                        | <b>\$30,230,800</b>                                                         |
| <b>TDT Revenue Based on Current Fee</b> | <b>\$16,254,437</b>                                                        | <b>\$16,254,437</b>                                                        | <b>\$16,254,437</b>                                                         |
| <b>Less Revenue Dedicated to Area</b>   | <b>-\$2,925,799</b>                                                        | <b>-\$6,501,775</b>                                                        | <b>-\$16,254,437</b>                                                        |
| <b>Remaining Costs</b>                  | <b>\$27,305,001</b>                                                        | <b>\$23,729,025</b>                                                        | <b>\$13,976,363</b>                                                         |

Source: FCS GROUP.

**Exhibit 4.4** shows the fee amount the City needs to fully fund the remaining funding gap for transportation facilities. Each funding source shown below would be intended to address the funding deficiency. For example, if 40% of the TDT revenues are dedicated to transportation projects within the Westside Planning Area, the net funding gap is expected to be approximately \$23.7 million. Given the level of planned development in the Westside Planning Area, this funding gap could be addressed though any of the following options:

- New transportation SDC of \$11,553 per dwelling unit (one time charge); or
- New transportation utility fee surcharge of \$96 per month; or
- New Local Option Levy of \$1,749 per year for the average home; or
- New Local Improvement District with \$23.7 million in principal and approximately \$8.3 million in interest payments.

**Exhibit 4.4**

| <b>Transportation Funding Options</b>             |                                                                            |                                                                            |                                                                             |
|---------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
|                                                   | <b>18% of Existing TDT<br/>Dedicated to<br/>Westside Planning<br/>Area</b> | <b>40% of Existing<br/>TDT Dedicated to<br/>Westside Planning<br/>Area</b> | <b>100% of Existing<br/>TDT Dedicated to<br/>Westside<br/>Planning Area</b> |
| <b>Costs</b>                                      |                                                                            |                                                                            |                                                                             |
| <b>Remaining Costs</b>                            | <b>\$27,305,001</b>                                                        | <b>\$23,729,025</b>                                                        | <b>\$13,976,363</b>                                                         |
| <b>New Fee to Recover Remaining Costs in Full</b> |                                                                            |                                                                            |                                                                             |
| <b>New SDC (per single family unit)</b>           | <b>\$13,294</b>                                                            | <b>\$11,553</b>                                                            | <b>\$6,804</b>                                                              |
| <b>Utility Fee (surcharge per month)</b>          | <b>\$110.78</b>                                                            | <b>\$96.27</b>                                                             | <b>\$56.70</b>                                                              |
| <b>Local Option Levy (per \$1,000 AV)*</b>        | <b>\$6.71</b>                                                              | <b>\$5.83</b>                                                              | <b>\$3.43</b>                                                               |
| <b>Local Option annual cost/\$300k home</b>       | <b>\$2,013</b>                                                             | <b>\$1,749</b>                                                             | <b>\$1,030</b>                                                              |
| <b>Local Improvement District**</b>               | <b>\$36,846,523</b>                                                        | <b>\$32,020,949</b>                                                        | <b>\$18,860,295</b>                                                         |

\* assumes special levy applied to Westside Plan District over 10 years.

\*\* assumes LID payments are financed at 6.5% over 10 years.

Source: FCS GROUP.



### B.3 Selected Funding Approach

After discussion with city staff, a preliminary funding approach has been formulated. The funding approach would rely upon an allocation of up to 40% of TDT revenues to the Westside Planning Area combined with a new transportation SDC on new development in the Westside Planning Area, until any transportation financing obligations by the City are met. In this approach, the local transportation SDC would be approximately \$11,369 per dwelling unit (plus administration charges). Note, actual charges would be higher for detached homes and lower for condos/townhomes and multifamily dwellings.

In light of the fact that SDC revenues would cumulate over time they would not be adequate to fully fund the short-term construction of the Thatcher Road project. Also, because David Hill is under multiple ownerships, it is unlikely that any single developer will be able to front the \$1.5 million cost for Thatcher Road improvements on their own. In order to help spur development, the City would need to evaluate the feasibility of advance financing the cost of this improvement project using its LTGO bonding capacity or other financing method. If the City decides to advance financing for this project, the formation of an LID in the David Hill area is recommended.

If a \$1.5 M LID is formed for the benefit area (includes David Hill and Gales Creek areas), the LID assessment would be approximately \$7,456 per acre or \$2,000 per allowable dwelling unit (assumes 90% absorption over 20 years or 771 net new dwelling units). Property owners would have the option of financing LID assessments over a 10 year (or longer) time frame.

City debt payment obligations would have a more secure stream of revenue from LID payments by properties within the David Hill area. In exchange for LID participation (secured by property liens until assessments are paid in full), a lower transportation SDC would be incurred in the David Hill area than in the Purdin Road area. It is recommended that this strategy be further evaluated by the City and subjected to property owner input prior to its refinement and implementation.

## C. WATER FUNDING APPROACH

### C.1 Capital Cost Requirements

The total water system infrastructure cost for the projects that are required to serve future development within the City and accommodate Westside Planning Area development is estimated at \$23.5 million, of which \$8.5 million is required for the Westside Planning Area, as shown in **Exhibit 4.5**.

According to city staff and engineering consultants, one major water supply project in the higher elevation areas of David Hill is required, a 500,000 gallon reservoir, prior to permitting new development. This short term project would cost approximately \$4.2 million. According to engineering estimates, approximately \$440,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R10 zoning. If there is a reduction in the density permitted in this area to SR (1 du/acre) approximately \$120,000 or 2.5% of the total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 24 dwelling units.



### Exhibit 4.5

| Water Facility Cost Estimates |                                       |             |                     |                                                      |                 |
|-------------------------------|---------------------------------------|-------------|---------------------|------------------------------------------------------|-----------------|
| No.                           | Description                           | Linear Feet | Total Costs         | Estimated Costs Attributed to Westside Planning Area | Area of Benefit |
| <b>Short Term Projects</b>    |                                       |             |                     |                                                      |                 |
| 10a                           | One 0.5 MG reservoirs <sup>1</sup>    | EA          | \$2,390,000         | \$500,000                                            | David Hill      |
|                               | Contingencies and Engineering         |             | \$1,792,500         | \$375,000                                            | David Hill      |
|                               | <i>Short Term Subtotal</i>            |             | <i>\$4,182,500</i>  | <i>\$875,000</i>                                     |                 |
| <b>Long Term Projects</b>     |                                       |             |                     |                                                      |                 |
| 1                             | Road 1 Water main                     | 1,050       | 63,000              | \$63,000                                             | David Hill      |
| 2                             | Road 2 Water main                     | 3,200       | 192,000             | \$192,000                                            | David Hill      |
| 3                             | Road 3 Water main                     | 600         | 36,000              | \$36,000                                             | David Hill      |
| 4                             | Road 4 Water main                     | 4,700       | 282,000             | \$282,000                                            | David Hill      |
| 5                             | Road 5 Water main                     | 1,250       | 75,000              | \$75,000                                             | David Hill      |
| 6                             | Road 6 Water main                     | 2,300       | 138,000             | \$138,000                                            | David Hill      |
| 7                             | Road 7 Water main                     | 5,500       | 330,000             | \$330,000                                            | Purdin Road     |
| 8                             | Road 8 Water main                     | 1,750       | 105,000             | \$105,000                                            | Purdin Road     |
| 9                             | Road 9 Water main                     | 3,500       | 525,000             | \$525,000                                            | David Hill      |
|                               | One 0.5 MG reservoirs <sup>1, 4</sup> | EA          | \$2,403,846         | \$0                                                  | David Hill URA  |
| 11                            | Two 0.3 MG reservoirs <sup>2</sup>    | EA          | \$2,910,448         | \$1,950,000                                          | Entire Area     |
| 12                            | One 2.25 MG reservoir near Watercrest | EA          | \$2,956,522         | \$680,000                                            | Entire Area     |
|                               | Contingencies and Engineering         |             | \$5,709,728         | \$3,282,000                                          | Entire Area     |
|                               | <i>Long Term Subtotal</i>             |             | <i>\$13,322,698</i> | <i>\$7,658,000</i>                                   |                 |
|                               | <b>Total</b>                          |             | <b>\$17,505,198</b> | <b>\$8,533,000</b>                                   |                 |

<sup>1</sup> One reservoir expected to be used by development within David Hill from 440 to 615 feet in elevation and portions of the David Hill URA between 190 and 615 feet. The other reservoir expected to be used to serve the remainder of the David Hill URA between 190 and 615 feet which is included herein to account for the shared costs of land acquisition, piping, pressure reducing valves and a pump station. Approximately \$500,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R10 zoning. If there is a reduction in the density permitted in this area to SR (1 du/acre) approximately \$120,000 or 2.5% of the total cost of these reservoirs would be attributed to serving the David Hill area above 440 feet which would include an estimated 24 dwelling units.

<sup>2</sup> A portion of these reservoirs will be used to serve the David Hill UGB between 250 and 440 feet. Approximately 67% of total costs would be associated with the David Hill Planning Area.

<sup>3</sup> Approximately 23% of the cost of this reservoir would be associated with the David Hill and Purdin Road Planning Areas.

<sup>4</sup> Cost of second 0.5 MG reservoir is shown for reference only and is not included in the Long Term Subtotal.

**Source:** Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

## C.2 Funding Scenarios

FCS GROUP calculated the level of funding required from the private sector necessary to cover 100% of the project costs. **Exhibit 4.6** shows the level of funding required based on how much SDC revenue is dedicated to the area. Another funding source is required for the City to construct the full project list unless the City devotes at least 76% of Westside Planning Area future SDC revenues to project capital costs.



**Exhibit 4.6**

| <b>Water Funding Costs</b>                |                                                         |                                                         |                                                          |
|-------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|
|                                           | 18% of Existing SDC Dedicated to Westside Planning Area | 40% of Existing SDC Dedicated to Westside Planning Area | 100% of Existing SDC Dedicated to Westside Planning Area |
| <b>Total Costs</b>                        | <b>\$8,533,000</b>                                      | <b>\$8,533,000</b>                                      | <b>\$8,533,000</b>                                       |
| SDC Revenue Based on Current Fee          | \$11,251,812                                            | \$11,251,812                                            | \$11,251,812                                             |
| <b>Less SDC Revenue Dedicated to Area</b> | <b><u>-\$2,025,326</u></b>                              | <b><u>-\$4,500,725</u></b>                              | <b><u>-\$11,251,812</u></b>                              |
| <b>Remaining Funding Gap</b>              | <b>\$6,507,674</b>                                      | <b>\$4,032,275</b>                                      | <b>\$0</b>                                               |

Source: FCS GROUP.

After identifying the remaining costs, **Exhibit 4.7** shows the fee amount the City must adopt to fully fund remaining costs. Each funding source shown below will address the full deficiency. The funding options include: an area specific SDC, utility surcharge, local option levy and a LID.

**Exhibit 4.7**

| <b>Water Funding Options</b>                      |                                                         |                                                         |                                                          |
|---------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|
|                                                   | 18% of Existing SDC Dedicated to Westside Planning Area | 40% of Existing SDC Dedicated to Westside Planning Area | 100% of Existing SDC Dedicated to Westside Planning Area |
| <b>Costs</b>                                      |                                                         |                                                         |                                                          |
| <b>Remaining Costs</b>                            | <b>\$6,507,674</b>                                      | <b>\$4,032,275</b>                                      | <b>\$0</b>                                               |
| <b>New Fee to Recover Remaining Costs in Full</b> |                                                         |                                                         |                                                          |
| <b>New SDC (per unit)</b>                         | \$3,168                                                 | \$1,963                                                 | \$0                                                      |
| <b>Utility Fee (fixed charge per month)</b>       | \$26.40                                                 | \$16.36                                                 | \$0.00                                                   |
| <b>Local Option Levy (per \$1,000 AV)*</b>        | \$1.60                                                  | \$0.99                                                  | \$0.00                                                   |
| <b>Local Option annual cost/\$300k home</b>       | \$480                                                   | \$297                                                   | \$0                                                      |
| <b>Local Improvement District**</b>               | \$8,781,730                                             | \$5,441,323                                             | \$0                                                      |

\* assumes special levy applied to Westside Plan District over 10 years.

\*\* assumes LID payments are financed at 6.5% over 10 years.

Source: FCS GROUP.

### C.3 Selected Funding Approach

The selected funding strategy for water relies upon the existing water system SDC and assumes that at least 76% of water SDC revenues collected in the Westside Planning Area will be used to meet capital improvement obligations attributed to the area. In this scenario, no additional SDC would be needed.

Similar to the issue of funding short-term transportation projects, the ability for the City to fund required short-term water reservoir improvements using SDC revenues is untenable. It is recommended that the City consider issuing revenue bonds (backed by water rates) or a new GO bond (requires voter approval) to pay for short-term water capital improvements. It is recommended that this strategy be further evaluated by the City and subjected to public input prior to its refinement and implementation.

## D. SANITARY SEWER FUNDING APPROACH

### D.1 Capital Cost Requirements

The total sewer system facility cost for the projects that are required to accommodate Westside Planning Area development is estimated at \$3.6 million, as shown in **Exhibit 4.8**. For sewer lines smaller than 12 inches, the City generally requires private developers to construct and dedicate them prior to development. This means the City will likely require all sewer distribution lines to be built as a condition of development approval. However, there are two short-term sewer line projects totaling \$1.1 million, which would only benefit the David Hill area. The \$1.1 million construction cost would likely be too high for any one developer to afford on their own so some level of upfront public investment would be required.

**Exhibit 4.8**

| Sewer Facility Cost Estimates                                                                                                                                                                                                                |                                 |                    |                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------|-----------------|
| No.                                                                                                                                                                                                                                          | Description                     | Estimated Cost     | Area of Benefit |
| <b>Short Term Projects</b>                                                                                                                                                                                                                   |                                 |                    |                 |
| 9                                                                                                                                                                                                                                            | Road 9 Sewer Line               | \$262,500          | David Hill      |
| 10                                                                                                                                                                                                                                           | Road 10 Sewer Line (700 LF 12") | \$382,500          | David Hill      |
|                                                                                                                                                                                                                                              | Contingencies and Engineering*  | \$483,750          | David Hill      |
|                                                                                                                                                                                                                                              | <i>Short Term Subtotal</i>      | <i>\$1,128,750</i> |                 |
| <b>Long Term Projects</b>                                                                                                                                                                                                                    |                                 |                    |                 |
| 1                                                                                                                                                                                                                                            | Road 1, 2, 3, Sewer Line        | \$225,000          | David Hill      |
| 4                                                                                                                                                                                                                                            | Road 4 Sewer Line               | \$300,000          | David Hill      |
| 5                                                                                                                                                                                                                                            | Road 5 Sewer Line               | \$82,500           | David Hill      |
| 6                                                                                                                                                                                                                                            | Road 6 Sewer Line               | \$165,000          | David Hill      |
| 7                                                                                                                                                                                                                                            | Road 7 Sewer Line (10")         | \$405,000          | Purdin Road     |
| 8                                                                                                                                                                                                                                            | Road 8 Sewer Line (10")         | \$255,000          | Purdin Road     |
|                                                                                                                                                                                                                                              | Contingencies and Engineering*  | \$1,074,350        | Entire Area     |
|                                                                                                                                                                                                                                              | <i>Long Term Subtotal</i>       | <i>\$2,506,850</i> |                 |
|                                                                                                                                                                                                                                              | <b>Total</b>                    | <b>\$3,635,600</b> |                 |
| <b>Source:</b> Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.<br>*Contingencies allocated proportionately to developer or City/CWS |                                 |                    |                 |

### D.2 Funding Scenarios

**Exhibit 4.9** shows the level of funding required based on how much sewer SDC revenue is dedicated to the area. Another funding source is required for the City to construct the full project list. There are additional timing considerations that require an up-front funding source for the project costs.



**Exhibit 4.9**

| <b>Sewer Funding Strategy Analysis</b> |                                                                |                                                                |                                                                 |
|----------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
|                                        | <b>18% of Existing SDC Dedicated to Westside Planning Area</b> | <b>40% of Existing SDC Dedicated to Westside Planning Area</b> | <b>100% of Existing SDC Dedicated to Westside Planning Area</b> |
| <b>Total Costs</b>                     | <b>\$3,635,600</b>                                             | <b>\$3,635,600</b>                                             | <b>\$3,635,600</b>                                              |
| SDC Revenue Based on Current Fee       | \$10,886,200                                                   | \$10,886,200                                                   | \$10,886,200                                                    |
| Less: CWS Revenue Share                | \$10,450,752                                                   | \$10,450,752                                                   | \$10,450,752                                                    |
| City SDC Revenue Share                 | \$435,448                                                      | \$435,448                                                      | \$435,448                                                       |
| <b>Less Net City SDC Revenue</b>       | <b>-\$78,381</b>                                               | <b>-\$174,179</b>                                              | <b>-\$435,448</b>                                               |
| <b>Remaining Funding Gap</b>           | <b>\$3,557,219</b>                                             | <b>\$3,461,421</b>                                             | <b>\$3,200,152</b>                                              |

Source: FCS GROUP.

After identifying the remaining costs, **Exhibit 4.10** shows the fee amount the City must adopt to fully fund remaining costs. Each funding source shown below will address the full deficiency. Because the City can require developers to build all projects on the list, we have included ‘developer dedications’ for the remaining project costs as the primary funding option.

**Exhibit 4.10**

| <b>Sewer Funding Options</b>                      |                                                                |                                                                |                                                                 |
|---------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
|                                                   | <b>18% of Existing SDC Dedicated to Westside Planning Area</b> | <b>40% of Existing SDC Dedicated to Westside Planning Area</b> | <b>100% of Existing SDC Dedicated to Westside Planning Area</b> |
| <b>Costs</b>                                      |                                                                |                                                                |                                                                 |
| <b>Remaining Costs</b>                            | <b>\$3,557,219</b>                                             | <b>\$3,461,421</b>                                             | <b>\$3,200,152</b>                                              |
| <b>New Fee to Recover Remaining Costs in Full</b> |                                                                |                                                                |                                                                 |
| Developer Dedications                             | \$3,557,219                                                    | \$3,461,421                                                    | \$3,200,152                                                     |
| New SDC (per unit)                                | \$1,732                                                        | \$1,685                                                        | \$1,558                                                         |
| Utility Fee (fixed charge per month)              | \$14.43                                                        | \$14.04                                                        | \$12.98                                                         |
| Local Option Levy (per \$1,000 AV)*               | \$0.87                                                         | \$0.85                                                         | \$0.79                                                          |
| Local Option annual cost/\$300k home              | \$262                                                          | \$255                                                          | \$236                                                           |
| Local Improvement District**                      | \$4,800,262                                                    | \$4,670,987                                                    | \$4,318,420                                                     |

\* assumes special levy applied to Westside Plan District over 10 years.

\*\* assumes LID payments are financed at 6.5% over 10 years.

Source: FCS GROUP.

### D.3 Selected Funding Approach

The selected funding strategy for sewer relies primarily upon developer dedications of sewer lines below 12 inches and on existing sewer SDC revenues collected in the Westside Planning Area to be dedicated to Westside Planning Area improvements. Note, this strategy will require concurrence from CWS.

In light of the need for approximately \$1.1 million in short-term sewer project construction to serve the David Hill area, the City should consider its ability to utilize available financing methods, such as its ability to borrow funds from the sewer fund, or the use of LTGO bonding capacity or other sources of debt financing. Debt payments can be secured by a local sewer rate surcharge, SDC payments, and LID or Reimbursement District payment by developers or property owners within the David Hill area. It is recommended that this strategy be further evaluated by the City and subjected to property owner and developer input prior to its refinement and implementation.



## E. STORMWATER FUNDING APPROACH

### E.1 Capital Cost Requirements

The total stormwater system facility cost for the projects that are required to address impacts of new roadway construction within the Westside Planning Area development is estimated at approximately \$1.6 million as shown in **Exhibit 4.11**. The City does not have any short-term projects for stormwater. It should be noted that in addition to the improvements specified in Exhibit 4.11, developers will be required to mitigate stormwater impacts created by their proposed developments.

**Exhibit 4.11**

| Stormwater Management Facility Cost Estimates |                                    |                    |                 |
|-----------------------------------------------|------------------------------------|--------------------|-----------------|
| Project No.                                   | Description                        | Estimated Cost     | Area of Benefit |
| Quantity 1                                    | Road 1, 2, 3, Storm Pond           | \$75,000           | David Hill      |
| Quantity 2                                    | Road 4 Storm Pond                  | \$75,000           | David Hill      |
| Quantity 3                                    | Road 5 and 9 Storm Pond            | \$100,000          | David Hill      |
| Quantity 4                                    | Road 6 and 10 Storm Pond           | \$150,000          | David Hill      |
| Quantity 5                                    | Road 7 Storm Pond                  | \$200,000          | Purdin Road     |
| Quantity 6                                    | Road 8 Storm Pond                  | \$50,000           | Purdin Road     |
| Quantity 7                                    | Road 1, 2, 3, Stormwater Treatment | \$35,000           | Purdin Road     |
| Quantity 8                                    | Road 4 Stormwater Treatment        | \$35,000           | David Hill      |
| Quantity 9                                    | Road 5 and 9 Stormwater Treatment  | \$70,000           | David Hill      |
| Quantity 10                                   | Road 6 and 10 Stormwater Treatment | \$70,000           | David Hill      |
| Quantity 11                                   | Road 7 Stormwater Treatment        | \$20,000           | David Hill      |
| Quantity 12                                   | Road 8 Stormwater Treatment        | \$20,000           | Purdin Road     |
|                                               | Contingencies and Engineering      | \$675,000          | Entire Area     |
|                                               | <b>Totals</b>                      | <b>\$1,575,000</b> |                 |

**Source:** Revised Final Westside Water, Sewer, and Stormwater Infrastructure Analysis dated June 24, 2016; compiled by FCS GROUP. Costs shown are in 2016 dollars.

### E.2 Funding Scenarios

**Exhibit 4.12** shows the level of funding expected for each scenario. Because the current stormwater SDC is \$510 and the City's share is small, existing SDCs do very little to cover capital costs, leaving a large funding gap.

**Exhibit 4.12**

| Stormwater Funding Strategy Analysis |                                                         |                                                         |                                                          |
|--------------------------------------|---------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|
|                                      | 18% of Existing SDC Dedicated to Westside Planning Area | 40% of Existing SDC Dedicated to Westside Planning Area | 100% of Existing SDC Dedicated to Westside Planning Area |
| <b>Total Costs</b>                   | <b>\$1,575,000</b>                                      | <b>\$1,575,000</b>                                      | <b>\$1,575,000</b>                                       |
| SDC Revenue Based on Current Fee     | \$1,047,540                                             | \$1,047,540                                             | \$1,047,540                                              |
| <b>Less SDC Revenue Share</b>        | <b>\$188,557</b>                                        | <b>\$419,016</b>                                        | <b>\$1,047,540</b>                                       |
| <b>Remaining Funding Gap</b>         | <b>\$1,386,443</b>                                      | <b>\$1,155,984</b>                                      | <b>\$527,460</b>                                         |

**Source:** FCS GROUP.

After identifying the remaining costs, **Exhibit 4.13** shows potential methods considered to fully fund remaining costs. Each funding source shown below will address the full deficiency.

**Exhibit 4.13**

| Stormwater Funding Options***                      |                                                          |                                                          |                                                           |
|----------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------|
|                                                    | 18% of Existing SDC<br>Dedicated to<br>Westside Planning | 40% of Existing SDC<br>Dedicated to<br>Westside Planning | 100% of Existing SDC<br>Dedicated to<br>Westside Planning |
| <b>Costs</b>                                       |                                                          |                                                          |                                                           |
| Remaining Costs                                    | \$1,386,443                                              | \$1,155,984                                              | \$527,460                                                 |
| <b>New Fees to Recover Remaining Costs in Full</b> |                                                          |                                                          |                                                           |
| New SDC (per unit)                                 | \$675                                                    | \$563                                                    | \$257                                                     |
| Utility Fee (fixed charge per month)               | \$5.62                                                   | \$4.69                                                   | \$2.14                                                    |
| Local Option Levy (per \$1,000 AV)*                | \$0.34                                                   | \$0.28                                                   | \$0.13                                                    |
| Local Option annual cost/\$300k home               | \$102                                                    | \$85                                                     | \$39                                                      |
| Local Improvement District**                       | \$1,870,925                                              | \$1,559,934                                              | \$711,777                                                 |

\* assumes special levy applied to Westside Plan District over 10 years.

\*\* assumes LID payments are financed at 6.5% over 10 years.

\*\*\* City Staff, compiled by FCS Group.

Source: FCS GROUP.

## E.3 Selected Funding Approach

The selected funding approach relies upon the existing SDC and includes a supplemental stormwater rate surcharge of approximately \$7 per month for households within the Westside Planning area (plus administrative charges). This rate surcharge can be phased in over a period of five years and indexed with inflation. Stormwater improvements will likely be built in conjunction with roadway construction projects in the Westside Planning Area. If fund balances from rate surcharges are insufficient to cover the cost of new stormwater ponds, the City may establish reimbursement district(s) for a proportionate share of financing costs, with total charges limited to approximately \$700 per dwelling unit.

## F. PARKS FUNDING APPROACH

### F.1 Capital Cost Requirements

The total parks cost for the three identified projects planned in the Westside Planning Area is estimated at \$6.6 million as shown in **Exhibit 4.14**. The City does not have any short term projects.

**Exhibit 4.14**

| Parks Cost Estimates for the Westside Planning Area |                           |                    |                                               |                                                  |                                                 |
|-----------------------------------------------------|---------------------------|--------------------|-----------------------------------------------|--------------------------------------------------|-------------------------------------------------|
| Project No.                                         | Description               | Estimated Cost     | Attributable to <u>Westside Planning Area</u> | Attributable to <u>Purdin Road Planning Area</u> | Attributable to <u>David Hill Planning Area</u> |
| 1                                                   | Purdin Road Neighborhood  | \$3,000,000        | \$3,000,000                                   | \$3,000,000                                      | \$0                                             |
| 2                                                   | Thatcher Park Development | \$3,400,000        | \$612,000                                     | \$349,799                                        | \$262,201                                       |
| 3                                                   | Dog Park Enhancement      | \$200,000          | \$36,000                                      | \$20,576                                         | \$15,424                                        |
|                                                     | <b>Totals</b>             | <b>\$6,600,000</b> | <b>\$3,648,000</b>                            | <b>\$3,370,376</b>                               | <b>\$277,624</b>                                |

Source: City staff, compiled by FCS GROUP. Costs shown are in 2016 dollars.



## F.2 Funding Scenarios

**Exhibits 4.15 and 4.15a** shows the level of funding by tool. Provided that the City uses SDCs from the entire Westside Planning Area, it will need to dedicate 50% of the SDC revenues collected to have adequate funds to construct the neighborhood park project.

**Exhibit 4.15**

| Parks Funding Strategy Analysis for the <i>Purdin Road Planning Area</i> |                                                                  |                                                                  |                                                                   |
|--------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                                          | 18% of Existing SDC<br>Dedicated to Purdin<br>Road Planning Area | 50% of Existing SDC<br>Dedicated to Purdin<br>Road Planning Area | 100% of Existing SDC<br>Dedicated to Purdin<br>Road Planning Area |
| Total Costs                                                              | \$ 3,370,376                                                     | \$ 3,370,376                                                     | \$ 3,370,376                                                      |
| SDC Revenue Based on Current Fee                                         | \$ 3,522,000                                                     | \$ 3,522,000                                                     | \$ 3,522,000                                                      |
| Less SDC Revenue Dedicated to Area                                       | \$ 633,960                                                       | \$ 1,761,000                                                     | \$ 3,522,000                                                      |
| Remaining Funding Gap                                                    | \$ 2,736,416                                                     | \$ 1,609,376                                                     | \$ (151,624)                                                      |

City Staff, compiled by FCS Group.

Source: FCS GROUP.

**Exhibit 4.15a**

| Parks Funding Strategy Analysis for the <i>David Hill Planning Area</i> |                                                                 |                                                                 |                                                                  |
|-------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|
|                                                                         | 18% of Existing SDC<br>Dedicated to David<br>Hill Planning Area | 50% of Existing SDC<br>Dedicated to David<br>Hill Planning Area | 100% of Existing SDC<br>Dedicated to David Hill<br>Planning Area |
| Total Costs                                                             | \$ 277,624                                                      | \$ 277,624                                                      | \$ 277,624                                                       |
| SDC Revenue Based on Current Fee                                        | \$ 2,640,000                                                    | \$ 2,640,000                                                    | \$ 2,640,000                                                     |
| Less SDC Revenue Dedicated to Area                                      | \$ 475,200                                                      | \$ 1,320,000                                                    | \$ 2,640,000                                                     |
| Remaining Funding Gap                                                   | \$ (197,576)                                                    | \$ (1,042,376)                                                  | \$ (2,362,376)                                                   |

City Staff, compiled by FCS Group.

Source: FCS GROUP.

After identifying the remaining costs, **Exhibits 4.16 and Exhibit 4.16a** show the fee amount the City would need to adopt to fully fund remaining costs. Although there is a funding deficiency for the Purdin Road area for parks facilities, there would be adequate amount of system development charges collected from the David Hill area to finance all the park related facilities. Thus, no other funding options are considered.

**Exhibit 4.16**

| Parks Funding Strategy Analysis for the <i>Purdin Road Planning Area</i> |                                                                  |                                                                  |                                                                   |
|--------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                                          | 18% of Existing SDC<br>Dedicated to Purdin<br>Road Planning Area | 50% of Existing SDC<br>Dedicated to Purdin<br>Road Planning Area | 100% of Existing SDC<br>Dedicated to Purdin<br>Road Planning Area |
| <b>Costs</b>                                                             |                                                                  |                                                                  |                                                                   |
| Remaining Costs                                                          | \$2,736,416                                                      | \$1,609,376                                                      | -\$151,624                                                        |
| <b>New Fees to Recover Remaining Costs in Full</b>                       |                                                                  |                                                                  |                                                                   |
| New SDC Purdin Road Planning Area (per unit)                             | \$1,917                                                          | \$1,127                                                          | \$0                                                               |

\* City Staff, compiled by FCS Group.

Source: FCS GROUP.

**Exhibit 4.16a**

| Parks Funding Strategy Analysis for the <i>David Hill Planning Area</i> |                                                                 |                                                                 |                                                                  |
|-------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|
|                                                                         | 18% of Existing SDC<br>Dedicated to David<br>Hill Planning Area | 50% of Existing SDC<br>Dedicated to David<br>Hill Planning Area | 100% of Existing SDC<br>Dedicated to David<br>Hill Planning Area |
| <b>Costs</b>                                                            |                                                                 |                                                                 |                                                                  |
| <b>Remaining Costs</b>                                                  | -\$197,576                                                      | -\$1,042,376                                                    | -\$2,362,376                                                     |
| <b>New Fees to Recover Remaining Costs in Full</b>                      |                                                                 |                                                                 |                                                                  |
| <b>New SDC Westside Planning Area (per unit)</b>                        | \$0                                                             | \$0                                                             | \$0                                                              |

\* City Staff, compiled by FCS Group.

Source: FCS GROUP.

### F.3 Selected Funding Approach

The selected funding approach for parks assumes the City will allocate all of the SDC revenues collected in the Westside Planning Area to identified parks projects. This funding approach assumes parks improvements are constructed after SDC revenues are sufficient to cover capital costs. It is possible that a developer may elect to construct and dedicate a neighborhood park to enhance amenities offered by their development. The ability of a developer to construct neighborhood parks can be enhanced if the City's parks SDC capital project list is amended to include such parks, and the City grants parks SDC credits based on the market value of dedicated land and allowable construction cost of the improvement (designed to city standards). City policies regarding the transferability of parks SDC credit also fosters private parks construction.

## SECTION V: MARKET CONSIDERATIONS

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This section provides an overview of market characteristics related to the near- and long-term development potential for the Westside Planning Area. In order to conduct this analysis, FCS GROUP evaluated current home sales prices in Forest Grove and the surrounding areas of Hillsboro. We also evaluated overall public facility infrastructure costs in comparison with other major annexation areas within the greater Metro Region.

### A. INFRASTRUCTURE COST COMPARISON

#### A.1 Developer Infrastructure Costs

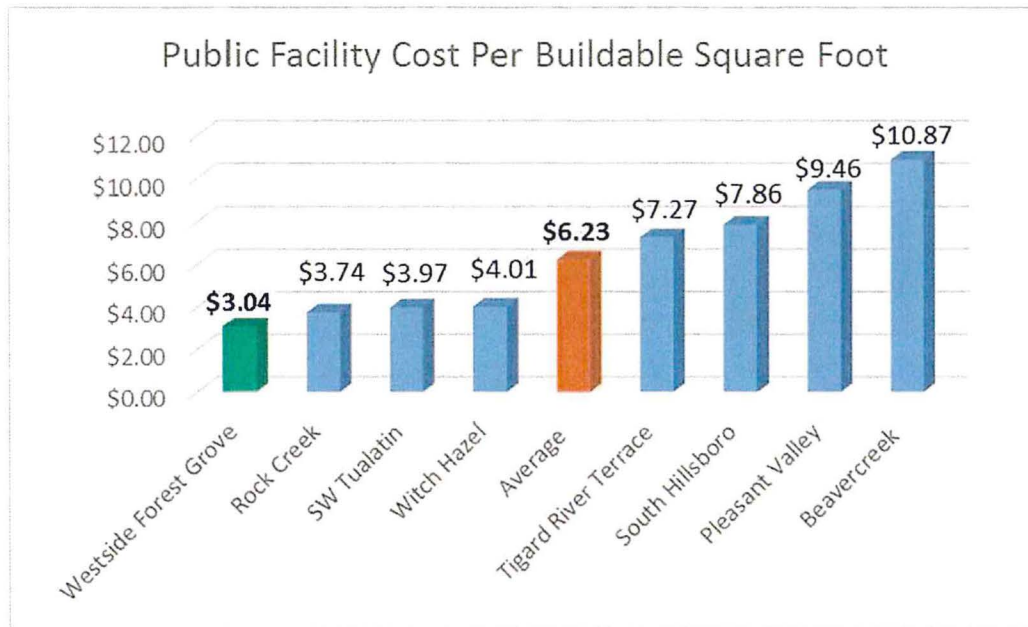
Prior to annexation, the City would require Annexation and Development Agreements that would identify any on- and off-site public infrastructure improvements required to address impacts related to new development within the Westside Planning Area. While much of the David Hill area is annexed, remaining areas could be subject to Development Agreements or conditions of approval.

The public infrastructure cost to serve development within the 374-acre Westside Planning Area was includes projects listed in **Section IV**. The total common infrastructure cost in this analysis is estimated at approximately \$45.7 million. This equates to approximately \$3.04 per net buildable square feet of land area for infrastructure before accounting for credit eligible deductions.

When we compare the cost of required public infrastructure to serve major urbanizing areas around the metropolitan region, we find the \$3.04 per net buildable square feet of land area estimate to be well below the average for seven other urbanizing areas shown in **Exhibit 5.1**. Hence, the preliminary common cost estimates appear to be on the low end of the range of other urbanizing areas in various stages of advanced planning or development. However, any additional fees would have a negative impact on the ability to accommodate subsidized housing in the area. Whether this planning area is the appropriate location for affordable housing is beyond the scope and purpose of this analysis.



**Exhibit 5.1: Estimated Major Infrastructure Cost per Square Feet of Buildable Land Area**

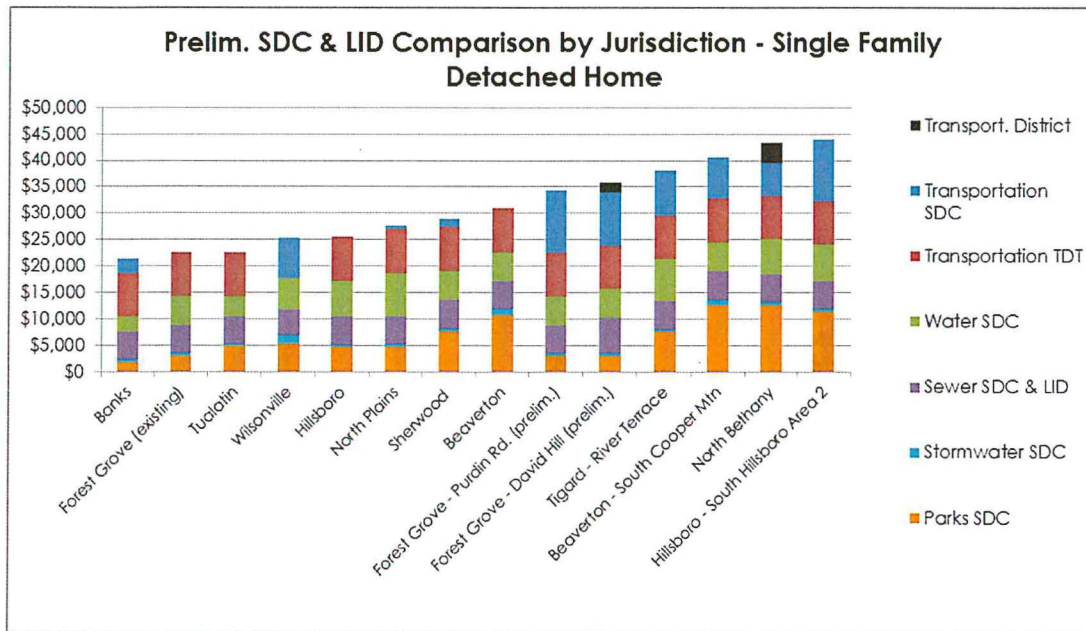


**Source:** analysis by FCS Group using assumptions contained in adopted concept plans and funding strategies for each area; adjusted to 2016 dollars.

## A.2 SDC and TDT Costs

The baseline financial analysis assumes that the developer would pay SDC and TDT charges for transportation and receive credits for constructing credit-eligible improvements. Credit policies are assumed to follow the current City and Washington County practice. The 40% TDT revenue allocation and resulting SDCs and LID charges (before credits) are shown in **Exhibits 5.2 and 5.3**. Please note: these exhibits only show preliminary SDCs and LID assessments and exclude other permits and construction excise taxes associated with development.

**Exhibit 5.2**



Source: analysis by FCS Group as of August 2016.

**Exhibit 5.3**

| Jurisdiction                        | Parks SDC | Stormwater SDC | Sewer SDC & LID | Water SDC | Transportation TDT | Transportation SDC | Transport. District | Total  |
|-------------------------------------|-----------|----------------|-----------------|-----------|--------------------|--------------------|---------------------|--------|
| Banks                               | 1,800     | 510            | 5,300           | 2,825     | 8,278              | 2,704              | -                   | 21,417 |
| Forest Grove (existing)             | 3,000     | 510            | 5,300           | 5,478     | 8,278              | -                  | -                   | 22,566 |
| Tualatin                            | 4,786     | 510            | 5,300           | 3,754     | 8,278              | -                  | -                   | 22,628 |
| Wilsonville                         | 5,374     | 1,628          | 4,849           | 5,842     | -                  | 7,695              | -                   | 25,388 |
| Hillsboro                           | 4,647     | 510            | 5,300           | 6,830     | 8,278              | -                  | -                   | 25,565 |
| North Plains                        | 4,725     | 510            | 5,300           | 8,169     | 8,278              | -                  | -                   | 27,620 |
| Sherwood                            | 7,669     | 621            | 5,295           | 5,592     | 8,278              | 1,506              | -                   | 28,961 |
| Beaverton                           | 10,800    | 1,104          | 5,300           | 5,512     | 8,278              | -                  | -                   | 30,994 |
| Forest Grove - Purdin Rd. (prelim.) | 3,000     | 510            | 5,300           | 5,478     | 8,278              | 12,084             | -                   | 34,650 |
| Forest Grove - David Hill (prelim.) | 3,000     | 510            | 6,727           | 5,478     | 8,278              | 10,084             | 2,000               | 36,077 |
| Tigard - River Terrace              | 7,566     | 510            | 5,300           | 7,917     | 8,278              | 8,489              | -                   | 38,060 |
| Beaverton - South Cooper Mtn        | 12,624    | 1,104          | 5,300           | 5,512     | 8,278              | 7,725              | -                   | 40,543 |
| North Bethany                       | 12,645    | 510            | 5,300           | 6,687     | 8,278              | 6,113              | 3,750               | 43,283 |
| Hillsboro - South Hillsboro Area 2  | 11,433    | 510            | 5,300           | 6,830     | 8,278              | 11,731             | -                   | 44,082 |

Source: survey conducted by FCS GROUP as of August 2016.

Current SDCs in Forest Grove are relatively low compared to other cities in the region. If the City implemented the recommended funding approach, the overall SDCs (and LID charges) would increase by approximately \$13,400 per single family dwelling within the Westside Planning Area. The resulting Westside Planning Area SDCs would be similar to the new overlay areas for South Hillsboro, Tigard River Terrace, Beaverton South Cooper Mountain, and North Bethany.



### A.3 Summary Recommendations

It is recommended that the City of Forest Grove pursue a funding approach as follows:

- ♦ **Transportation:** Allocate 40% of the TDT revenues collected in the Westside Planning Area to Area projects, and adopt a new local transportation SDC (Westside Planning Area only) of approximately \$1,208 per average daily vehicle trip.<sup>1</sup> As indicated in the table below (lower fees would be required for multifamily dwellings and higher fees for detached dwellings). In the short-term, the City should also consider advance financing for the \$1.5 million Thatcher Road improvement project, with repayment using a combination of TDT and SDC revenues and a LID within the David Hill area.

| Existing and Proposed<br>Transportation Charges in Forest<br>Grove by Dwelling Type | Current<br>TDT | Proposed<br>Area SDC<br>(prelim.) | Total<br>(prelim.) |
|-------------------------------------------------------------------------------------|----------------|-----------------------------------|--------------------|
| Single Family Detached                                                              | \$8,278        | \$12,084                          | \$20,362           |
| Apartment                                                                           | \$5,415        | \$7,905                           | \$13,320           |
| Condo/Townhouse                                                                     | \$4,951        | \$7,227                           | \$12,178           |

- ♦ **Water:** Allocate up to 76% of the water SDC revenues collected in the Westside Planning Area to Area projects. In the short-term the City should consider its means to finance a \$4.5 million reservoir improvement (City wide benefit) using rate revenue bonds or hybrid bonds.
- ♦ **Sanitary Sewer:** With concurrence from CWS, require developers to construct sewer lines under 12 inches in diameter as a condition of approval. In the short-term the City should consider its means for advance financing \$1.1 million for sewer truck line construction, using funds borrowed by its sewer fund and payments secured through either an LID or a reimbursement district in the David Hill area.
- ♦ **Stormwater:** Allocate 100% of the stormwater SDC revenues collected in the Westside Planning Area to Area projects and adopt a new local area specific stormwater rate of approximately \$7 per month for customers within the Westside Planning Area. The City may need to consider formation of reimbursement districts in the future if fund balances are inadequate to construct new facilities as development occurs.
- ♦ **Parks:** Allocate 100% of the parks SDC revenues collected in the Westside Planning Area to Area projects.

When accounting for existing TDT and SDCs, and the recommended area-specific SDCs noted above, the total impact fees (TDT and SDCs) for Westside Planning Area development would equate to approximately \$36,000 per single family dwelling unit. See **Exhibit 5.4** for a regional comparison of total SDCs. Note, these assumptions and findings are considered to be preliminary and subject to change and refinement once the City moves forward with a detailed SDC methodology report.

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<sup>1</sup> This allocation of 40% of the TDT revenues collected in the Westside Planning Area to capital projects in the Planning Area reflects the expected growth in average daily vehicle trips that are expected to occur in the Planning Area as a share of the entire City of Forest Grove over the next 20 years; the residual 60% of TDT revenues would be available for citywide needs.



**Exhibit 5.4**

| <b>Total SDC &amp; IID assessments per Single Family Detached Dwelling</b> |                                                                                            |                                                                |                                                                  |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------|
|                                                                            | <b>Current/<br/>Proposed SDCs &amp;<br/>IIDs per Sq.Ft. of<br/>Floor Area <sup>1</sup></b> | <b>Expected<br/>Home Sales<br/>Price per<br/>Square Foot**</b> | <b>SDCs &amp; IIDs<br/>as a % of<br/>Current Sales<br/>Price</b> |
| <b>Forest Grove (existing)</b>                                             | \$9.03                                                                                     | \$140.72                                                       | 6.4%                                                             |
| <b>Beaverton - South Cooper Mountain</b>                                   | \$16.22                                                                                    | \$199.98                                                       | 8.1%                                                             |
| <b>Forest Grove - Westside Planning Area</b>                               | \$14.43                                                                                    | \$161.83                                                       | 8.9%                                                             |
| <b>Hillsboro - South Hillsboro</b>                                         | \$17.63                                                                                    | \$171.76                                                       | 10.3%                                                            |

Note 1: Assumes 2,500 square foot house and assumes 15% price per square foot premium for housing in new master planned areas.

Note 2: Reflects sales price for homes built since 2010.

Compiled by FCS GROUP based on Zillow.com data.

## Appendix A: Westside Planning Area Costs and Status Quo Revenues

| <b>Summary of Capital Infrastructure Costs and Expected Funding Gap Under Status Quo</b>                                                          |                        |                         |                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------|-----------------------|
| <b>Transportation Element</b>                                                                                                                     |                        |                         |                       |
|                                                                                                                                                   | <b>David Hill Area</b> | <b>Purdin Road Area</b> | <b>Combined Areas</b> |
| <b>Total Costs</b>                                                                                                                                |                        |                         |                       |
| Total Costs                                                                                                                                       | \$23,880,900           | \$6,349,900             | \$30,230,800          |
| Net Revenue Based on Current TDT*                                                                                                                 | \$6,781,915            | \$9,472,522             | \$16,254,437          |
| Remaining Costs                                                                                                                                   | \$17,098,985           | -\$3,122,622            | \$13,976,363          |
| <b>Water Element</b>                                                                                                                              |                        |                         |                       |
|                                                                                                                                                   | <b>David Hill Area</b> | <b>Purdin Road Area</b> | <b>Combined Areas</b> |
| <b>Total Costs</b>                                                                                                                                |                        |                         |                       |
| Total Costs                                                                                                                                       | \$6,855,500            | \$1,677,600             | \$8,533,100           |
| Net Revenue Based on Current SDC*                                                                                                                 | \$4,694,646            | \$6,557,166             | \$11,251,812          |
| Remaining Costs                                                                                                                                   | \$2,160,854            | -\$4,879,566            | -\$2,718,712          |
| <b>Sanitary Sewer Element</b>                                                                                                                     |                        |                         |                       |
|                                                                                                                                                   | <b>David Hill Area</b> | <b>Purdin Road Area</b> | <b>Combined Areas</b> |
| <b>Total Costs</b>                                                                                                                                |                        |                         |                       |
| Total Costs                                                                                                                                       | \$2,480,600            | \$1,155,000             | \$3,635,600           |
| Net Revenue Based on Current SDC*                                                                                                                 | \$181,684              | \$253,764               | \$435,448             |
| Remaining Costs                                                                                                                                   | \$2,298,916            | \$901,236               | \$3,200,152           |
| <b>Stormwater Element</b>                                                                                                                         |                        |                         |                       |
|                                                                                                                                                   | <b>David Hill Area</b> | <b>Purdin Road Area</b> | <b>Combined Areas</b> |
| <b>Total Costs</b>                                                                                                                                |                        |                         |                       |
| Total Costs                                                                                                                                       | \$1,067,500            | \$507,500               | \$1,575,000           |
| Net Revenue Based on Current SDC*                                                                                                                 | \$436,824              | \$610,716               | \$1,047,540           |
| Remaining Costs                                                                                                                                   | \$630,676              | -\$103,216              | \$1,533,098           |
| <b>Parks Element</b>                                                                                                                              |                        |                         |                       |
|                                                                                                                                                   | <b>David Hill Area</b> | <b>Purdin Road Area</b> | <b>Combined Areas</b> |
| <b>Total Costs</b>                                                                                                                                |                        |                         |                       |
| Total Costs                                                                                                                                       | \$648,000              | \$3,000,000             | \$3,648,000           |
| Net Revenue Based on Current SDC*                                                                                                                 | \$2,571,000            | \$3,591,000             | \$6,162,000           |
| Remaining Costs                                                                                                                                   | -\$1,923,000           | -\$591,000              | -\$2,514,000          |
| * revenues are based on residential development only and conservatively excludes additional long-term SDC revenue from retail, schools and parks. |                        |                         |                       |







## MEMORANDUM

**TO:** Jon Holan, Community Development Director  
City of Forest Grove

**FROM:** Anne Sylvester, PTE and Jim Gibson, PE

**DATE:** June 24, 2016

**PROJECT #:** 0742.01 Forest Grove Westside Planning Project

**SUBJECT:** Revised Final Westside Water, Sewer and Stormwater Infrastructure Analysis

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### Introduction and Background

This memorandum presents an assessment of the key municipal infrastructure systems that needs to be in place to develop property in the Westside Planning Area. This infrastructure system includes: a collector level street system, a water service system, a sewer system and a stormwater management system. Included in the memorandum are:

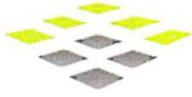
- Maps that lay out the proposed systems for providing municipal services,
- Descriptive text that outlines key assumptions, findings and conclusions for each system, and
- Cost estimates for each road and for each element of the water, sewer and stormwater management systems.

As illustrated in Figure 1, two areas within the City of Forest Grove are included in the Westside Planning Project:

- David Hill planning area
- Purdin Road planning area

**David Hill** - The David Hill planning area is located in the northwestern portion of the City of Forest Grove and has been included in the Urban Growth Boundary (UGB) for several years. David Hill is one of the city's prime growth areas and over 90% of this area is projected to develop by 2025. While urban land use designations currently exist, the need for street and infrastructure planning is urgent. As noted in the figure, the David Hill planning area also incorporates an area between David Hill Road and Gales Creek Road. Much of this area is already developed but it is included to address the integration of land uses and transportation/urban service connectivity.

**Purdin Road** - The Purdin Road planning area is located east of David Hill and directly north of the city. Today it is predominately used for agricultural purposes. This area was added to the UGB through legislative action in 2014, but there has been no comprehensive planning to guide the designation of urban land uses or infrastructure development. The Westside Planning Project is intended to meet these needs.



**Figure 1. Westside Planning Project Study Areas**



## **Organization of This Memorandum**

In addition to this Introduction, this memorandum includes five additional sections. These are:

- Land Use Development Assumptions
- Internal Street System
- Sewer System
- Stormwater Management System
- Water System

## **Revised Land Use Development Assumptions**

The development of municipal infrastructure to serve properties in the David Hill and Purdin Road planning areas is based on both the types of land uses that are envisioned for these areas and the magnitude of development that is anticipated.

As with the traffic impact analysis documented in a separate memorandum and conducted to identify roadway improvement needs, potential Transportation System Plan (TSP) amendments, and Transportation Planning Rule (TPR) compliance, the analysis of municipal utility infrastructure is based on the Westside Land Use Alternative as developed by the City and dated October 26, 2015. Figure 2 was developed by City staff to illustrate the component elements of this alternative.

This figure identifies a series of transportation zones by which different land uses are aggregated for analysis purposes. Table 1 includes detailed information concerning the specific land use types and



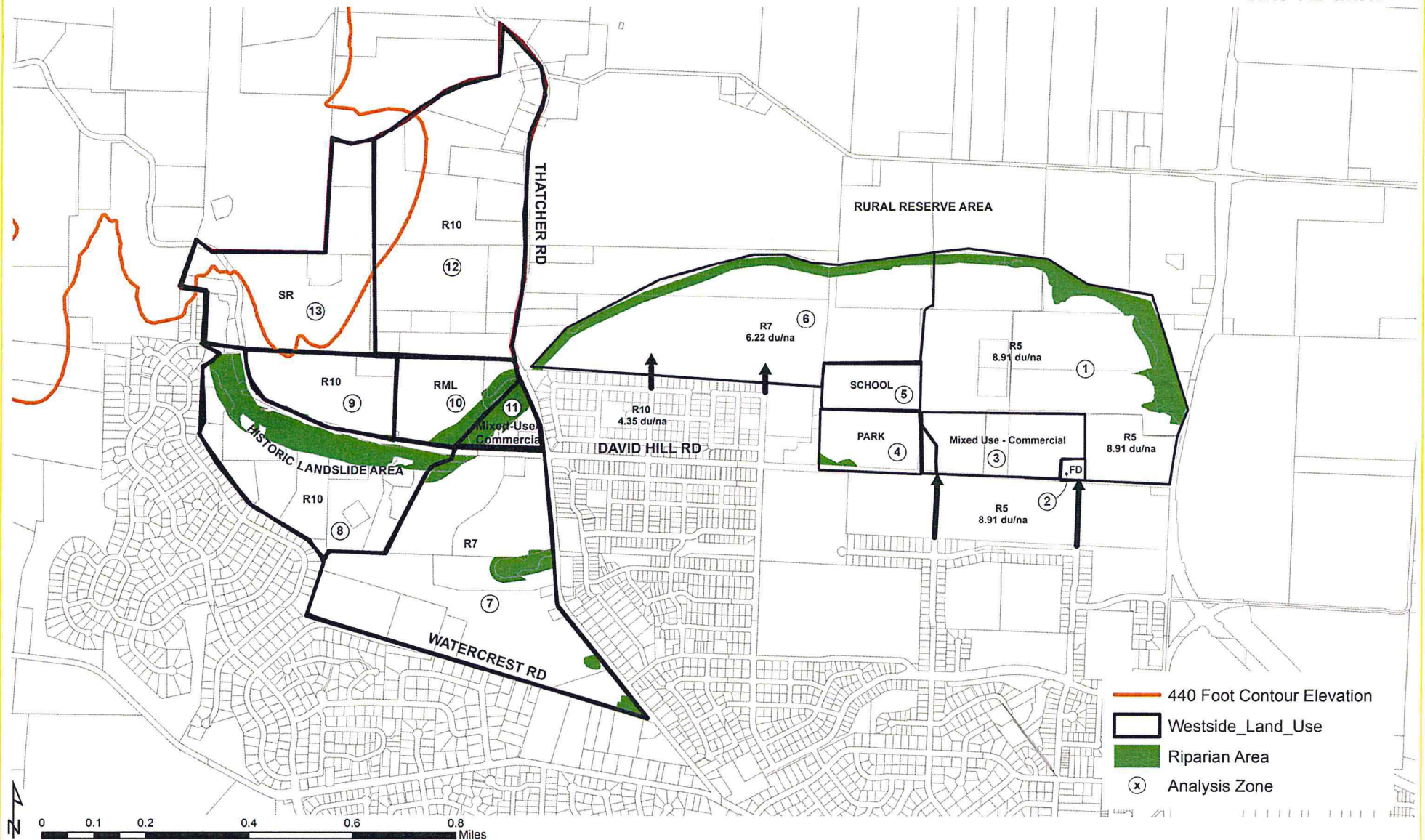


Figure 2  
Revised Land Use Alternative (10/26/15)

Westside Planning Project  
Forest Grove, OR



**Table 1. Comparison of Existing Comprehensive Plan and Revised Alternative**

| Zone                                    | Area                                      | Revised Land Use Alternative (4/15/2016) |               |                    |                   |              |              |           | 2014 Comprehensive Plan |               |                    |                   |
|-----------------------------------------|-------------------------------------------|------------------------------------------|---------------|--------------------|-------------------|--------------|--------------|-----------|-------------------------|---------------|--------------------|-------------------|
|                                         |                                           | Density<br>(units/ac)                    | Net Ac        | Slope<br>Deduction | Dwelling<br>Units | KSF          | Acres        | Employees | Density<br>(units/ac)   | Net Ac        | Slope<br>Deduction | Dwelling<br>Units |
| 1                                       | Purdin (R5)                               | 8.71                                     | 67.76         | 0%                 | 590               |              |              |           |                         | 67.76         | 0%                 | 2                 |
| 2                                       | Fire Station                              |                                          | 2.00          | 0%                 |                   |              |              | 3         |                         | 2.00          | 0%                 |                   |
| 3                                       | Purdin (Residential)                      | 12.0                                     | 18.50         | 0%                 | 221               |              |              |           |                         | 18.50         | 0%                 |                   |
| 3                                       | Purdin (Retail Commercial) <sup>1</sup>   |                                          |               |                    |                   | 46.5         |              | 46        |                         |               |                    |                   |
| 4                                       | Purdin (Park)                             |                                          | 10.98         | 0%                 |                   |              | 10.98        |           |                         | 10.98         | 0%                 |                   |
| 5                                       | Purdin (Elementary School) <sup>2</sup>   |                                          | 11.96         | 0%                 |                   | 65.0         |              |           |                         | 11.96         | 0%                 |                   |
| 6                                       | Purdin (R7)                               | 6.22                                     | 62.08         | 0%                 | 386               |              |              |           | 1/20 ac                 | 62.08         | 0%                 | 3                 |
| <i>Sub-Total Purdin</i>                 |                                           |                                          | 173.28        |                    | 1,197             | 111.5        | 10.98        | 49        |                         | 173.28        |                    | 5                 |
| 7                                       | Watercrest (R7) <sup>3</sup>              | 6.22                                     | 56.50         | 10%                | 316               |              |              |           | 4.35                    | 56.50         | 10%                | 220               |
| 8                                       | South of David Hill Rd (R10) <sup>4</sup> | 4.35                                     | 10.39         | 20%                | 36                |              |              |           | 4.35                    | 10.39         | 20%                | 36                |
| 9                                       | North of David Hill Rd (R10)              | 4.35                                     | 14.18         | 15%                | 52                |              |              |           | 4.35                    | 14.18         | 15%                | 52                |
| 10                                      | David Hill Village (R10)                  | 4.35                                     | 12.05         | 15%                | 44                |              |              |           | 4.35                    | 12.05         | 15%                | 44                |
| 11                                      | David Hill Village (Comm)                 |                                          | 2.90          | 0%                 |                   | 15.0         |              | 32        |                         | 2.90          | 0%                 |                   |
| 11                                      | David Hill Village (Res) <sup>5</sup>     | 12.0                                     | --            | 0%                 | 4                 |              |              |           | 4.35                    | --            | 0%                 | 12                |
| 12                                      | Thatcher (R10)                            | 4.35                                     | 76.65         | 10%                | 300               |              |              |           | 4.35                    | 76.65         | 10%                | 300               |
| 13                                      | David Hill (R10) <sup>6</sup>             | 4.35                                     | 28.50         | 15%                | 105               |              |              |           | 1.0                     | 28.50         | 15%                | 24                |
| <i>Sub-Total David Hill/Gales Creek</i> |                                           |                                          | 201.17        |                    | 857               | 15.0         | 0            | 32        |                         | 201.17        |                    | 688               |
| <b>Totals</b>                           |                                           |                                          | <b>374.45</b> |                    | <b>2,054</b>      | <b>126.5</b> | <b>10.98</b> | <b>81</b> |                         | <b>374.45</b> |                    | <b>693</b>        |

<sup>1</sup> Retail employment based on FAR of 0.25 for retail uses and 11 employees per net acre of commercial land within mixed-use area (approximately 4.2 net acres).

<sup>2</sup> Assumes average school size of 65,000 sq. ft. consistent with newer elementary schools in Forest Grove.

<sup>3</sup> Land area within Thatcher Park and Thatcher Woods has been deducted from total land area. This deduction is approximately 25.18 acres.

<sup>4</sup> Area outside of riparian zone and landslide hazard area.

<sup>5</sup> Assumes limited residential above retail or standalone-plex development

<sup>6</sup> While Figure 2 shows SR zoning for this area, analysis was based on R10 level of development to provide a "worst case" scenario.



quantities included in each zone. Figure 2 also shows existing riparian areas which must be avoided as the area is developed, along with the 440-foot contour interval on the west side of the David Hill area. This elevation represents the limit of existing city water service.

As indicated in Table 1, a net total of just over 374 acres have been identified for development as part of the Westside Planning Project. This excludes areas designated as vegetated corridors under Clean Water Services standards. Under the existing Comprehensive Plan (adopted in 2014) the two planning areas are entirely zoned for residential development yielding a total of 693 single family dwelling units. Under this Revised land use scenario, mixed use development is proposed consisting of single and multi-family dwellings, retail, a fire station and an elementary school. This development would include an estimated 2,054 dwelling units, an increase of 1,361 units over the existing plan with 169 more in the David Hill planning area and 1,192 more in the Purdin Road planning area. The development would also include 61,500 square feet of retail (yielding an estimated 78 employees), a 10.98-acre park, a 2-acre fire station with an estimated 3 employees, and a 65,000-square foot elementary school.

The land use assumptions shown in Table 1 should be considered as a “worst case” scenario for purposes of infrastructure planning. These land uses differ from the version originally endorsed by the Forest Grove Planning Commission in 2015 as follows:

- **Purdin Road** - In the Purdin Road Planning Area the April 2016 documented in this report include a total of 1,197 dwelling units in comparison to the Planning Commission which included 979 dwelling units. Conversely, the Planning Commission version showed a much higher growth assumption for commercial development with 202,600 square feet compared to the 46,500 square feet in the April 2016 version. Fundamentally, the current version assumed much higher residential development (218 more units) and much lower commercial development (156,100 fewer square feet) than the Planning Commission version.
- **David Hill** – Residential development assumptions for the April 2016 version are slightly higher than the Planning Commission version (857 as compared to 776). The primary difference lies in the assumed development density for the area at the western edge of the David Hill. This area has been identified for Suburban Residential development at 1 du/acre in both scenarios, but has been analyzed at a higher density (R10) for purposes of this infrastructure memo. This approach provides a means of testing the financial feasibility of a higher level of development.

## Internal Street System

Due to the extent of unknown factors affecting the development of a transportation system for David Hill, the City’s recently adopted Transportation System Plan (TSP) did not identify a potential future street system. The TSP called for further refinement planning to address the unique aspects of providing urban services in this topographically challenged area. This refinement planning effort has been incorporated into the Westside Project, along with consideration of connectivity issues for the Gales Creek area located immediately south of David Hill Road. In addition, since the Purdin Road Planning Area was incorporated into the Urban Growth Boundary by Legislative action, no concept plan had been prepared outlining an internal street system. The Westside Project is also intended to address this need.

The development of an internal street system focused on laying out a system of collector level roads intended to provide access to and connectivity through major portions of each planning area.

### Street Layout Assumptions

Assumptions made for the initial planning level layout of this collector street system include:



- The number of internal roads and their points of connection to the surrounding street system relies on the traffic impact and improvement needs analysis discussed in a separate memorandum. Internal roads will generally have a single travel lane in each direction with left turn channelization at key intersections.
- The layout of all internal collector streets was based on the collector street classification in the City's Development Code that requires 60 feet of right-of-way and a 40-foot street cross-section. However the streets with half-street roadway improvements require modified collector street standards. (See the Appendix for each street geometric section.)
- All internal collector streets would have bicycle lanes and sidewalks on both sides.
- Connectivity to the surrounding street system takes into account some of the key findings in the City's TSP with respect to the following roads:
  - **David Hill Road** – The extension of David Hill Road is included from its current terminus eastward to intersect at Highway 47 (this project is currently under design and is expected to open in 2018). A single lane roundabout was assumed for the intersection with Highway 47 based on existing project development activities.
  - **Vista Drive** – The addition of the Vista Drive extension between Gales Creek and Thatcher Roads is included in the TSP. With this improvement a significant volume of existing and projected future traffic would be diverted away from the intersection of Gales Creek and Thatcher Roads. Without this improvement it will be necessary to signalize or otherwise improve traffic operations at the Gales Creek/Thatcher intersection.
  - **Main Street and B Street Extensions** – The proposed recommended street layout for the Purdin Road area includes connections into developed portions of the city via extensions of Main Street and B Street. Extensions of these two streets are included in the adopted TSP between Hartford Drive and the David Hill Road extension.

#### **General Street Design Assumptions and Conclusions**

- As each road is actually designed it will need to be fully reviewed for compliance with AASHTO, City and/or County standards.
- Vertical curves will need to be designed. The length of each vertical curve identified during final design will affect the volume of cut and fill that were identified based on the initial planning level layout.
- A sight distance review has not been completed. This will need to be included in the roadway final design. This review may require adjustments to the volume of cut and fill initially identified.
- Due to the poor quality of soil infiltration that was identified by the geo-technical consultant for the Westside Planning Project, stormwater is expected to be collected in catch basins and conveyed to stormwater facilities for treatment and detention prior to being released.
- Wetland studies may be required to refine the level of detail currently available about possible wetland locations and impacts to determine if it is necessary to modify the proposed internal street system to avoid wetland impacts or to provide for necessary mitigation.
- It will be necessary to review where and how site access is provided along the proposed collector street system. Where appropriate, site access should occur on the lowest order street





in the functional classification hierarchy (i.e., onto a collector street rather than an arterial like David Hill or NW Thatcher Roads, or onto a local street rather than a collector).

- Roadway access in the David Hill planning area must also consider how topography will affect access to property adjacent to collector roads if this access is required. In many portions of David Hill 3:1 side slopes from the proposed roads would extend up or down for approximately 10 feet. This would make it hard for residential driveways to be constructed. Further, any secondary or local road connections to a collector street will likely start 10 feet below or above the adjacent road grade. This will make it difficult to construct the local road with a grade of less than 12%.
- In-road sewer lines and water line pressure will need to be reviewed with respect to roadway grades. A water storage tank may be needed for additional storage/fire flow or to increase the pressure for the lots. These are further discussed in the sections on the sewer and water systems.
- While the planning level street system layout considers the intersection and driveway spacing requirements of relevant City and/or County standards, the spacing of these connection points will need to be reviewed during final design.
- Roadway design will need to coordinate with all the utilities in addition to the municipal services addressed in this memorandum (i.e., cable, electrical, phone, fiber-optic, natural gas, and/or others).

### **Individual Street Assumptions and Conclusions**

This section presents assumptions, findings and conclusions from the initial planning level layout of individual collector streets within the David Hill and Purdin Road planning areas. These streets are illustrated in Figure 3 and each has been assigned a unique identifier number. It should be noted that only proposed collector roads are shown within the planning areas in this figure. All other internal streets would be considered local roads, and would be identified and laid out when property development proposals are prepared.

#### **Road 1**

Road 1 is a northerly extension of Vista Drive which is identified for implementation in the City's 2014 TSP. This road would provide a connection between Watercrest Road and NW Thatcher Road, helping to relieve traffic congestion at the intersection of Thatcher Road with Gales Creek Road. The road would be located through undeveloped property. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- Traffic control during construction would be required at intersections with Watercrest Drive and NW Thatcher Road.
- Road grade would be approximately 8 to 10%.

#### **Road 2**

This road would provide connectivity to potential future development along the south side of David Hill Road between the Vista Drive extension (Road 1) and a proposed extension of Valley Crest Way from south of Lavina Drive into the development area. The roadway will be located south of an existing resource parcel.

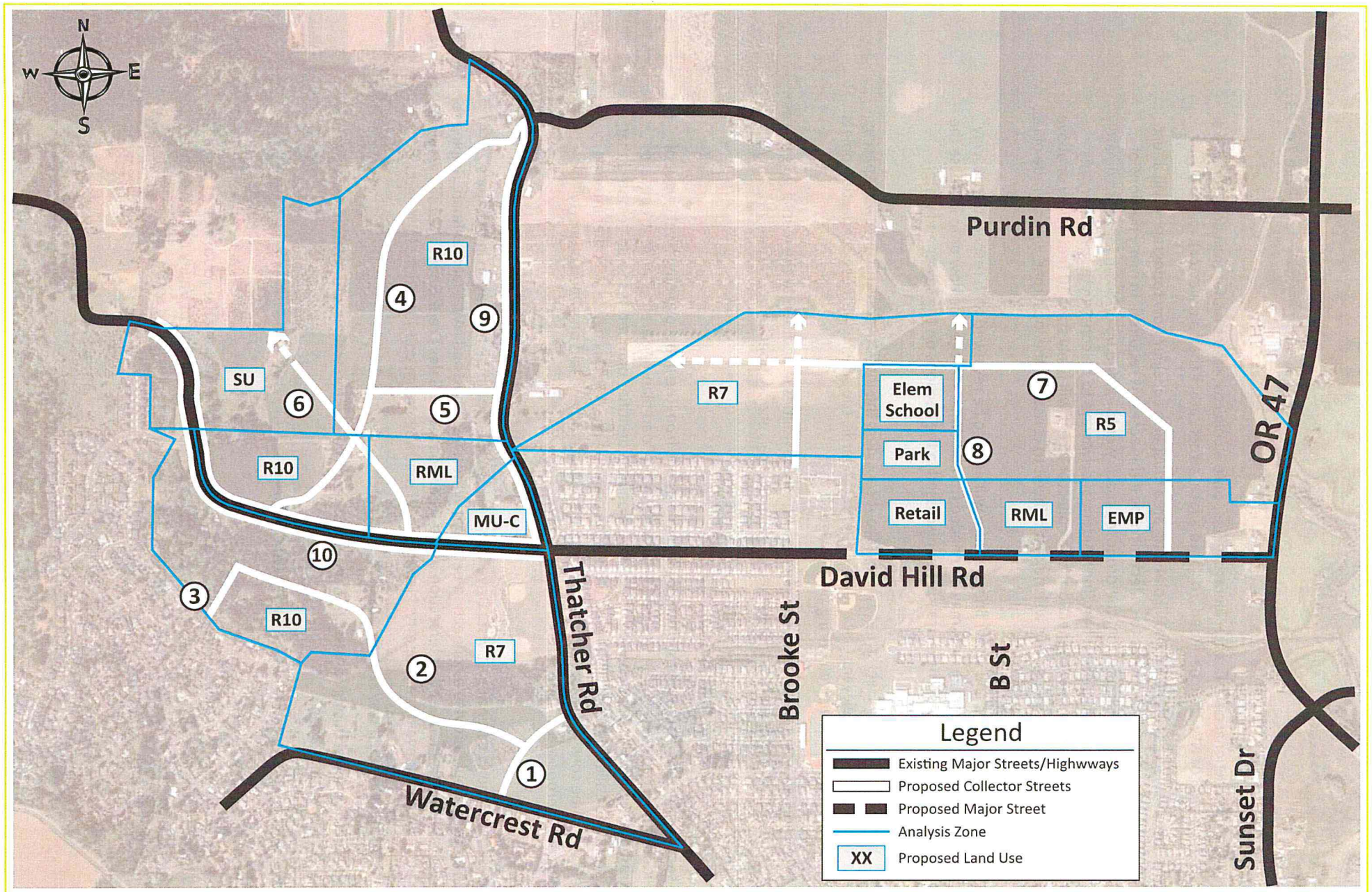


Figure 3  
Proposed Street System

Westside Planning Project  
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This area has been identified as a Landslide Hazard Zone and further investigation related to the feasibility of building residential development and associated infrastructure in this area will likely be necessary prior to final design and/or construction of this road. Planning level roadway design considerations included:

- A collector roadway section was used with catch slopes of 3:1.
- Road grade is assumed to be 15% to match the existing site grade of 15% through three small segments of the road totaling 1,250 feet. The remainder of the road would have a grade of 12% or less. If the entire road grade were limited to 12% as required by City Code, additional cut and fill (with associated additional costs) would be required.
- Culverts will need to be sized and placed under the road to allow for stormwater runoff to flow from south to north to the existing creek along the south side of David Hill Road. A minimum of three culverts may be required. See Figure 5 for locations.

### **Road 3**

This road would be an extension of Valley Crest Way north of Lavina Drive. As with Road 2, ultimate feasibility of this road would be linked to the overall feasibility of development in the Landslide Hazard Area. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road grade was assumed to be 12%.
- The road would have an intersection at Lavina Drive that would require traffic control during construction.
- The existing terrain where the road is to be located is forested.

A connection from Road 3 to David Hill Road is not shown due to the potential landslide hazard in this area and the need to cross the stream and vegetative corridor that runs along the south side of David Hill Road through this area.

### **Road 4**

This road would provide major north/south access through the entire David Hill planning area. It would intersect David Hill Road at an existing driveway approximately 2,500 feet west of the intersection with NW Thatcher Road, and then extend generally north and northeast for approximately 4,700 feet to intersect NW Thatcher Road at Purdin Road. This road represents the spine around which most access into and out of the David Hill planning area would congregate. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- Road grade is assumed to be 15% to match the existing site grade of 15% through a small segment of the road totaling slightly over 600 feet in a single location. The remainder of the road would have a grade of 12% or less. If the entire road grade were limited to 12% as required by City Code, additional cut and fill (with associated additional costs) would be required. The earthwork cut section would start out as negligible and increase to an additional six feet of cut at the center and ultimately daylight at the top of the rise. This represents an excavation cost increase of approximately 40% over the 15% design. The cost estimate for this road assumes concrete pavement for this distance.





The analysis in this memo is based on aerial contours and GIS information provided by the City, Metro and other sources. It is possible that when a future developer conducts a field survey of the area and prepares preliminary roadway design, actual topography may be somewhat different than the values assumed in this report. If that were to occur, then it may be possible to meet the 12% grade limitation of the existing Development Code. However, it is also possible that a revision to the City's Development Code may be necessary to allow 15% grades longer than 250 feet. This issue should be addressed if and when it becomes necessary.

- The elevation of Road 4 at its intersection of with Road 6 will need to match. This may control the slope of one or both of the roads.
- The two intersections at the connecting streets were aligned to follow the existing grades more closely. Retaining walls will need to be constructed on each side of the roadway for about 400 feet to match into existing grades at each of these intersections. The wall locations and types will be determined by the residential development during the final design phase.

#### **Road 5**

Using the existing alignment of the privately-owned Plum Hill Road, Road 5 would be constructed to urban standards to provide a direct connection between Road 4 and NW Thatcher Road. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- Road 5 would have grades ranging from 12% to 15% for the full length of the roadway. If a consistent grade of 12% is used for the design of this road, the elevation of the intersection would need to match Road 4.

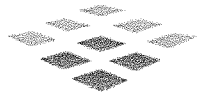
#### **Road 6**

This road would also provide access into the David Hill planning area from David Hill Road at a new intersection approximately 1,250 feet west of NW Thatcher Road. This access point takes advantage of a location where grades are less steep than most locations along the north side of David Hill Road at this location. This road is assumed to run approximately 2,300 feet north and west of the David Hill Road intersection, serving the far western edge of the planning area. When initially constructed it is expected that this road would end in a temporary turnaround at its western end, but it will be extended further west into the City's Urban Reserve area at such time as this area comes into the UGB and development occurs. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road grade is assumed to be 15% to match the existing 15% grade for the entire length of the road. If a flatter (12%) slope was assumed, it would require approximately 240,000 cubic yards of additional cut and fill above the level required to achieve a 15% grade. The cul-de-sac at the westerly end of this road would be 40-feet below existing grade if a 12% slope was used.
- The elevation of Road 6 at its intersection with Road 4 will need to match. This may control the slope of one or both of the roads.
- There is an existing residence in the vicinity of the proposed cul-de-sac.

#### **Road 7**

Road 7 is the primary road serving the Purdin Road planning area. On its easterly end, it intersects the David Hill Road extension approximately 900 feet west of Highway 47 and then runs north and west into



the planning area. This road would bisect the proposed employment area and provide access into and through the single family residential areas. It turns south at a point that generally aligns with Brooke Street (a city-designated collector street facility). Other roads serving the proposed single family residential areas located in the northern portion of the planning area would be local streets. They are not shown in Figure 3 but would be identified when and as development proposals are prepared. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road is flat with grades under 5%.
- Culverts will need to be sized and placed under the road to allow for stormwater runoff to flow from west to east. A minimum of two culverts may be required.
- The turns in Road 7 as shown in Figure 3 are for illustrative purposes and will need to be adjusted during final design to meet ASSHTO standards.

#### **Road 8**

This north/south road connects to David Hill Road on its southern end approximately 2,400 feet west of Highway 47. This connection is recommended to occur directly opposite an extension of B Street as proposed in the TSP and identified in the pending Silverstone development. On its northern end, Road 8 would intersect Road 7 about 1,500 east of the extension of Brooke Street north into the planning area (i.e., the westernmost end of Road 7). Road 8 provides direct access to a mixed use residential area and commercial development proposed for the north side of David Hill Road. It would also serve the proposed park and elementary school in the heart of the planning area, and provides an alternate route into the single family residential area. Planning level roadway design considerations included:

- A collector road way section was used with catch slopes of 3:1.
- The road is flat with grades under 5%.

#### **Road 9 (Thatcher Road)**

Planning level roadway design discussions with the City indicate that half street improvements will be required on the east side of this roadway from Purdin Road to David Hill Road, a distance of approximately 4,050 feet in length. A section of the roadway will be raised to allow for a gravity sewer line to cross over the existing drainage located approximately 900 north of David Hill Road. Crossing the creek depression will take a fill prism of 800 feet. The fill would start at existing grade at the beginning and increase to 15 feet in the center of the depression (approximately 400 feet of distance) then transition back down to existing grade at the 800-foot mark. These improvements are considered as a portion of the City's roadway collector requirements and are included in the cost estimate. See the Appendix for details.

#### **Road 10 (David Hill Road)**

David Hill Road is planned for a reconstruction from Thatcher Road west by 5,100 feet. A three lane section is proposed from Thatcher Road west by 850 feet to the existing drainage way. A two lane section is proposed from the drainage way west for another 4,250 feet. Planning level roadway design consideration include:

- A road way section was used with catch slopes of 3:1.
- The road grade is assumed to match the existing grade for the entire length of the road.



### **Other Roads**

Figure 3 also illustrates some potential future roadway connections that are intended to provide collector arterial road access into the Rural Reserve area south of Purdin Road and north of the existing east/west creek (the current UGB line). It is not anticipated that these connections would be made within the 20-year planning horizon for the Westside Planning Area study. However, they are shown to provide a very long-term vision of a future transportation network to both serve this area and to provide guidance on the type and size of roads that should be built within the UGB.

In Figure 3, these roads are shown as dashed lines with arrows that point to the future extension. They include future extensions of Brooke Street and B Street north of Road 7, and a westerly extension of Road 7 to the UGB that would be aligned north of and parallel to David Hill Road. This westerly extension could ultimately connect with Road 5 on the west side of Thatcher Road providing additional east/west connectivity between the David Hill area and the Purdin Road area.

These street extensions would be designated as collector streets and designed accordingly. It is anticipated that they will provide local access only if the Rural Reserve area develops. At that time they will function as collectors.

### **Internal Road System Cost Estimates**

Table 2 summarizes planning level cost estimates prepared for the ten internal roads in the Westside Planning Project area. More detailed information is included in a cost estimate worksheet prepared for each road and included in Appendix A. As indicated in the table, total estimated cost for constructing the designated collector street system with the amenities and cross-section required by City Code would be \$29,463,900. It should be noted that this estimate does not include any local street construction or any street mitigation that may be required as a result of the traffic impact assessment. This estimate is subject to the limitations and caveats noted above in general and/or for each specific roadway. All costs included in Table 2 are assumed to be private costs associated with providing access for development or traffic impact mitigation.

**Table 2. Westside Planning Project Area Internal Street System Cost Estimates**

| No. | Street Name                          | Limits                                        | Description                                     | Estimated Cost |
|-----|--------------------------------------|-----------------------------------------------|-------------------------------------------------|----------------|
| 1   | Road 1 – Gales Ck (Vista Drive)      | Watercrest Road to NW Thatcher Road           | Construct new 1,050-foot urban collector street | \$1,000,300    |
| 2   | Road 2 – Gales Ck                    | Area 7 to Area 8                              | Construct new 3,200-foot urban collector street | \$4,246,000    |
| 3   | Road 3 – Gales Ck                    | Area 8 Connector                              | Construct new 600-foot urban collector street   | \$787,200      |
| 4   | Road 4 – David Hill                  | David Hill Road to Purdin Road                | Construct new 4,700-foot urban collector street | \$6,409,200    |
| 5   | Road 5 – David Hill (Plum Hill Road) | Area 13 Mid-Block Connection to Thatcher Road | Construct new 1,250-foot urban collector street | \$1,212,200    |
| 6   | Road 6 – David Hill                  | Area 13 to temporary turn-around              | Construct new 2,300-foot urban collector street | \$2,391,000    |
| 7   | Road 7 – Purdin                      | Brooke Street to David Hill Road              | Construct new 5,500-foot urban collector street | \$4,766,200    |





**Table 2 Continued. Westside Planning Project Area Internal Street System Cost Estimates**

| No.           | Street Name          | Limits                                    | Description                                                   | Estimated Cost      |
|---------------|----------------------|-------------------------------------------|---------------------------------------------------------------|---------------------|
| 8             | Road 8 - Purdin      | David Hill Road to Proposed Brooke Street | Construct new 1,750-foot urban collector street               | \$1,583,700         |
| 9             | Road 9 – Thatcher    | David Hill Road to Purdin Road            | Half street reconstruction, 4050-foot ½ street improvements   | \$3,124,600         |
| 10            | Road 10 – David Hill | Thatcher Road to West of Area 9           | Full street reconstruction, 5,100-foot urban collector street | \$3,943,500         |
| <b>Totals</b> |                      |                                           |                                                               | <b>\$29,463,900</b> |

Note: See Figure 2 for an illustration of the areas that are referenced in this table.

## Sewer System

This section presents a discussion of the proposed sewer system to serve residential and other urban development in the Westside Planning Area. The analysis of sewer system needs is based on the development assumptions identified in Table 2. Sewer services should be designed to meet City of Forest Grove development standards.

Figure 4 illustrates the proposed sewer system improvements to provide service to both the David Hill and Purdin Road planning areas. This system typically follows the existing and/or proposed street system. It includes both sewer lines and manholes.

### General Sewer System Design Assumptions and Conclusions

Specific observations, findings and recommendations with respect to the provision of future sewer service to the Westside Planning Area are summarized in the bullet points below:

- The lots off of Road 2 and 3 will flow to a sewer line located south of David Hill Road as indicated in Figure 4. An 8" diameter sewer pipe will be required, but its ultimate location will be determined at the time of development application, and will depend on the nature of development in this area.
- Based on the alignment shown in Figure 3, Road 4 would slope in two directions. The southern ends of Road 4 and Road 6 would generally slope to the south and east. Sewage in this area would be served by gravity flow to an existing connection point at a manhole located at the intersection of David Hill Road and NW Thatcher Road.
- Sewage flow from the north end of Road 4 would flow north and then south along NW Thatcher Road to an existing manhole located approximately 560 feet north of the intersection of David Hill Road and NW Thatcher Road. One of the challenges of making this connection is the stream crossing north of David Hill Road. As noted in the discussion of Road 9 (Thatcher Road), the proposed improvements on this road would include raising approximately 800-feet of this facility to allow gravity flow for the sewer line. It should be recognized that there are other options for moving sewage across the creek including installation of either a siphon or a pump station. These options should be considered during final design of roadway improvements along Thatcher Road.

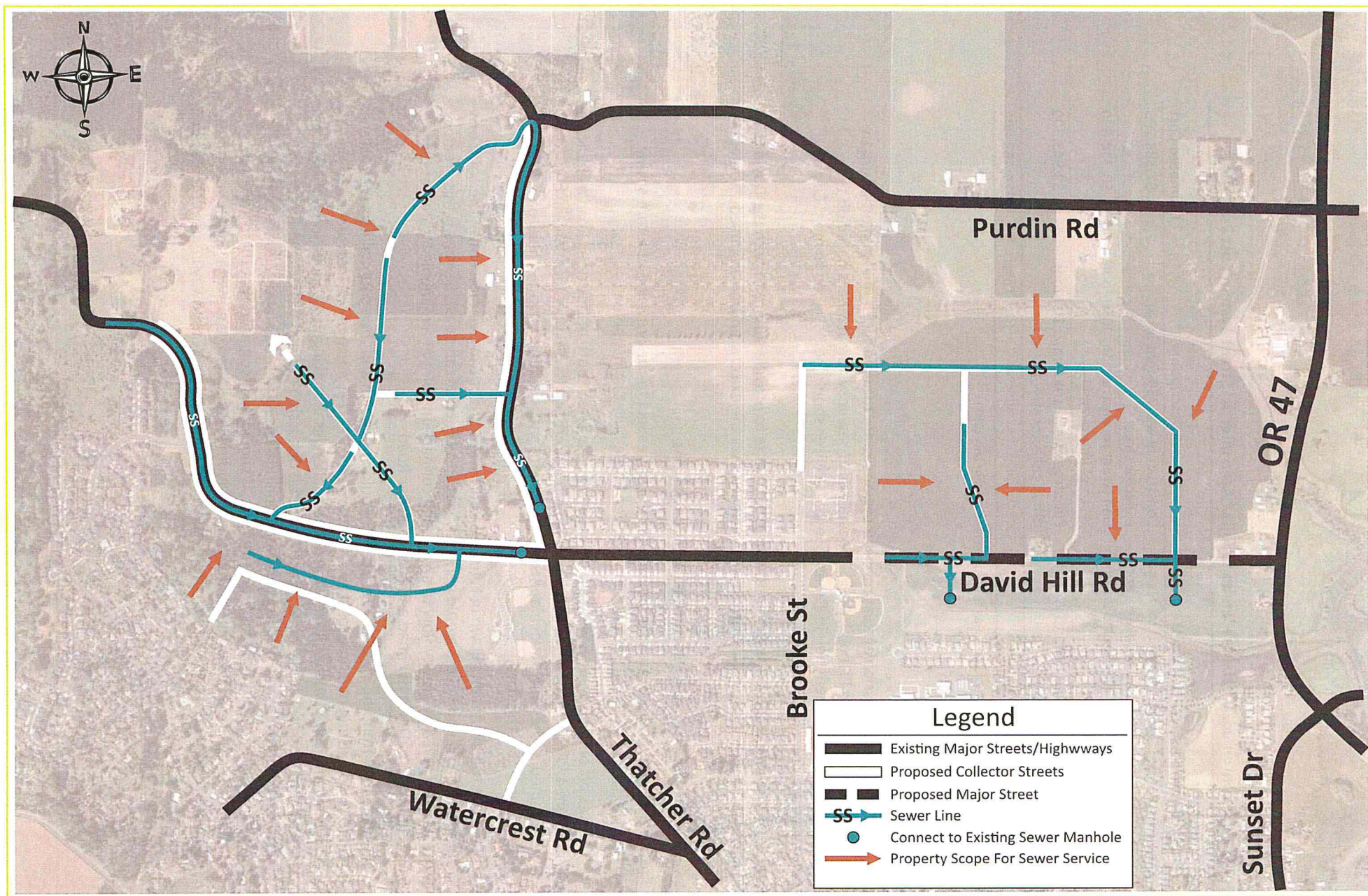


Figure 4  
Sewer Utilities

Westside Planning Project  
Forest Grove, OR





- Sewage flow from Road 5 (Plum Hill Road) will flow east to a gravity sewer line located at the intersection of Road 5 and NW Thatcher Road. The sewer line proposed in Thatcher Road will flow south to an existing sewer line located 600 feet north of David Hill Road.
- The use of connections to the existing sewer system on Thatcher and David Hill Roads was based on an analysis of potential sewer flows from the David Hill Planning Area and a review of the 2009 *Sewer Master Plan*. The Master Plan did not identify a current constriction in the downstream system that would preclude service to the David Hill area. This area is in the current UGB and development at the level identified in the Comprehensive Plan would have been assumed in the development of the Master Plan. The David Hill development assumed in this report would have approximately 170 more dwelling units than were assumed in the Comprehensive Plan. Our analysis also took into account the sewer extensions/connections along David Hill Road (Nehalem Lateral in the 2009 *Sewer Master Plan*, see appendix for an illustration) that are being installed with the roadway connection as currently planned. The Nehalem Lateral extension would connect at generally the same location as the Future North Forest Grove Trunk line. This future trunk line is shown in the Rural Reserve Area north of the Westside Planning Area and the stream. The extension of a sewer line through a Rural Reserve area to connect two portions of a UGB is permitted under state land use regulations<sup>1</sup>.
- Sewage flow from Roads 7 and 8 will gravity flow an existing sewer manhole located at the intersection of Hartford Drive and Main Street. This will require coordination with the pending Silverstone development located along the south side of the new David Hill Road alignment west of Highway 47.
- The system wide capacity and flow will need to be verified for design level documents. This report has used the proposed land uses and flows to provide planning level estimates for pipe sizing. This has shown that new 8" diameter sewer mains should be able to support the proposed land uses.
- Based on the assumption that for all new sewer mains 8 inches in size the installation shall be at the developers' expense and no cost sharing is expected between the City and future development. All new sewer mains that are expected to be more than 8 inches in size are assumed to be publicly-funded.
- Additional sewer calculations will need to be completed to determine the required pipe sizes, slopes and pipe cover.

### **Sewer System Cost Estimates**

Table 3 summarizes planning level cost estimates prepared for the major components of the sewer system proposed for the Westside Planning Area. More detailed information is included in a cost estimate worksheet in the Appendix. As indicated in the table, total estimated cost for constructing the proposed sewer system as required by City Code would be \$3,635,600. In most cases, the sewer lines were proposed to be 8-inches in diameter. Funding for all 8-inch pipes is assumed to be provided by private developers. Funding for pipes larger than 8 inches is expected to be publicly-funded. This includes the sewer lines proposed along Roads 7 and 8 that are anticipated to be 10-inches in diameter and the line along Road 10 (David Hill Road) is expected to be 12-inches in diameter.

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<sup>1</sup> Per email communication with Anne Debbaut of DLCD staff on May 23, 2016.





The Sewer system cost estimate is preliminary in nature and based best available information at the time of the report. Sewer main locations are based on preliminary roadway locations and GIS topography information. No survey or field verifications have been completed as part of this analysis.

**Table 3. Westside Planning Project Area Sewer System Cost Estimates**

| No. | Description                     | Estimated Cost      |
|-----|---------------------------------|---------------------|
| 1   | Road 1, 2, 3 Sewer Line         | \$225,000           |
| 4   | Road 4 Sewer Line               | \$300,000           |
| 5   | Road 5 Sewer Line               | \$82,500            |
| 6   | Road 6 Sewer Line               | \$165,000           |
| 7   | Road 7 Sewer Line (10")         | \$405,000           |
| 8   | Road 8 Sewer Line (10")         | \$255,000           |
| 9   | Road 9 Sewer Line               | \$262,500           |
| 10  | Road 10 Sewer Line (700 LF 12") | \$382,500           |
|     | Contingencies and Engineering   | \$1,558,100         |
|     | <b>Totals</b>                   | <b>\$3,2635,600</b> |

## Stormwater System

This section presents a discussion of the proposed stormwater management system to the future collector streets being proposed in the Westside Planning Area. The analysis of stormwater system needs is based on the lineal footage of the road layout shown in Figure 3. At this time, the local streets that support the land uses identified in Table 2 have not been included, nor has runoff from property adjacent to the public street system. This memorandum only includes the requirements to construct stormwater ponds for the collector roadways. Future land use applicants will be required to make provisions to meet their own stormwater management needs. The stormwater system will need to be designed to meet Clean Water Services' development standards. It will be challenging to construct a stormwater treatment facility on existing slopes which range from 8 to 20% in locations.

Figure 5 illustrates the proposed stormwater management system improvements to provide service to both the David Hill and Purdin Road planning areas. This system typically follows the existing and/or proposed street system alignment and places stormwater ponds in areas that are topographically reasonable to collect the stormwater from roadway conveyance systems. Stormwater modeling will be required prior to final design to verify locations, sizes, and elevations of each facility. Each location has assumed that the facility can treat its own stormwater within the footprint of the facility and no retaining walls will be required.

### General Stormwater Management System Design Assumptions and Conclusions

Specific observations, findings and recommendations with respect to the provision of future stormwater management service to the Westside Planning Area are summarized in the bullet points below:

- Stormwater from Roads 1, 2 and 3 may be conveyed to a treatment facility located adjacent to NW Thatcher Road. Stormwater from this facility would need to be released to an acceptable location to be determined during design engineering. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies. There are multiple options to engage in a comprehensive

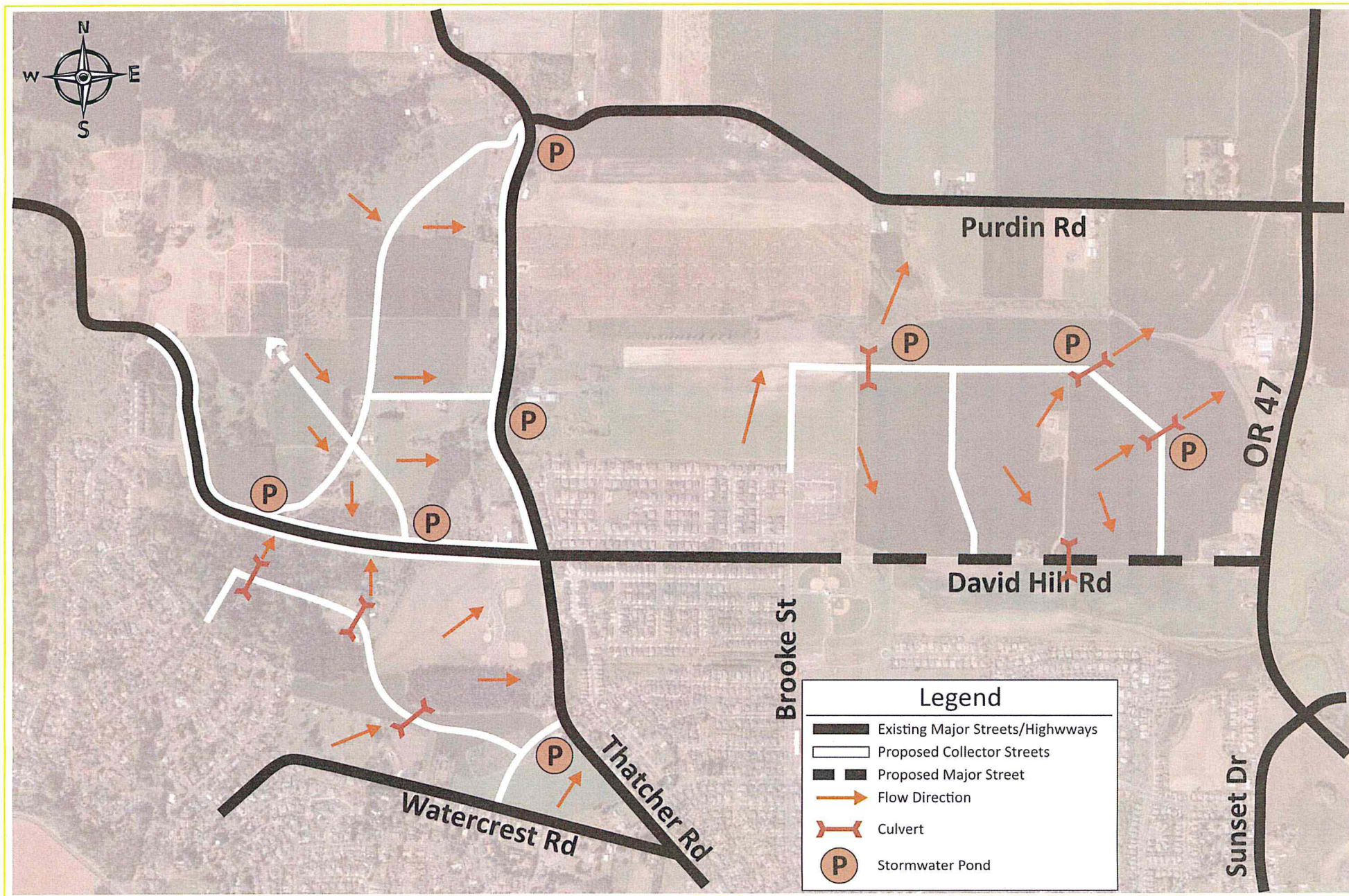


Figure 5  
Stormwater Utilities

Westside Planning Project  
Forest Grove, OR



approach to overall stormwater management that must be developed during subdivision or general site design. Any facilities meeting a comprehensive public stormwater management need will be publicly owned and managed.

- Culverts may need to be installed under Road 2 in three locations.
- Stormwater from the south end of Road 4 would be conveyed to a treatment facility located adjacent to David Hill Road and released to an acceptable location to be determined during design engineering. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from north end of Road 4 would be conveyed to a treatment facility located adjacent to NW Thatcher Road and released to an acceptable location. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from Road 5 would be conveyed to a treatment facility located adjacent to NW Thatcher Road and released to an acceptable location. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from Road 6 would be conveyed to a treatment facility located adjacent to David Hill Rd and released to an acceptable location. It is assumed that subdivisions next to public streets will develop their own approach to stormwater management in cooperation with public agencies.
- Stormwater from Road 9 will be collected and conveyed to a treatment facility east of Roadway 5.
- Stormwater from Road 10 will be collected and conveyed to a treatment facility adjacent to Road 2.
- Stormwater from Road 7 may be detained in three treatment facilities and then released.
- Culverts may need to be installed under Road 7 in three locations.
- Stormwater from Road 8 may be detained in a treatment facility and then released.

It should be noted that the locations of the stormwater facilities in Figure 5 are only shown schematically. Based on details to be worked out during design for site development, it is expected that they would be located within public rights-of-way either on property dedicated to the City or County as part of a development-driven road construction or improvement project, or on property acquired by a jurisdiction. At the level of detail addressed in this memo, it cannot be precisely determined whether there is sufficient existing right-of-way along Thatcher Road to provide the stormwater treatment facilities indicated. Based on communications with the Oregon Department of Land Conservation and Development, construction and operation of stormwater treatment facilities in the Rural Reserve area along the east side of Thatcher Road is permitted under state statutes (OAR 660-033-130(10)(A)).<sup>2</sup>

During discussions with Clean Water Services (CWS) it was generally accepted that the collector roadways will be constructed as part of the private developments and the stormwater facilities would

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<sup>2</sup> Per email communication with Anne Debbaut of DLCD staff on May 23, 2016.





likely be handling stormwater from the collector streets, local streets and land uses. In doing so the private developers would be required to construct the stormwater facilities. For this report, we have only included an estimate of stormwater needs and costs for the collector streets.

All cities in urban Washington County, including the City of Forest Grove, use Clean Water Services' Design and Construction Standards (Standards) as their minimum requirements. The Standards identify how to manage both stormwater quality and quantity. These standards have been consulted during the development of the Westside stormwater management concept. The current CWS stormwater standards require stormwater to just be treated before being released downstream. It is also required to make sure the downstream conveyance is sufficient to handle the additional runoff. It should be noted that Clean Water Services (CWS) is currently making major modifications to these standards which may be applicable as soon as 2016. These revisions are expected to require both water quality and quantity control will be the major focus during the upcoming modification process. Stormwater management strategies for collector streets, as well as local roads and individual properties should follow the CWS standards in place at the time of development.

#### **Stormwater Management System Cost Estimates**

Table 4 summarizes planning level cost estimates prepared for the proposed stormwater management system in the Westside Planning Area. These estimates include both facilities to address the quantity and quality of water flow. While they are identified separately in the table, they could be co-located when constructed. More detailed information is included in a cost estimate worksheet in the Appendix.

**Table 4. Westside Project Planning Area Stormwater Management System Cost Estimates**

| No.                                                                   | Description                        | Estimated Cost     |
|-----------------------------------------------------------------------|------------------------------------|--------------------|
| <i><u>Facilities to address management of stormwater quantity</u></i> |                                    |                    |
| 1                                                                     | Road 1, 2, 3 Storm Pond            | \$75,000           |
| 2                                                                     | Road 4 Storm Pond                  | \$75,000           |
| 3                                                                     | Road 5 and 9 Storm Pond            | \$100,000          |
| 4                                                                     | Road 6 and 10 Storm Pond           | \$150,000          |
| 5                                                                     | Road 7 Storm Pond                  | \$200,000          |
| 6                                                                     | Road 8 Storm Pond                  | \$50,000           |
|                                                                       |                                    |                    |
| <i><u>Facilities to address management of stormwater quality</u></i>  |                                    |                    |
| 7                                                                     | Road 1, 2, 3 Stormwater Treatment  | \$35,000           |
| 8                                                                     | Road 4 Stormwater Treatment        | \$35,000           |
| 9                                                                     | Road 5 and 9 Stormwater Treatment  | \$70,000           |
| 10                                                                    | Road 6 and 10 Stormwater Treatment | \$70,000           |
| 11                                                                    | Road 7 Stormwater Treatment        | \$20,000           |
| 12                                                                    | Road 8 Stormwater Treatment        | \$20,000           |
|                                                                       | Contingencies and Engineering      | \$675,000          |
|                                                                       | <b>Totals</b>                      | <b>\$1,575,000</b> |

As indicated in the table, the total estimated cost for constructing the proposed stormwater management system as required by Clean Water Services and City Code would be \$1,575,000. It should



be noted that these cost estimates include construction and engineering only, and do not reflect the cost of any necessary right-of-way. It is to be assumed that developers will be required to dedicate additional land to construct the stormwater facilities. At this time, there is no anticipated public/private split of cost sharing for these facilities. If they are constructed as part of the private developments then the costs would be entirely private.

The Stormwater concept cost estimate is preliminary in nature and based best available information at the time of the report. Storm conveyance mains and pond locations are based on preliminary roadway locations and GIS topography information. No survey or field verifications have been completed as part of this analysis. All costs included in Table 4 are assumed to be private costs associated with providing the basic stormwater management infrastructure necessary for development.

## Water System

This section presents a discussion of the proposed water system to serve residential and other urban development in the Westside Planning Area. The analysis of water system needs is based on the development assumptions identified in Table 2 and uses the internal road layout shown in Figure 3. The water system will need to be designed to meet the City of Forest Grove's development standards. New reservoirs will be required to serve the David Hill UGB and Purdin Road UGB. The new reservoirs will include:

- 2.25 Million Gallon (MG) reservoir located near or adjacent to the existing 5.0 MG reservoir at the Treatment Plant. This reservoir will provide service to areas from elevation 155 to 250.
- Two 0.3 MG reservoirs located near or adjacent to the existing 1.0 MG David Hill reservoir. These reservoirs will provide service to areas from elevation 250 to 440.
- One 0.5 MG reservoir located outside of the David Hill UGB and URA. This reservoir will provide service to areas from elevation 440 to 615 within the David Hill UGB and a portion of the David Hill URA from elevation 190 to 615. A future second reservoir of the same size will provide service to the remaining David Hill URA demand from elevation 190 to 615. Cost estimates include both reservoirs (plus land acquisition, piping, pressure reducing valves, and a pump station) to accommodate equitable cost sharing between the UGB and the URA

A key element of providing water service to the westerly portion of the David Hill planning area will be the need to develop and connect to a new reservoir to be located west of the planning area and outside of the City's Urban Reserve Area. Service from a new reservoir is necessary for all properties located above 440-feet of elevation which cannot currently be served by the existing city water system. This approach was selected as constructing a dedicated reservoir to serve the David Hill UGB above elevation 440 was cost prohibitive and did not consider the demands of the development in the David Hill URA. A siting study and sizing analysis will be part of the FY18 Water Master Plan Update.

Figure 6 illustrates the proposed water system improvements to provide service to both the David Hill and Purdin Road planning areas. This system typically follows the existing and/or proposed street system alignment. The areas above 440-feet in elevation and a service connection to proposed new reservoir locations are indicated in the figure. The figure also illustrates potential new reservoir locations in the southern portion of the study area just north of Watercrest Road and near the existing treatment plant.



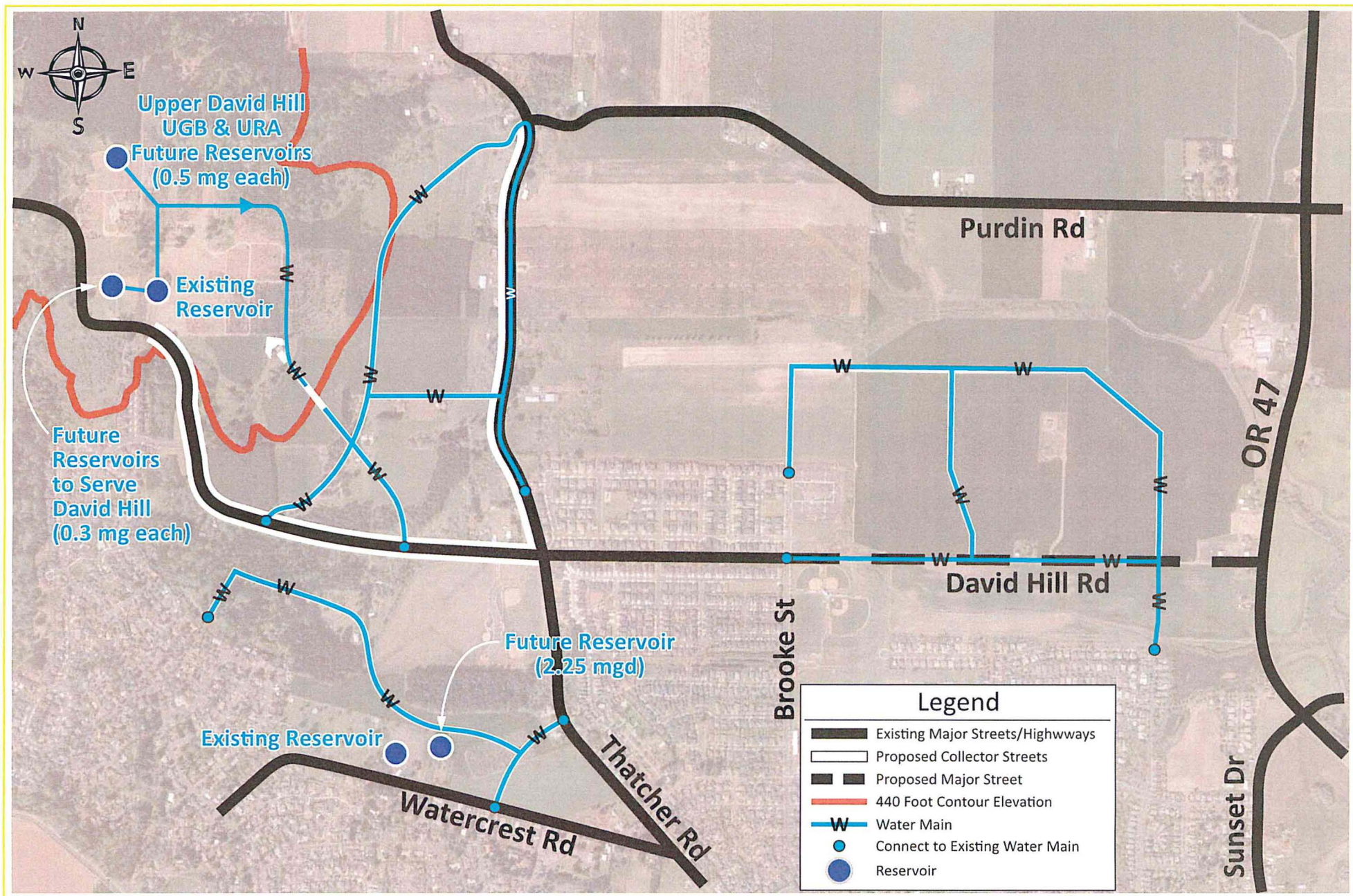
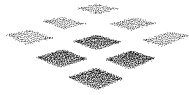


Figure 6  
Water Utilities

Westside Planning Project  
Forest Grove, OR





### General Water System Design Assumptions and Conclusions

Specific observations, findings and recommendations with respect to the provision of future water service to the Westside Planning Area are summarized in the bullet points below:

- The water main size will need to be analyzed to determine the final required pipe sizing.
- A siting study will be needed to locate reservoirs and determine land value.
- Sizing of the reservoirs and pump station will need to be evaluated.
- The pressure zones will need to be reviewed for the system.
- The system wide capacity and flow will need to be reviewed.
- The placement of fire hydrants will need to be placed based on City code.

### Water System Cost Estimates

Table 5 summarizes planning level cost estimates prepared for the proposed water system in the Westside Planning Area. More detailed information is included in a cost estimate worksheet in the Appendix. As indicated in the table, total estimated cost for constructing the proposed water system as required by City Code would be \$8,533,000.

**Table 5. Westside Project Planning Area Water System Cost Estimates**

| No.                           | Description                                             | Linear Feet | Estimated Cost     |
|-------------------------------|---------------------------------------------------------|-------------|--------------------|
| 1                             | Road 1 Water main                                       | 1,050       | \$63,000           |
| 2                             | Road 2 Water main                                       | 3,200       | \$192,000          |
| 3                             | Road 3 Water main                                       | 600         | \$36,000           |
| 4                             | Road 4 Water main                                       | 4,700       | \$282,000          |
| 5                             | Road 5 Water main                                       | 1,250       | \$75,000           |
| 6                             | Road 6 Water main                                       | 2,300       | \$138,000          |
| 7                             | Road 7 Water main                                       | 5,500       | \$330,000          |
| 8                             | Road 8 Water main                                       | 1,750       | \$105,000          |
| 9                             | Road 9 Water main                                       | 3,500       | \$525,000          |
| 10                            | Two 0.5 MG reservoirs <sup>1</sup>                      | EA          | \$500,000          |
| 11                            | Two 0.3 MG reservoirs <sup>2</sup>                      | EA          | \$1,950,000        |
| 12                            | One 2.25 MG reservoir near Watercrest Road <sup>3</sup> | EA          | \$680,000          |
| Contingencies and Engineering |                                                         |             | \$3,657,000        |
| <b>Totals</b>                 |                                                         |             | <b>\$8,533,000</b> |

<sup>1</sup> One reservoir expected to be used by development within David Hill from 440 to 615 feet in elevation and portions of the David Hill URA between 190 and 615 feet. The other reservoir expected to be used to serve the remainder of the David Hill URA between 190 and 615 feet which is included herein to account for the shared costs of land acquisition, piping, pressure reducing valves and a pump station. Approximately \$500,000 or 10.4% of total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 105 dwelling units with R10 zoning. If there is a reduction in the density permitted in this area to SR (1 du/acre) approximately \$120,000 or 2.5% of the total cost of these reservoirs would be attributed to serving the David Hill UGB above 440 feet which would include an estimated 24 dwelling units.



- <sup>2</sup> A portion of these reservoirs will be used to serve the David Hill UGB between 250 and 440 feet. Approximately 67% of total costs would be associated with the David Hill Planning Area.
- <sup>3</sup> Approximately 23% of the cost of this reservoir would be associated with the David Hill and Purdin Road Planning Areas.

It should be noted that cost estimates in this table for installation of the new reservoirs that will serve the Westside Planning Area were developed by City staff<sup>3</sup>. Reservoir costs in the table reflect only those costs allocated to the David Hill and Purdin Road UGBs for construction of new reservoirs, the pump station, piping, and pressure reducing valves needed to convey water from the existing David Hill 1.0 MG reservoir to the new reservoir, and land acquisition cost to serve the David Hill and Purdin Road UGBs. Total reservoir-related costs for these areas are \$3.13 million which is a portion of the overall storage improvement costs (assuming 105 dwelling units with R10 zoning above elevation 440 feet). The total costs associated with growth for the construction of the reservoirs, pump station, piping, pressure reducing valves, and land acquisition will be paid for by the City using SDC funds.

The Water system cost estimate is preliminary in nature and based on best available information at the time of the report. Water main locations are based on preliminary roadway locations and GIS topography information. No survey or field verifications have been completed as part of this analysis.

### **Effect of Reduced Land Use Density on West Side of David Hill Planning Area**

As noted previously, the analysis in this report assumes the land use types and intensities shown in Table 1 under "Revised Land Use Alternative" dated April 15, 2016. This includes medium density development in the western portion of the David Hill Planning Area, generally above 440 feet in elevation. The Planning Commission is proposing Suburban Residential (SR) at 1 dwelling unit per acre

The land use alternative used in this report would include approximately 105 dwelling units on 10,000 square foot lots in Area 13 (this area is assumed to generally represent the area above 440-feet within the Westside Planning Project area). If development intensity were retained at the existing Comprehensive Plan density of 1 unit / acre (SR), only 24 units could be developed. This represents a difference of 81 additional dwelling units between the two land use alternatives.

If the western portion of the David Hill Planning Area were developed at the level of intensity assumed in the Comprehensive Plan rather than the level assumed in Table 1 the cost for the needed reservoirs, their service mains and pump station would have to be borne by a lower number of units. The per unit cost for the added reservoirs would be \$4,762 at R10 density (\$500,000/105 units) and about \$5,000 at SR density (\$120,000/24). Some cost savings for the lower density development pattern would be realized for the localized system of roads, sewers and stormwater management facilities that must be borne by private developers. However, it is not expected that there would be a substantial reduction in the cost of collector roads (i.e., the portion of Road 6 leading to the temporary turn-around), or the major sewer, stormwater or water facilities that would serve the western portion of David Hill (as identified in Figures 4, 5 and 6). Private costs for these facilities would still need to be borne largely in their entirety. It should be noted that the value of development on a per unit basis would be higher at SR densities when compared with a R10 designation and have a greater capacity to absorb infrastructure costs. The concern is whether the higher per unit water cost for SR densities as noted above makes this option financially infeasible. This will be further explored as part of the financing program.

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<sup>3</sup> Based on Tables 1 and 2 provided by City engineering staff on June 23, 2016.



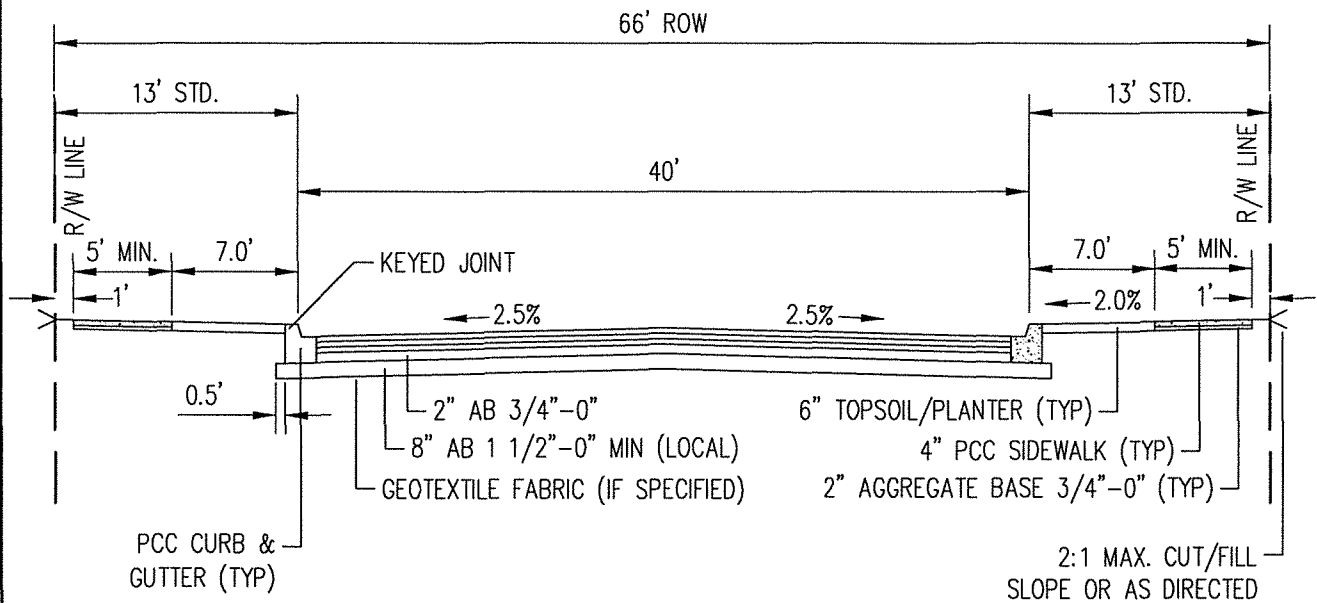


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## **APPENDIX**

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## COLLECTOR ROADWAY SECTION

NTS

Oct 05, 2015 2:32:33pm - User: lisa.seller  
K:\PROJECTS\0742 CITY OF FOREST GROVE\0742.01 FOREST GROVE WESTSIDE PLAN\PHASE 10 - WESTSIDE PLAN\CAD\EXHIBITS\742.01 EXH1.DWG

**SCJ ALLIANCE**  
CONSULTING SERVICES

8730 TALLON LANE NE, SUITE 200, LACEY, WASHINGTON 98516  
P: 360-352-1465 F: 360-352-1509  
SCJALLIANCE.COM

HORIZONTAL SCALE:

NTS

DATE:

9/14/15

JOB No.:

742.01

DRAWING FILE No.:

742.01 EXH1.dwg

ROADWAY SECTIONS

FOREST GROVE

EXHIBIT No:

EXH1

SHEET No:

1



Option Roadway 1

Length

1050 LF

Desc. Watercrest Rd to Thatcher Rd

Roadway Section

Collector

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 99,750.00        | \$ 99,750.00    |
| 2        | HMAC                                            | 1000     | TON  | \$ 110.00           | \$ 110,000.00   |
| 3        | AGGREGATE BASE                                  | 2800     | TON  | \$ 20.00            | \$ 56,000.00    |
| 4        | 12 INCH STORM PIPE                              | 1400     | LF   | \$ 40.00            | \$ 56,000.00    |
| 5        | CONCRETE INLET                                  | 30       | EACH | \$ 1,500.00         | \$ 45,000.00    |
| 6        | CURB AND GUTTER                                 | 2100     | LF   | \$ 20.00            | \$ 42,000.00    |
| 7        | SIDEWALK                                        | 1170     | SY   | \$ 5.00             | \$ 5,850.00     |
| 8        | PAVEMENT STRIPING                               | 4200     | LF   | \$ 0.50             | \$ 2,100.00     |
| 9        | EARTHWORK                                       | 4000     | CY   | \$ 20.00            | \$ 80,000.00    |
| 10       | GEOTEXSTILE                                     | 5000     | EACH | \$ 1.50             | \$ 7,500.00     |
| 11       | PLANTING STRIP                                  | 1600     | SY   | \$ 20.00            | \$ 32,000.00    |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             |                 |
| 13       | CLEARING AND GRUBBING                           | 2.0      | ACRE | \$ 3,000.00         | \$ 6,000.00     |
| 14       | SIGNING                                         | 1        | LS   | \$ 3,150.00         | \$ 3,150.00     |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 5,250.00         | \$ 5,250.00     |
| 16       | SURVEYING                                       | 1        | LS   | \$ 21,000.00        | \$ 21,000.00    |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 571,600.00   |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 228,640.00   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 80,024.00    |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 120,036.00   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 1,000,300.00 |
|          |                                                 |          |      |                     |                 |

Option Roadway 2

Length

3700 LF

| Desc.    | Area 7 to Area 8                                | Roadway Section |      | Collector           |                 |
|----------|-------------------------------------------------|-----------------|------|---------------------|-----------------|
|          |                                                 |                 |      | Engineer's Estimate |                 |
| Item No. | Bid Item Description                            | Quantity        | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1               | LS   | \$ 304,000.00       | \$ 304,000.00   |
| 2        | HMAC                                            | 3600            | TON  | \$ 110.00           | \$ 396,000.00   |
| 3        | AGGREGATE BASE                                  | 8500            | TON  | \$ 20.00            | \$ 170,000.00   |
| 4        | 12 INCH STORM PIPE                              | 4000            | LF   | \$ 40.00            | \$ 160,000.00   |
| 5        | CONCRETE INLET                                  | 37              | EACH | \$ 1,500.00         | \$ 55,500.00    |
| 6        | CURB AND GUTTER                                 | 6400            | LF   | \$ 20.00            | \$ 128,000.00   |
| 7        | SIDEWALK                                        | 3556            | SY   | \$ 5.00             | \$ 17,777.78    |
| 8        | PAVEMENT STRIPING                               | 12800           | LF   | \$ 0.50             | \$ 6,400.00     |
| 9        | EARTHWORK                                       | 48000           | CY   | \$ 20.00            | \$ 960,000.00   |
| 10       | GEOTEXSTILE                                     | 18000           | EACH | \$ 1.50             | \$ 27,000.00    |
| 11       | PLANTING STRIP                                  | 4700            | SY   | \$ 20.00            | \$ 94,000.00    |
| 12       | WATER QUALITY                                   | 1               | LS   | \$ 1.00             | \$ -            |
| 13       | CLEARING AND GRUBBING                           | 6.0             | ACRE | \$ 3,000.00         | \$ 18,000.00    |
| 14       | SIGNING                                         | 1               | LS   | \$ 9,600.00         | \$ 9,600.00     |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1               | LS   | \$ 16,000.00        | \$ 16,000.00    |
| 16       | SURVEYING                                       | 1               | LS   | \$ 64,000.00        | \$ 64,000.00    |
|          |                                                 |                 |      |                     |                 |
|          |                                                 |                 |      |                     |                 |
|          |                                                 |                 |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |                 |      |                     | \$ 2,426,277.78 |
|          | CONTINGENCY (40%)                               |                 |      |                     | \$ 970,511.11   |
|          | PRELIMINARY ENGINEERING (10%)                   |                 |      |                     | \$ 339,678.89   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |                 |      |                     | \$ 509,518.33   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |                 |      |                     | \$ 4,245,986.11 |
|          |                                                 |                 |      |                     |                 |

Option Roadway 3

Length

600 LF

Desc. Area 8 Connector

Roadway Section

Collector

|          |                                                 |          |      | Engineer's Estimate |               |
|----------|-------------------------------------------------|----------|------|---------------------|---------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total         |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 57,000.00        | \$ 57,000.00  |
| 2        | HMAC                                            | 600      | TON  | \$ 110.00           | \$ 66,000.00  |
| 3        | AGGREGATE BASE                                  | 1600     | TON  | \$ 20.00            | \$ 32,000.00  |
| 4        | 12 INCH STORM PIPE                              | 800      | LF   | \$ 40.00            | \$ 32,000.00  |
| 5        | CONCRETE INLET                                  | 6        | EACH | \$ 1,500.00         | \$ 9,000.00   |
| 6        | CURB AND GUTTER                                 | 1200     | LF   | \$ 20.00            | \$ 24,000.00  |
| 7        | SIDEWALK                                        | 667      | SY   | \$ 5.00             | \$ 3,333.33   |
| 8        | PAVEMENT STRIPING                               | 2400     | LF   | \$ 0.50             | \$ 1,200.00   |
| 9        | EARTHWORK                                       | 9000     | CY   | \$ 20.00            | \$ 180,000.00 |
| 10       | GEOTEXSTILE                                     | 3000     | EACH | \$ 1.50             | \$ 4,500.00   |
| 11       | PLANTING STRIP                                  | 900      | SY   | \$ 20.00            | \$ 18,000.00  |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             | \$ -          |
| 13       | CLEARING AND GRUBBING                           | 2.0      | ACRE | \$ 3,000.00         | \$ 6,000.00   |
| 14       | SIGNING                                         | 1        | LS   | \$ 1,800.00         | \$ 1,800.00   |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 3,000.00         | \$ 3,000.00   |
| 16       | SURVEYING                                       | 1        | LS   | \$ 12,000.00        | \$ 12,000.00  |
|          |                                                 |          |      |                     |               |
|          |                                                 |          |      |                     |               |
|          |                                                 |          |      |                     |               |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 449,833.33 |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 179,933.33 |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 62,976.67  |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 94,465.00  |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 787,208.33 |
|          |                                                 |          |      |                     |               |



Option Roadway 4

Length

4700 LF

Desc. David Hill Road to Purdin Road

Roadway Section

Collector

| Item No. | Bid Item Description                                       | Quantity | Unit | Engineer's Estimate |                 |
|----------|------------------------------------------------------------|----------|------|---------------------|-----------------|
|          |                                                            |          |      | Unit Price          | Total           |
| 1        | MOBILIZATION                                               | 1        | LS   | \$ 446,500.00       | \$ 446,500.00   |
| 2        | HMAC                                                       | 4500     | TON  | \$ 110.00           | \$ 495,000.00   |
| 3        | AGGREGATE BASE                                             | 12500    | TON  | \$ 20.00            | \$ 250,000.00   |
| 4        | 12 INCH STORM PIPE                                         | 5900     | LF   | \$ 40.00            | \$ 236,000.00   |
| 5        | CONCRETE INLET                                             | 47       | EACH | \$ 1,500.00         | \$ 70,500.00    |
| 6        | CURB AND GUTTER                                            | 9400     | LF   | \$ 20.00            | \$ 188,000.00   |
| 7        | SIDEWALK                                                   | 5222     | SY   | \$ 5.00             | \$ 26,111.11    |
| 8        | PAVEMENT STRIPING                                          | 18800    | LF   | \$ 0.50             | \$ 9,400.00     |
| 9        | EARTHWORK                                                  | 56000    | CY   | \$ 20.00            | \$ 1,120,000.00 |
| 10       | GEOTEXSTILE                                                | 22000    | EACH | \$ 1.50             | \$ 33,000.00    |
| 11       | PLANTING STRIP                                             | 6800     | SY   | \$ 20.00            | \$ 136,000.00   |
| 12       | WATER QUALITY                                              | 1        | LS   | \$ 1.00             | \$ -            |
| 13       | CLEARING AND GRUBBING                                      | 9.0      | ACRE | \$ 3,000.00         | \$ 27,000.00    |
| 14       | SIGNING                                                    | 1        | LS   | \$ 14,100.00        | \$ 14,100.00    |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                           | 1        | LS   | \$ 23,500.00        | \$ 23,500.00    |
| 16       | SURVEYING                                                  | 1        | LS   | \$ 94,000.00        | \$ 94,000.00    |
| 17       | RETAINING WALLS                                            | 6000     | SF   | \$ 50.00            | \$ 300,000.00   |
|          |                                                            |          |      |                     |                 |
|          | <b>ROADWAY CONSTRUCTION SUBTOTAL</b>                       |          |      |                     | \$ 3,469,111.11 |
|          | <b>CONTINGENCY (40%)</b>                                   |          |      |                     | \$ 1,387,644.44 |
|          | <b>PRELIMINARY ENGINEERING (10%)</b>                       |          |      |                     | \$ 485,675.56   |
|          | <b>ROADWAY CONSTRUCTION ENGINEERING (15%)</b>              |          |      |                     | \$ 728,513.33   |
|          | <b>ROADWAY CONSTRUCTION &amp; CONSTRUCTION ENGINEERING</b> |          |      |                     | \$ 6,070,944.44 |
|          |                                                            |          |      |                     |                 |

Option Roadway 5

Length

1250 LF

Desc. Area 13 Mid-Block Connection to Thatcher Road

Roadway Section

Collector

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 118,750.00       | \$ 118,750.00   |
| 2        | HMAC                                            | 1200     | TON  | \$ 110.00           | \$ 132,000.00   |
| 3        | AGGREGATE BASE                                  | 3400     | TON  | \$ 20.00            | \$ 68,000.00    |
| 4        | 12 INCH STORM PIPE                              | 1600     | LF   | \$ 40.00            | \$ 64,000.00    |
| 5        | CONCRETE INLET                                  | 13       | EACH | \$ 1,500.00         | \$ 19,500.00    |
| 6        | CURB AND GUTTER                                 | 2500     | LF   | \$ 20.00            | \$ 50,000.00    |
| 7        | SIDEWALK                                        | 1389     | SY   | \$ 5.00             | \$ 6,944.44     |
| 8        | PAVEMENT STRIPING                               | 5000     | LF   | \$ 0.50             | \$ 2,500.00     |
| 9        | EARTHWORK                                       | 7000     | CY   | \$ 20.00            | \$ 140,000.00   |
| 10       | GEOTEXSTILE                                     | 6000     | EACH | \$ 1.50             | \$ 9,000.00     |
| 11       | PLANTING STRIP                                  | 1900     | SY   | \$ 20.00            | \$ 38,000.00    |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             |                 |
| 13       | CLEARING AND GRUBBING                           | 3.0      | ACRE | \$ 3,000.00         | \$ 9,000.00     |
| 14       | SIGNING                                         | 1        | LS   | \$ 3,750.00         | \$ 3,750.00     |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 6,250.00         | \$ 6,250.00     |
| 16       | SURVEYING                                       | 1        | LS   | \$ 25,000.00        | \$ 25,000.00    |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 692,694.44   |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 277,077.78   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 96,977.22    |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 145,465.83   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 1,212,215.28 |
|          |                                                 |          |      |                     |                 |

Option Roadway 6

Length

2300 LF

Desc. Area 13 to Temporary Turn-around

Roadway Section

Collector

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 218,500.00       | \$ 218,500.00   |
| 2        | HMAC                                            | 2200     | TON  | \$ 110.00           | \$ 242,000.00   |
| 3        | AGGREGATE BASE                                  | 6100     | TON  | \$ 20.00            | \$ 122,000.00   |
| 4        | 12 INCH STORM PIPE                              | 2900     | LF   | \$ 40.00            | \$ 116,000.00   |
| 5        | CONCRETE INLET                                  | 23       | EACH | \$ 1,500.00         | \$ 34,500.00    |
| 6        | CURB AND GUTTER                                 | 4600     | LF   | \$ 20.00            | \$ 92,000.00    |
| 7        | SIDEWALK                                        | 2556     | SY   | \$ 5.00             | \$ 12,777.78    |
| 8        | PAVEMENT STRIPING                               | 9200     | LF   | \$ 0.50             | \$ 4,600.00     |
| 9        | EARTHWORK                                       | 18000    | CY   | \$ 20.00            | \$ 360,000.00   |
| 10       | GEOTEXSTILE                                     | 11000    | EACH | \$ 1.50             | \$ 16,500.00    |
| 11       | PLANTING STRIP                                  | 3400     | SY   | \$ 20.00            | \$ 68,000.00    |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             | \$ -            |
| 13       | CLEARING AND GRUBBING                           | 5.0      | ACRE | \$ 3,000.00         | \$ 15,000.00    |
| 14       | SIGNING                                         | 1        | LS   | \$ 6,900.00         | \$ 6,900.00     |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 11,500.00        | \$ 11,500.00    |
| 16       | SURVEYING                                       | 1        | LS   | \$ 46,000.00        | \$ 46,000.00    |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 1,366,277.78 |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 546,511.11   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 191,278.89   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 286,918.33   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 2,390,986.11 |
|          |                                                 |          |      |                     |                 |



Option Roadway 7

Length

5500 LF

Desc. Brook Street to David Hill Road

Roadway Section

Collector

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 522,500.00       | \$ 522,500.00   |
| 2        | HMAC                                            | 5300     | TON  | \$ 110.00           | \$ 583,000.00   |
| 3        | AGGREGATE BASE                                  | 14600    | TON  | \$ 20.00            | \$ 292,000.00   |
| 4        | 12 INCH STORM PIPE                              | 6900     | LF   | \$ 40.00            | \$ 276,000.00   |
| 5        | CONCRETE INLET                                  | 55       | EACH | \$ 1,500.00         | \$ 82,500.00    |
| 6        | CURB AND GUTTER                                 | 11000    | LF   | \$ 20.00            | \$ 220,000.00   |
| 7        | SIDEWALK                                        | 6111     | SY   | \$ 5.00             | \$ 30,555.56    |
| 8        | PAVEMENT STRIPING                               | 22000    | LF   | \$ 0.50             | \$ 11,000.00    |
| 9        | EARTHWORK                                       | 16000    | CY   | \$ 20.00            | \$ 320,000.00   |
| 10       | GEOTEXSTILE                                     | 26000    | EACH | \$ 1.50             | \$ 39,000.00    |
| 11       | PLANTING STRIP                                  | 8000     | SY   | \$ 20.00            | \$ 160,000.00   |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             |                 |
| 13       | CLEARING AND GRUBBING                           | 11.0     | ACRE | \$ 3,000.00         | \$ 33,000.00    |
| 14       | SIGNING                                         | 1        | LS   | \$ 16,500.00        | \$ 16,500.00    |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 27,500.00        | \$ 27,500.00    |
| 16       | SURVEYING                                       | 1        | LS   | \$ 110,000.00       | \$ 110,000.00   |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 2,723,555.56 |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 1,089,422.22 |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 381,297.78   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 571,946.67   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 4,766,222.22 |
|          |                                                 |          |      |                     |                 |

Option     Roadway 8

Length

1750 LF

Desc.     David Hill Road to Proposed Brook Street

Roadway Section

Collector

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 166,250.00       | \$ 166,250.00   |
| 2        | HMAC                                            | 1700     | TON  | \$ 110.00           | \$ 187,000.00   |
| 3        | AGGREGATE BASE                                  | 4700     | TON  | \$ 20.00            | \$ 94,000.00    |
| 4        | 12 INCH STORM PIPE                              | 2200     | LF   | \$ 40.00            | \$ 88,000.00    |
| 5        | CONCRETE INLET                                  | 40       | EACH | \$ 1,500.00         | \$ 60,000.00    |
| 6        | CURB AND GUTTER                                 | 3500     | LF   | \$ 20.00            | \$ 70,000.00    |
| 7        | SIDEWALK                                        | 1950     | SY   | \$ 5.00             | \$ 9,750.00     |
| 8        | PAVEMENT STRIPING                               | 7000     | LF   | \$ 0.50             | \$ 3,500.00     |
| 9        | EARTHWORK                                       | 5000     | CY   | \$ 20.00            | \$ 100,000.00   |
| 10       | GEOTEXSTILE                                     | 9000     | EACH | \$ 1.50             | \$ 13,500.00    |
| 11       | PLANTING STRIP                                  | 2600     | SY   | \$ 20.00            | \$ 52,000.00    |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             | \$ -            |
| 13       | CLEARING AND GRUBBING                           | 4.0      | ACRE | \$ 3,000.00         | \$ 12,000.00    |
| 14       | SIGNING                                         | 1        | LS   | \$ 5,250.00         | \$ 5,250.00     |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 8,750.00         | \$ 8,750.00     |
| 16       | SURVEYING                                       | 1        | LS   | \$ 35,000.00        | \$ 35,000.00    |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 905,000.00   |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 362,000.00   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 126,700.00   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 190,050.00   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 1,583,750.00 |
|          |                                                 |          |      |                     |                 |

Option Roadway 9

Length

4050 LF

Desc. David Hill Road to Purdin Road

Roadway Section

1/2 Street Improvements

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 384,750.00       | \$ 384,750.00   |
| 2        | HMAC                                            | 4100     | TON  | \$ 110.00           | \$ 451,000.00   |
| 3        | AGGREGATE BASE                                  | 5200     | TON  | \$ 20.00            | \$ 104,000.00   |
| 4        | 12 INCH STORM PIPE                              | 5100     | LF   | \$ 40.00            | \$ 204,000.00   |
| 5        | CONCRETE INLET                                  | 90       | EACH | \$ 1,500.00         | \$ 135,000.00   |
| 6        | CURB AND GUTTER                                 | 4050     | LF   | \$ 20.00            | \$ 81,000.00    |
| 7        | SIDEWALK                                        | 2250     | SY   | \$ 5.00             | \$ 11,250.00    |
| 8        | PAVEMENT STRIPING                               | 16200    | LF   | \$ 0.50             | \$ 8,100.00     |
| 9        | EARTHWORK                                       | 11000    | CY   | \$ 20.00            | \$ 220,000.00   |
| 10       | GEOTEXSTILE                                     | 10000    | EACH | \$ 1.50             | \$ 15,000.00    |
| 11       | PLANTING STRIP                                  | 2300     | SY   | \$ 20.00            | \$ 46,000.00    |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ 1.00             | \$ -            |
| 13       | CLEARING AND GRUBBING                           | 4.0      | ACRE | \$ 3,000.00         | \$ 12,000.00    |
| 14       | SIGNING                                         | 1        | LS   | \$ 12,150.00        | \$ 12,150.00    |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 20,250.00        | \$ 20,250.00    |
| 16       | SURVEYING                                       | 1        | LS   | \$ 81,000.00        | \$ 81,000.00    |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 1,785,500.00 |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 714,200.00   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 249,970.00   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 374,955.00   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 3,124,625.00 |
|          |                                                 |          |      |                     |                 |



Option Roadway 10

Length

5100 LF

Desc. Thatcher Road to West of Area 9

Roadway Section

Modified Collector Street

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | MOBILIZATION                                    | 1        | LS   | \$ 484,500.00       | \$ 484,500.00   |
| 2        | HMAC                                            | 4100     | TON  | \$ 110.00           | \$ 451,000.00   |
| 3        | AGGREGATE BASE                                  | 11000    | TON  | \$ 20.00            | \$ 220,000.00   |
| 4        | 12 INCH STORM PIPE                              | 6400     | LF   | \$ 40.00            | \$ 256,000.00   |
| 5        | CONCRETE INLET                                  | 110      | EACH | \$ 1,500.00         | \$ 165,000.00   |
| 6        | CURB AND GUTTER                                 | 10200    | LF   | \$ 20.00            | \$ 204,000.00   |
| 7        | SIDEWALK                                        | 3400     | SY   | \$ 5.00             | \$ 17,000.00    |
| 8        | PAVEMENT STRIPING                               | 10200    | LF   | \$ 0.50             | \$ 5,100.00     |
| 9        | EARTHWORK                                       | 13000    | CY   | \$ 20.00            | \$ 260,000.00   |
| 10       | GEOTEXSTILE                                     | 20000    | EACH | \$ 1.50             | \$ 30,000.00    |
| 11       | PLANTING STRIP                                  | 0        | SY   | \$ 20.00            | \$ -            |
| 12       | WATER QUALITY                                   | 1        | LS   | \$ -                | \$ -            |
| 13       | CLEARING AND GRUBBING                           | 8.0      | ACRE | \$ 3,000.00         | \$ 24,000.00    |
| 14       | SIGNING                                         | 1        | LS   | \$ 15,300.00        | \$ 15,300.00    |
| 15       | TRAFFIC CONTROL FOR CONSTRUCTION                | 1        | LS   | \$ 25,500.00        | \$ 19,517.65    |
| 16       | SURVEYING                                       | 1        | LS   | \$ 102,000.00       | \$ 102,000.00   |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 2,253,417.65 |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 901,367.06   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 315,478.47   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 473,217.71   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 3,943,480.89 |
|          |                                                 |          |      |                     |                 |

| Road | Length | Cut   | Fill  | Total | CY/FT |
|------|--------|-------|-------|-------|-------|
| 1    | 1050   | 2200  | 1600  | 3800  | 3.6   |
| 2    | 3200   | 20000 | 27000 | 47000 | 14.7  |
| 3    | 1050   |       |       | 0     | 0.0   |
| 4    | 4700   | 33500 | 22500 | 56000 | 11.9  |
| 5    | 1250   | 5000  | 1500  | 6500  | 5.2   |
| 6    | 2300   | 14000 | 4000  | 18000 | 7.8   |
| 7    | 5500   | 9000  | 6500  | 15500 | 2.8   |
| 8    | 1750   | 3500  | 800   | 4300  | 2.5   |
| 9    |        |       |       |       |       |
| 10   |        |       |       |       |       |

Stormwater Basin

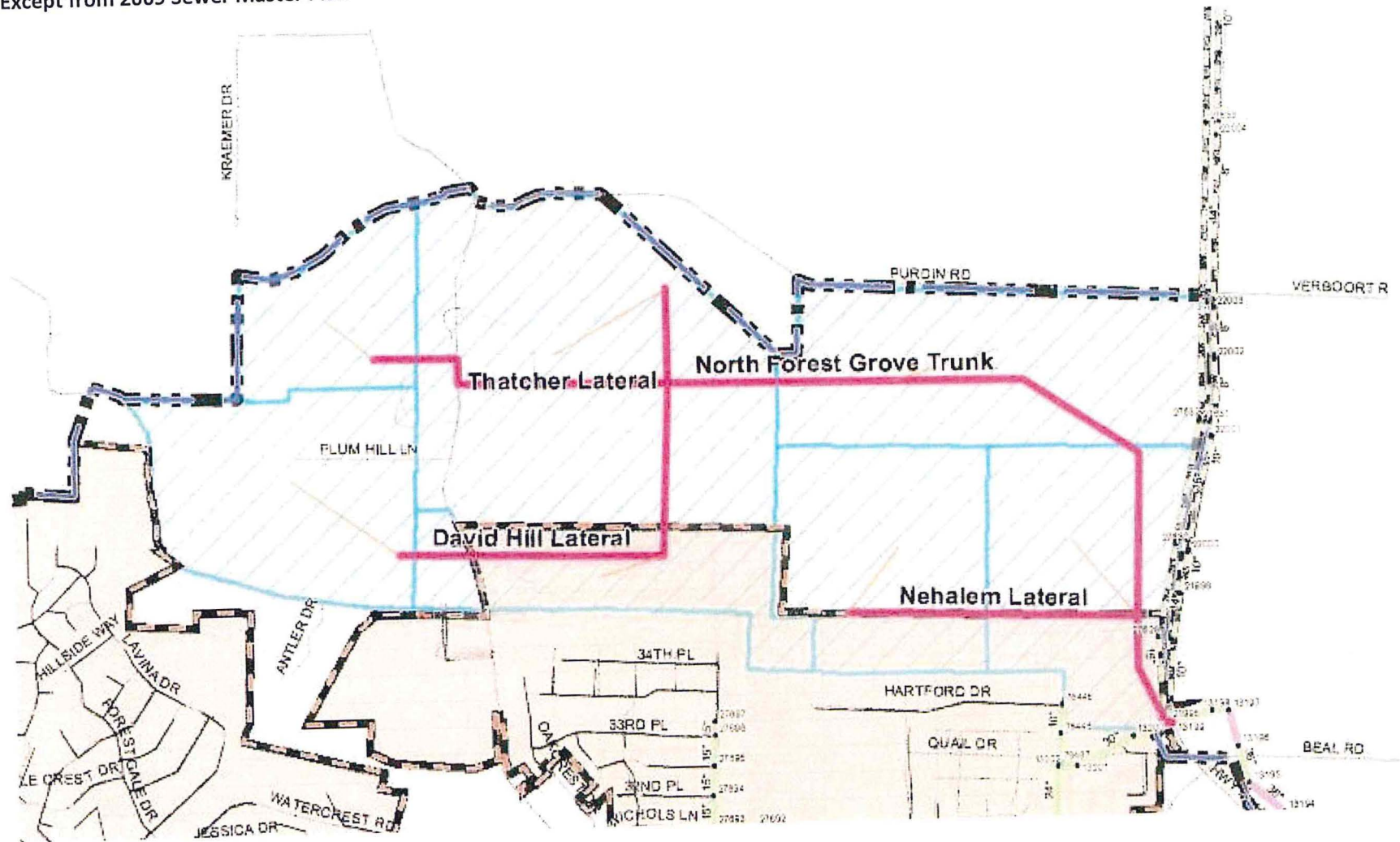
| Item No. | Bid Item Description                                       | Quantity | Unit | Engineer's Estimate |                 |
|----------|------------------------------------------------------------|----------|------|---------------------|-----------------|
|          |                                                            |          |      | Unit Price          | Total           |
| 1        | Road 1,2,3 Storm Pond                                      | 1        | EACH | \$ 75,000.00        | \$ 75,000.00    |
| 2        | Road 4 Storm Pond                                          | 1        | EACH | \$ 75,000.00        | \$ 75,000.00    |
| 3        | Road 5 and 9 Storm Pond                                    | 1        | EACH | \$ 100,000.00       | \$ 100,000.00   |
| 4        | Road 6 and 10 Storm Pond                                   | 1        | EACH | \$ 150,000.00       | \$ 150,000.00   |
| 5        | Road 7 Storm Pond                                          | 1        | EACH | \$ 200,000.00       | \$ 200,000.00   |
| 6        | Road 8 Storm Pond                                          | 1        | EACH | \$ 50,000.00        | \$ 50,000.00    |
| 7        |                                                            |          |      |                     | \$ -            |
| 8        | Road 1,2,3 Stormwater Treatment                            | 1        | EACH | \$ 35,000.00        | \$ 35,000.00    |
| 9        | Road 4 Stormwater Treatment                                | 1        | EACH | \$ 35,000.00        | \$ 35,000.00    |
| 10       | Road 5 and 9 Stormwater Treatment                          | 1        | EACH | \$ 70,000.00        | \$ 70,000.00    |
| 11       | Road 6 and 10 Stormwater Treatment                         | 1        | EACH | \$ 70,000.00        | \$ 70,000.00    |
| 12       | Road 7 Stormwater Treatment                                | 1        | EACH | \$ 20,000.00        | \$ 20,000.00    |
| 13       | Road 8 Stormwater Treatment                                | 1        | EACH | \$ 20,000.00        | \$ 20,000.00    |
|          |                                                            |          |      |                     | \$ -            |
|          |                                                            |          |      |                     | \$ -            |
|          |                                                            |          |      |                     | \$ -            |
|          | RETAINING WALLS                                            |          |      |                     |                 |
|          |                                                            |          |      |                     |                 |
|          |                                                            |          |      |                     |                 |
|          | <b>ROADWAY CONSTRUCTION SUBTOTAL</b>                       |          |      |                     | \$ 900,000.00   |
|          | <b>CONTINGENCY (40%)</b>                                   |          |      |                     | \$ 360,000.00   |
|          | <b>PRELIMINARY ENGINEERING (10%)</b>                       |          |      |                     | \$ 126,000.00   |
|          | <b>ROADWAY CONSTRUCTION ENGINEERING (15%)</b>              |          |      |                     | \$ 189,000.00   |
|          | <b>ROADWAY CONSTRUCTION &amp; CONSTRUCTION ENGINEERING</b> |          |      |                     | \$ 1,575,000.00 |
|          |                                                            |          |      |                     |                 |



**Sewer**

|          |                                                 |          |      | Engineer's Estimate |                 |
|----------|-------------------------------------------------|----------|------|---------------------|-----------------|
| Item No. | Bid Item Description                            | Quantity | Unit | Unit Price          | Total           |
| 1        | Road 1, 2 & 3 Sewer Line                        | 3000     | LF   | \$ 75.00            | \$ 225,000.00   |
| 2        | Road 4 Sewer Line                               | 4000     | LF   | \$ 75.00            | \$ 300,000.00   |
| 3        | Road 5 Sewer Line                               | 1100     | LF   | \$ 75.00            | \$ 82,500.00    |
| 4        | Road 6 Sewer Line                               | 2200     | LF   | \$ 75.00            | \$ 165,000.00   |
| 5        | Road 7 Sewer Line (10")                         | 5400     | LF   | \$ 75.00            | \$ 405,000.00   |
| 6        | Road 8 Sewer Line (10")                         | 3400     | LF   | \$ 75.00            | \$ 255,000.00   |
| 7        | Road 9 Sewer Line                               | 3500     | LF   | \$ 75.00            | \$ 262,500.00   |
| 8        | Road 10 Sewer Line *                            | 5100     | LF   | \$ 75.00            | \$ 382,500.00   |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
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|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          |                                                 |          |      |                     |                 |
|          | ROADWAY CONSTRUCTION SUBTOTAL                   |          |      |                     | \$ 2,077,500.00 |
|          | CONTINGENCY (40%)                               |          |      |                     | \$ 831,000.00   |
|          | PRELIMINARY ENGINEERING (10%)                   |          |      |                     | \$ 290,850.00   |
|          | ROADWAY CONSTRUCTION ENGINEERING (15%)          |          |      |                     | \$ 436,275.00   |
|          | ROADWAY CONSTRUCTION & CONSTRUCTION ENGINEERING |          |      |                     | \$ 3,635,625.00 |
|          |                                                 |          |      |                     |                 |

Except from 2009 Sewer Master Plan



Water

| Item No. | Bid Item Description                                                  | Quantity | Unit | Engineer's Estimate |                 |
|----------|-----------------------------------------------------------------------|----------|------|---------------------|-----------------|
|          |                                                                       |          |      | Unit Price          | Total           |
| 1        | Road 1 Watermain                                                      | 1050     | LF   | \$ 60.00            | \$ 63,000.00    |
| 2        | Road 2 Watermain                                                      | 3200     | LF   | \$ 60.00            | \$ 192,000.00   |
| 3        | Road 3 Watermain                                                      | 600      | LF   | \$ 60.00            | \$ 36,000.00    |
| 4        | Road 4 Watermain                                                      | 4700     | LF   | \$ 60.00            | \$ 282,000.00   |
| 5        | Road 5 Watermain                                                      | 1250     | LF   | \$ 60.00            | \$ 75,000.00    |
| 6        | Road 6 Watermain                                                      | 2300     | LF   | \$ 60.00            | \$ 138,000.00   |
| 7        | Road 7 Watermain                                                      | 5500     | LF   | \$ 60.00            | \$ 330,000.00   |
| 8        | Road 8 Watermain                                                      | 1750     | LF   | \$ 60.00            | \$ 105,000.00   |
| 9        | Road 9 Watermain                                                      | 3500     | LF   | \$ 150.00           | \$ 525,000.00   |
| 10       | 2- 0.5 mg Water Reservoirs to serve David Hill (440-615 ft elevation) | 1        | LS   | \$ 500,000.00       | \$ 500,000.00   |
| 11       | 2- 0.3 mg Water Reservoirs to serve David Hill (250-440 ft elevation) | 1        | LS   | \$ 1,950,000.00     | \$ 1,950,000.00 |
| 12       | 1- 2.25 mg Water Reservoir to serve city (155-250 ft elevation)       | 1        | LS   | \$ 680,000.00       | \$ 680,000.00   |
|          |                                                                       |          |      |                     | \$ -            |
|          |                                                                       |          |      |                     | \$ -            |
|          |                                                                       |          |      |                     | \$ -            |
|          |                                                                       |          |      |                     | \$ -            |
|          | RETAINING WALLS                                                       |          |      |                     |                 |
|          |                                                                       |          |      |                     |                 |
|          |                                                                       |          |      |                     |                 |
|          | <b>WATER SYSTEM CONSTRUCTION SUBTOTAL</b>                             |          |      |                     | \$ 4,876,000.00 |
|          | <b>CONTINGENCY (40%)</b>                                              |          |      |                     | \$ 1,950,400.00 |
|          | <b>PRELIMINARY ENGINEERING (10%)</b>                                  |          |      |                     | \$ 682,640.00   |
|          | <b>ROADWAY CONSTRUCTION ENGINEERING (15%)</b>                         |          |      |                     | \$ 1,023,960.00 |
|          | <b>ROADWAY CONSTRUCTION &amp; CONSTRUCTION ENGINEERING</b>            |          |      |                     | \$ 8,533,000.00 |

Note: Reservoir costs include only those portions of total costs that are attributable to the Westside Planning Area (including David Hill and Purdin Road)





## MEMORANDUM

**TO:** Jon Holan, Community Development Director  
City of Forest Grove

**FROM:** Anne Sylvester, PTE

**DATE:** November 2, 2015

**PROJECT #:** 0742.01 Forest Grove Westside Planning Project

**SUBJECT:** 2035 PM Peak Hour Traffic Operations Analysis of Revised Land Use  
Alternative (10/26/15 Version)

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### Introduction and Background

The memorandum presents the results of traffic operations analysis for the revised land use alternative developed by the City of Forest Grove on October 26, 2015, for the Westside Planning Project. Included in this memo is a discussion of:

- Key elements in the land use alternative
- The methodology used to develop and analyze long-range traffic forecasts at key intersections impacted by Westside growth
- Review of the traffic forecasts and operating analysis results including a comparison with the adopted 2014 Transportation System Plan
- Identification of impacts associated with Westside development and potential roadway improvement needs

As illustrated in Figure 1, two areas within the City of Forest Grove are included in the Westside Planning Project:

- David Hill planning area
- Purdin Road planning area

**David Hill** - The David Hill planning area is located in the northwestern portion of the City of Forest Grove and has been included in the Urban Growth Boundary (UGB) for several years. David Hill is one of the city's prime growth areas and over 90 percent of this area is projected to develop by 2025. While urban land use designations currently exist, the need for street and infrastructure planning is urgent. However, due to the extent of unknown factors affecting the development of a transportation system for David Hill, the City's recently adopted Transportation System Plan (TSP) did not identify a potential future street system. The TSP called for further refinement planning to address the unique aspects of providing urban services in this topographically challenged area. This refinement planning has been incorporated into the Westside Project along with consideration of connectivity issues for the Gales Creek area located immediately south of David Hill.

**Purdin Road** - The Purdin Road planning area is located east of David Hill and directly north of the city. It is predominately used for agricultural purposes. This area was added to the UGB through legislative





action in 2014, but there has been no comprehensive planning to guide the designation of urban land uses or infrastructure. The Westside Planning Project is intended to meet these needs.

**Figure 1. Westside Planning Project Study Areas**



### **Revised Land Use Alternative (10/26/15)**

Figure 2 was developed by City staff to illustrate the component elements of the Revised Westside Land Use Alternative dated October 26, 2015. This figure identifies a series of transportation zones by which different land uses are aggregated for analysis purposes. Table 1 includes detailed information concerning the specific land use types and quantities included in each zone. Figure 2 also shows existing riparian areas which must be avoided as the area is developed, along with the 440-foot contour interval on the west side of the David Hill area. This elevation represents the limit of existing city water service.

As indicated in Table 1, a net total of just over 374 acres have been identified for development as part of the Westside Planning Project. This excludes areas designated as vegetated corridors under Clean Water Services standards. Under the existing Comprehensive Plan (adopted in 2014) the two planning areas are entirely zoned for residential development yielding a total of 693 single family dwelling units. Under the Revised land use scenario, mixed use development is proposed consisting of single and multi-family dwellings, retail, a fire station and an elementary school. This development would include an estimated 2,132 dwelling units, an increase of 1,439 units over the existing plan with 247 more in the David Hill planning area and 1,192 more in the Purdin Road planning area. The development would also include 61,500 square feet of retail (yielding an estimated 78 employees), a 10.98-acre park, a 2-acre fire station with an estimated 3 employees, and a 65,000-square foot elementary school.



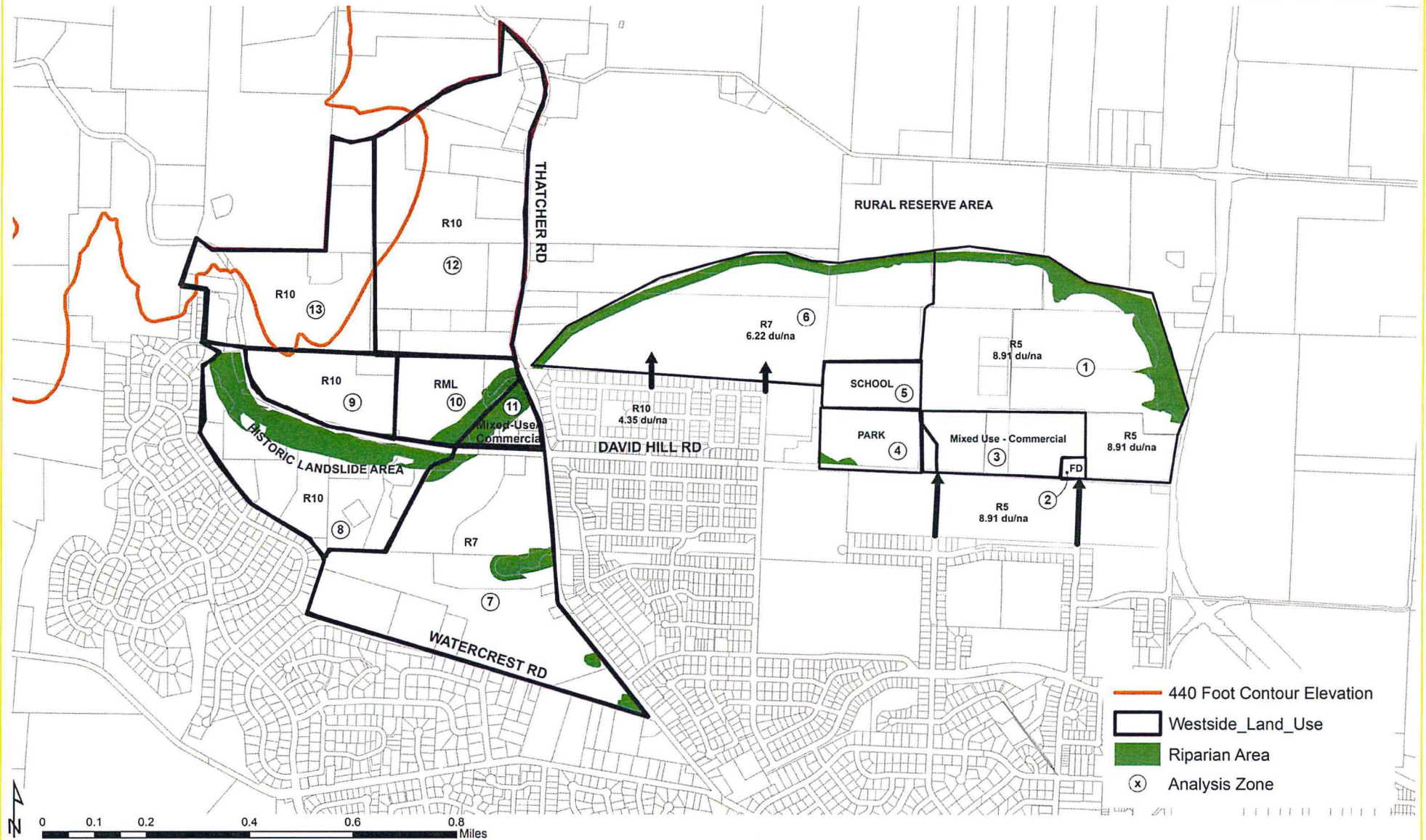


Figure 2  
Revised Land Use Alternative (10/26/15)

Westside Planning Project  
Forest Grove, OR





**Table 1. Comparison of Existing Comprehensive Plan and Revised Alternative**

| Zone                                    | Area                                      | Revised Land Use Alternative (10/26/2015) |               |                    |                   |              |              |           | 2014 Comprehensive Plan |               |                    |                   |
|-----------------------------------------|-------------------------------------------|-------------------------------------------|---------------|--------------------|-------------------|--------------|--------------|-----------|-------------------------|---------------|--------------------|-------------------|
|                                         |                                           | Density<br>(units/ac)                     | Net Ac        | Slope<br>Deduction | Dwelling<br>Units | KSF          | Acres        | Employees | Density<br>(units/ac)   | Net Ac        | Slope<br>Deduction | Dwelling<br>Units |
| 1                                       | Purdin (R5)                               | 8.71                                      | 67.76         | 0%                 | 590               |              |              |           |                         | 67.76         | 0%                 | 2                 |
| 2                                       | Fire Station                              |                                           | 2.00          | 0%                 |                   |              |              | 3         |                         | 2.00          | 0%                 |                   |
| 3                                       | Purdin (Residential)                      | 12.0                                      | 18.50         | 0%                 | 221               |              |              |           |                         | 18.50         | 0%                 |                   |
| 3                                       | Purdin (Retail Commercial) <sup>1</sup>   |                                           |               |                    |                   | 46.5         |              | 46        |                         |               |                    |                   |
| 4                                       | Purdin (Park)                             |                                           | 10.98         | 0%                 |                   |              | 10.98        |           |                         | 10.98         | 0%                 |                   |
| 5                                       | Purdin (Elementary School) <sup>2</sup>   |                                           | 11.96         | 0%                 |                   | 65.0         |              |           |                         | 11.96         | 0%                 |                   |
| 6                                       | Purdin (R7)                               | 6.22                                      | 62.08         | 0%                 | 386               |              |              |           | 1/20 ac                 | 62.08         | 0%                 | 3                 |
| <i>Sub-Total Purdin</i>                 |                                           |                                           | <i>173.28</i> |                    | <i>1,197</i>      | <i>111.5</i> | <i>10.98</i> | <i>49</i> |                         | <i>173.28</i> |                    | <i>5</i>          |
| 7                                       | Watercrest (R7) <sup>3</sup>              | 6.22                                      | 56.50         | 10%                | 316               |              |              |           | 4.35                    | 56.50         | 10%                | 220               |
| 8                                       | South of David Hill Rd (R10) <sup>4</sup> | 4.35                                      | 10.39         | 20%                | 36                |              |              |           | 4.35                    | 10.39         | 20%                | 36                |
| 9                                       | North of David Hill Rd (R10)              | 4.35                                      | 14.18         | 15%                | 52                |              |              |           | 4.35                    | 14.18         | 15%                | 52                |
| 10                                      | David Hill Village (RML)                  | 12.0                                      | 12.05         | 15%                | 122               |              |              |           | 4.35                    | 12.05         | 15%                | 44                |
| 11                                      | David Hill Village (Comm)                 |                                           | 2.90          | 0%                 |                   | 15.0         |              | 32        |                         | 2.90          | 0%                 |                   |
| 11                                      | David Hill Village (Res) <sup>5</sup>     | 12.0                                      | --            | 0%                 | 4                 |              |              |           | 4.35                    | --            | 0%                 | 12                |
| 12                                      | Thatcher (R10)                            | 4.35                                      | 76.65         | 10%                | 300               |              |              |           | 4.35                    | 76.65         | 10%                | 300               |
| 13                                      | David Hill (R10)                          | 4.35                                      | 28.50         | 15%                | 105               |              |              |           | 1.0                     | 28.50         | 15%                | 24                |
| <i>Sub-Total David Hill/Gales Creek</i> |                                           |                                           | <i>201.17</i> |                    | <i>935</i>        | <i>15.0</i>  | <i>0</i>     | <i>32</i> |                         | <i>201.17</i> |                    | <i>688</i>        |
| <b>Totals</b>                           |                                           |                                           | <b>374.45</b> |                    | <b>2,132</b>      | <b>126.5</b> | <b>10.98</b> | <b>81</b> |                         | <b>374.45</b> |                    | <b>693</b>        |

<sup>1</sup> Retail employment based on FAR of 0.25 for retail uses and 11 employees per net acre of commercial land within mixed-use area (approximately 4.2 net acres).

<sup>2</sup> Assumes average school size of 65,000 sq. ft. consistent with newer elementary schools in Forest Grove.

<sup>3</sup> Land area within Thatcher Park and Thatcher Woods has been deducted from total land area. This deduction is approximately 25.18 acres.

<sup>4</sup> Area outside of riparian zone and landslide hazard area.

<sup>5</sup> Assumes limited residential above retail or standalone-plex development



## 2035 Traffic Projections

To determine traffic impacts associated with the revised land use alternative and to identify any potential roadway improvement needs, the expected traffic volumes associated with this development must be forecast and analyzed. The process used to prepare Westside traffic projections is described in the following pages. For consistency with the City's recently adopted TSP, the 2035 PM peak hour was chosen as the basis for this analysis.

### Traffic Forecasting Methodology

The development of 2035 PM peak hour projections for the Westside involved a multi-step process starting with review of the volumes and land development assumptions inherent in the TSP. These volumes were developed using Metro's regional travel demand model with a modified version of the Gamma population and employment projections that is based on the City's 2014 *Comprehensive Plan*. Seven intersections were identified for analysis as these were either critical locations in the Forest Grove transportation system or would likely experience the greatest degree of impact associated with proposed Westside land uses.

The process of moving from TSP forecasts to Westside forecasts based on the revised land use alternative includes the following steps:

1. **Comparison of Land Use Projections** – The household and employment forecasts that are consistent with the 2014 *Comprehensive Plan* and which undergird the TSP were compared with the estimate dwelling unit and employment forecasts for the Westside revised alternative for TAZ's 1392, 1393 and 1396 in the modified regional travel demand model.
2. **Calculation of Land Use Growth** – Estimates of new growth in household and employment forecasts (over the forecasts used in the TSP) were determined by location.
3. **Development of Trip Generation Estimates** – Trip end estimates consistent with the TSP were obtained from the regional model for TAZ's 1392 (Purdin Road area), 1393 (David Hill area) and 1396 (Gales Creek area). These estimates were factored up or down by location consistent with the new dwelling unit and/or employment growth in the revised alternative. For the Gales Creek and David Hill areas, total trip ends with the revised alternative are expected to very slightly decrease in comparison with the TSP. This is because, while the number of dwelling units increased with the revised alternative, the regional model originally included trips related to future employment in these areas. As the revised alternative includes only minor growth in employment in TAZ's 1393 and 1396, the net growth in trip-making in comparison to the TSP would likely decrease. Total trip ends for TAZ 1392 (the Purdin Road planning area) are expected to see a significant increase as this area was not included within the UGB at the time the TSP was developed. ITE trip generation rates were used to estimate likely daily and PM peak hourly traffic volumes for this area. These were added to the 2035 PM peak hour projections prepared for the TSP.
4. **Identification of Trip Distribution Patterns** – Trip distribution assumptions for the net increase in trips with the revised alternative were developed through review of traffic patterns from several different runs of the Metro regional model. The trip distribution analysis also incorporated a variety of roadway network additions that are included in the TSP, and thus in the regional travel forecasts. There is a strong attractiveness from the Purdin Road planning area to/from the north and east (linking Forest Grove with Hillsboro and Portland). Approximately 47 percent of net new trips are expected to travel in this direction. However, it is



anticipated that the majority of new trips to/from the Purdin planning area would be destined to the west and southwest (approximately 25 percent), south (about 5 percent) and southeast (about 23 percent). Highway 47 is a highly attractive route for these trips, as is David Hill and Thatcher Roads.

5. **Preparation of Trip Assignments** – Net new trips from each Westside analysis zone (see Figure 2 for the location of these zones) were assigned to the street system consistent with the assumed trip distribution pattern.

#### **Roadway Network Assumptions**

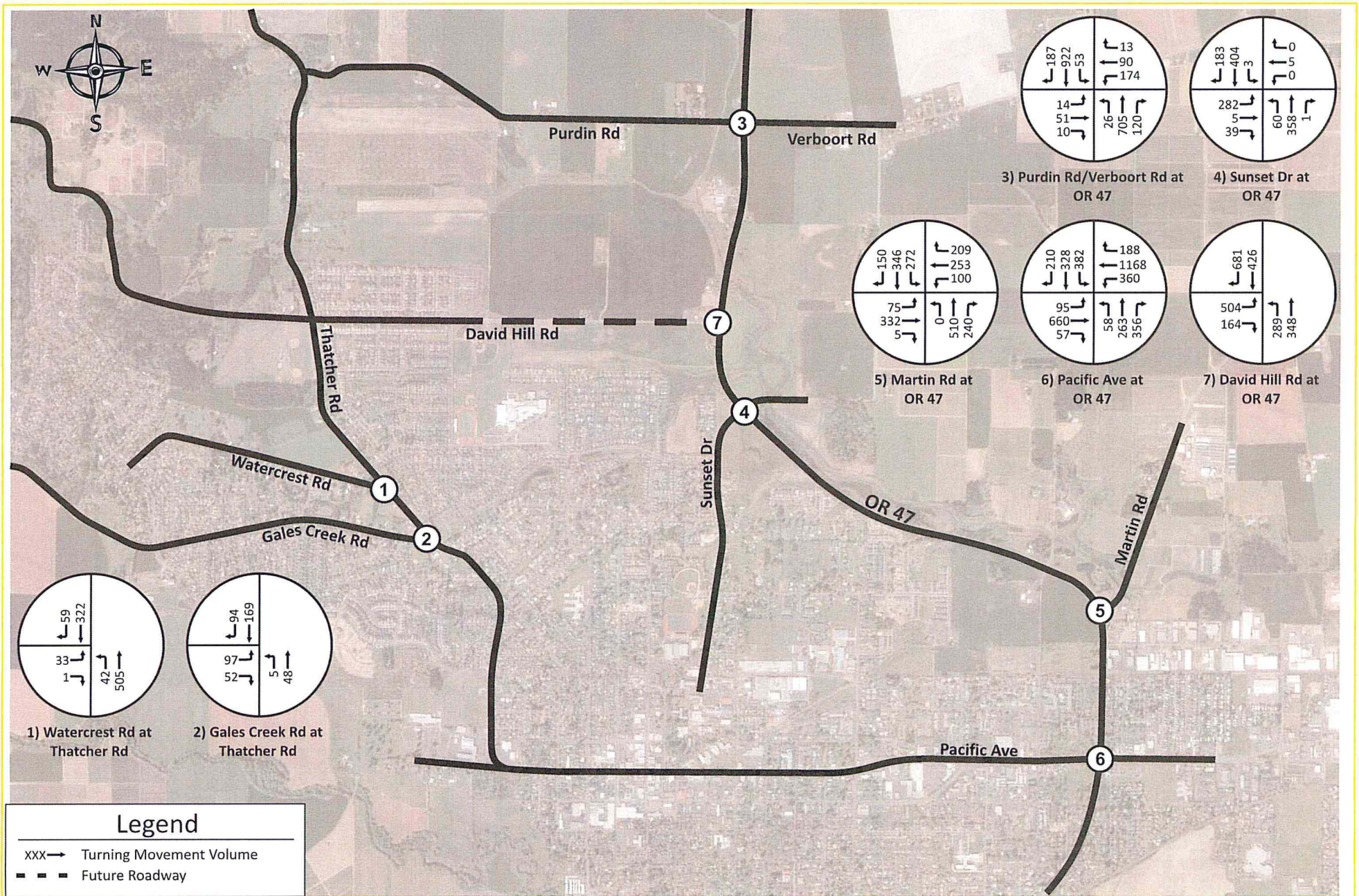
Traffic forecasts for the revised alternative include the roadway system improvements and extensions in the Westside vicinity that were adopted as part of the City's TSP. These are described below:

- **David Hill Road** – The extension of David Hill Road is included from its current terminus eastward to intersect at Highway 47. A single lane roundabout was assumed for this intersection based on current project development activities.
- **Vista Drive/Talisman Lane** – The addition of the Vista Drive and Talisman Lane extensions between Gales Creek and Thatcher Roads are included. With these improvements a significant volume of existing and projected future traffic would be diverted away from the intersection of Gales Creek and Thatcher Roads. Without these improvements it will be necessary to signalize or otherwise improve traffic operations at the Gales Creek/Thatcher intersection.
- **Highway 47 at Verboort Road/Purdin Road** – Improvements to the intersection of Highway 47 and Verboort/Purdin Road are included to address existing safety issues and future capacity needs. A single lane roundabout was assumed based on current project development activities. Improvements to this location, increasing densification in the Westside and completion of the David Hill Road extension are all expected to draw traffic away from the Highway 47/Martin Road intersection, helping to address expected future congestion problems at this location.
- **Highway 47 at Martin Road** – As noted above, the addition of new local and arterial street connections in the northwestern portion of the City will help to reduce regional traffic entering the city via Martin Road. As noted in the TSP, the connection of Martin Road across Highway 47 ultimately connecting with 23<sup>rd</sup> Avenue. This connection is expected to reduce some traffic volumes along Highway 47, but would worsen traffic operations at the intersection with Martin Road, exacerbating the need for intersection improvements that could include signalization.
- **Main Street and B Street Extensions** – The proposed recommended street layout for the Purdin Road area includes connections into developed portions of the city via extensions of Main Street and B Streets. Extensions of these two streets are included in the adopted TSP between Hartford Drive and the David Hill Road extension.

#### **2035 PM Peak Hour Turning Movement Projections**

Figure 3 presents the 2035 PM peak hour turning movement projections resulting from the analysis process described above.





**Figure 3**  
**2035 PM Peak Hour Traffic Volumes**  
**with Revised Land Use Alternative (10/26/15)**



## 2035 Projected PM Peak Hour Traffic Operations

### Mobility Standards

Level of Service, delay and volume-to-capacity ratios are used as measures of effectiveness for study intersection performance. As part of its adoption of the 2011 TSP, the City endorsed use of a minimum standard Level of Service (LOS) D to determine project improvement needs for streets under its jurisdiction. ODOT and Washington County standards apply to roadways under their jurisdiction. The applicable intersection operational standards for Washington County and ODOT are summarized below.

- ODOT defines a maximum volume-to-capacity ratio for Highway 47 of 0.99<sup>1</sup>
- Washington County defines acceptable performance in urban areas as volume-to-capacity ratio of 0.99 with LOS E or better<sup>2</sup>.

These two standards apply to the various intersections analyzed for Westside land uses.

### 2035 PM Peak Hour Operations Analysis Results

To identify the magnitude of traffic impacts associated with the revised alternative, a comparison was made with the 2035 PM peak hour traffic operations as incorporated into the recently adopted TSP. As noted above, traffic analysis in the TSP used future volume forecasts that were consistent with the adopted 2014 Comprehensive Plan. These forecasts also assumed the roadway connections and improvements discussed above. Operations analysis results based on adopted TSP traffic projections are presented in Table 2.

**Table 2. 2035 PM Peak Hour Intersection Level of Service with TSP Land Uses and Streets**

| No.                               | Intersection                   | Operational Standard | Level of Service (LOS) <sup>1</sup> | Average Delay* (Seconds) | Volume / Capacity (V/C) |
|-----------------------------------|--------------------------------|----------------------|-------------------------------------|--------------------------|-------------------------|
| <i>Unsignalized Intersections</i> |                                |                      |                                     |                          |                         |
| 1                                 | Thatcher Road/Watercrest Road  | LOS E/0.99           | A/C                                 | 17.2 <sup>2</sup>        | 0.09 <sup>2</sup>       |
| 2                                 | Gales Creek Road/Thatcher Road | LOS E/0.99           | A/B                                 | 11.6 <sup>2</sup>        | 0.24 <sup>2</sup>       |
| 3                                 | Highway 47/Verboort & Purdin   | V/C=0.99             | A/F                                 | >200 <sup>2</sup>        | >2.00 <sup>2,3</sup>    |
| 5                                 | Highway 47/Martin Road         | V/C=0.99             | A/F                                 | >200 <sup>2</sup>        | >2.00 <sup>2</sup>      |
| 7                                 | Highway 47/David Hill Road     | V/C=0.99             | -/F                                 | >200 <sup>2</sup>        | 1.54 <sup>2,4</sup>     |
| <i>Signalized Intersections</i>   |                                |                      |                                     |                          |                         |
| 4                                 | Highway 47/Sunset Drive        | V/C=0.99             | B                                   | 16.1                     | 0.50                    |
| 6                                 | Pacific Avenue/Quince Street   | V/C=0.99             | D                                   | 53.4                     | 0.97                    |

\* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Development of local street connections in Forest Grove may divert added WB traffic to this location requiring improvements. This analysis assumes existing lane configuration and traffic control. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

4 Assumes stop control for side street traffic. Subsequent to TSP preparation, improvement of the intersection as a single lane roundabout was undertaken.

<sup>1</sup> Oregon Highway Plan, Policy Element, Table 7, Oregon Department of Transportation, 1999.

<sup>2</sup> Washington County 2020 Transportation System Plan, Washington County, 2002.





Table 2 includes information for each intersection including the relevant operational standard based on roadway jurisdiction (e.g., ODOT, or Washington County), Level of Service for the through unstopped movement and the worst stopped movement, average delay for the worst stopped movement, and volume-to-capacity ratio for the worst stopped movement.

As indicated in this table, two intersections along Highway 47 are expected to fail by 2035 during the PM peak hour – Highway 47 at Verboort Road/Purdin Road and Highway 27 at Martin Road. The TSP assumes that both of these intersections would retain their existing configurations.

Table 3 presents a summary of intersection operations analysis results for conditions with the revised land use alternative. As indicated in the table, the intersection of Highway 47 with Martin Road would still show significant failure and will need further study to identify an appropriate solution. The intersection of Highway 47 with Verboort/Purdin Road was assumed to be improved to a single lane roundabout which provides substantially more capacity than the existing stop-controlled single lane configuration. However, by 2035 with the addition of Purdin Road planning area traffic, this location could begin to see significant delays with a volume/capacity ratio exceed the adopted mobility standard. The new intersection of Highway 47 with David Hill Road is currently being developed as a single lane roundabout, but this location is also expected to see failure by 2035 with the addition of Purdin Road traffic.

All other intersections within the study area are expected to operate within their adopted mobility standards during the 2035 PM peak hour.

**Table 3. 2035 PM Peak Hour Intersection Level of Service with Westside Revised Land Use Scenario**

| No.                               | Intersection                   | Operational Standard | Level of Service (LOS) <sup>1</sup> | Average Delay* (Seconds) | Volume / Capacity (V/C) |
|-----------------------------------|--------------------------------|----------------------|-------------------------------------|--------------------------|-------------------------|
| <i>Unsignalized Intersections</i> |                                |                      |                                     |                          |                         |
| 1                                 | Thatcher Road/Watercrest Road  | LOS E/0.99           | A/C                                 | 21.8 <sup>2</sup>        | 0.15 <sup>2</sup>       |
| 2                                 | Gales Creek Road/Thatcher Road | LOS E/0.99           | A/B                                 | 10.8 <sup>2</sup>        | 0.21 <sup>2</sup>       |
| 5                                 | Highway 47/Martin Road         | V/C=0.99             | -/F                                 | 158.8 <sup>2</sup>       | 1.21 <sup>2</sup>       |
| <i>Roundabouts</i>                |                                |                      |                                     |                          |                         |
| 3                                 | Highway 47/Verboort & Purdin   | V/C=0.99             | F                                   | 87.4 <sup>2,3</sup>      | 1.34 <sup>2,3</sup>     |
| 7                                 | Highway 47/David Hill Road     | V/C=0.99             | F                                   | 91.4 <sup>2,3</sup>      | 1.33 <sup>2,3</sup>     |
| <i>Signalized Intersections</i>   |                                |                      |                                     |                          |                         |
| 4                                 | Highway 47/Sunset Drive        | V/C=0.99             | C                                   | 33.4                     | 0.60                    |
| 6                                 | Pacific Avenue/Quince Street   | V/C=0.99             | E                                   | 65.5                     | 0.99                    |

\* Minor street average delay reported for unsignalized intersections

1 For unsignalized intersections the first value is the free movement; second value is the worst stopped movement. At signalized locations the value is for the entire intersection.

2 Worst stopped movement.

3 Pending single lane roundabout intersection improvements are assumed here.





## Improvements

In order to address the expected deficiencies the following intersection improvements could be considered.

### Highway 47 at Martin Road

This intersection is currently unsignalized with stop-control on Martin Road. It operates within ODOT's mobility targets based on the TSP's existing conditions analysis. As noted in the TSP, as the community grows, this intersection (and the immediately adjacent intersection of 24<sup>th</sup> Avenue) will become increasingly congested. Both signalization and installation of a roundabout were considered for this location during the TSP planning process (the intersection is expected to meet signal warrants based on the 2035 traffic projections in the TSP). However, no resolution of differences among affected agencies on the appropriate improvement could be achieved. Accordingly, this area is shown in the Roadway Network Plan as a "TPR Refinement Area" for which further study and deliberation needs to be conducted leading to a recommended course of action.

### Highway 47 at Verboort Road/Purdin Road

This intersection is currently located outside of the Forest Grove UGB in rural Washington County. Working together, Washington County and ODOT have partnered to develop an improvement concept to address existing safety deficiencies and future congestion needs at this location. Dependent on the final land use plan for the Purdin Road planning area, some improvement to this intersection may be needed by 2035. This improvement could include added channelization at the roundabout.

### Highway 24 at David Hill Road

Washington County and ODOT have also partnered to extend David Hill Road from its existing easterly terminus to connect with Highway 47, including development of a single lane roundabout at the new intersection. As with the Verboort Road/Purdin Road intersection and dependent on the final land use plan for the Purdin Road planning area, some improvement to this intersection may be needed by 2035. This improvement could include added channelization at the roundabout.

# **APPENDIX A**

## **TRAFFIC OPERATIONS ANALYSIS WORKSHEETS**





Westside Planning Project  
16: Thatcher Rd & Watercrest Rd

2035 PM Peak with Development

| Intersection             |        |       |        |      |        |      |
|--------------------------|--------|-------|--------|------|--------|------|
| Int Delay, s/veh         | 1.1    |       |        |      |        |      |
| Movement                 | EBL    | EBR   | SET    | SER  | NWL    | NWT  |
| Vol, veh/h               | 33     | 1     | 322    | 59   | 42     | 505  |
| Conflicting Peds, #/hr   | 0      | 0     | 0      | 0    | 0      | 0    |
| Sign Control             | Stop   | Stop  | Free   | Free | Free   | Free |
| RT Channelized           | -      | None  | -      | None | -      | None |
| Storage Length           | 0      | -     | -      | -    | -      | -    |
| Veh in Median Storage, # | 0      | -     | 0      | -    | -      | 0    |
| Grade, %                 | 0      | -     | 0      | -    | -      | 0    |
| Peak Hour Factor         | 92     | 92    | 92     | 92   | 92     | 92   |
| Heavy Vehicles, %        | 2      | 2     | 2      | 2    | 2      | 2    |
| Mvmt Flow                | 36     | 1     | 350    | 64   | 46     | 549  |
| Major/Minor              | Minor1 |       | Major1 |      | Major2 |      |
| Conflicting Flow All     | 1022   | 382   | 0      | 0    | 414    | 0    |
| Stage 1                  | 382    | -     | -      | -    | -      | -    |
| Stage 2                  | 640    | -     | -      | -    | -      | -    |
| Critical Hdwy            | 6.42   | 6.22  | -      | -    | 4.12   | -    |
| Critical Hdwy Stg 1      | 5.42   | -     | -      | -    | -      | -    |
| Critical Hdwy Stg 2      | 5.42   | -     | -      | -    | -      | -    |
| Follow-up Hdwy           | 3.518  | 3.318 | -      | -    | 2.218  | -    |
| Pot Cap-1 Maneuver       | 261    | 665   | -      | -    | 1145   | -    |
| Stage 1                  | 690    | -     | -      | -    | -      | -    |
| Stage 2                  | 525    | -     | -      | -    | -      | -    |
| Platoon blocked, %       |        |       | -      | -    |        | -    |
| Mov Cap-1 Maneuver       | 246    | 665   | -      | -    | 1145   | -    |
| Mov Cap-2 Maneuver       | 246    | -     | -      | -    | -      | -    |
| Stage 1                  | 690    | -     | -      | -    | -      | -    |
| Stage 2                  | 495    | -     | -      | -    | -      | -    |
| Approach                 | EB     |       | SE     |      | NW     |      |
| HCM Control Delay, s     | 21.8   |       | 0      |      | 0.6    |      |
| HCM LOS                  | C      |       |        |      |        |      |
| Minor Lane/Major Mvmt    | NWL    | NWT   | EBLn1  | SET  | SER    |      |
| Capacity (veh/h)         | 1145   | -     | 251    | -    | -      |      |
| HCM Lane V/C Ratio       | 0.04   | -     | 0.147  | -    | -      |      |
| HCM Control Delay (s)    | 8.3    | 0     | 21.8   | -    | -      |      |
| HCM Lane LOS             | A      | A     | C      | -    | -      |      |
| HCM 95th %tile Q(veh)    | 0.1    | -     | 0.5    | -    | -      |      |

Westside Planning Project  
5: Gales Creek Rd & Thatcher Rd

2035 PM Peak with Development

Intersection

Int Delay, s/veh 3.5

| Movement                 | EBL  | EBT  | WBT  | WBR   | SBL  | SBR  |
|--------------------------|------|------|------|-------|------|------|
| Vol, veh/h               | 5    | 48   | 169  | 94    | 97   | 52   |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0     | 0    | 0    |
| Sign Control             | Free | Free | Free | Free  | Stop | Stop |
| RT Channelized           | -    | None | -    | Yield | -    | None |
| Storage Length           | 150  | -    | -    | -     | 0    | -    |
| Veh in Median Storage, # | -    | 0    | 0    | -     | 0    | -    |
| Grade, %                 | -    | 0    | 0    | -     | 0    | -    |
| Peak Hour Factor         | 93   | 93   | 93   | 93    | 93   | 93   |
| Heavy Vehicles, %        | 2    | 2    | 2    | 2     | 2    | 2    |
| Mvmt Flow                | 5    | 52   | 182  | 101   | 104  | 56   |

| Major/Minor          | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|--------|
| Conflicting Flow All | 182    | 0      | 244    |
| Stage 1              | -      | -      | 182    |
| Stage 2              | -      | -      | 62     |
| Critical Hdwy        | 4.12   | -      | 6.42   |
| Critical Hdwy Stg 1  | -      | -      | 5.42   |
| Critical Hdwy Stg 2  | -      | -      | 5.42   |
| Follow-up Hdwy       | 2.218  | -      | 3.518  |
| Pot Cap-1 Maneuver   | 1393   | -      | 744    |
| Stage 1              | -      | -      | 849    |
| Stage 2              | -      | -      | 961    |
| Platoon blocked, %   | -      | -      | -      |
| Mov Cap-1 Maneuver   | 1393   | -      | 741    |
| Mov Cap-2 Maneuver   | -      | -      | 741    |
| Stage 1              | -      | -      | 849    |
| Stage 2              | -      | -      | 958    |

| Approach             | EB  | WB | SB   |
|----------------------|-----|----|------|
| HCM Control Delay, s | 0.7 | 0  | 10.8 |
| HCM LOS              |     |    | B    |

| Minor Lane/Major Mvmt | EBL   | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h)      | 1393  | -   | -   | -   | 779   |
| HCM Lane V/C Ratio    | 0.004 | -   | -   | -   | 0.206 |
| HCM Control Delay (s) | 7.6   | -   | -   | -   | 10.8  |
| HCM Lane LOS          | A     | -   | -   | -   | B     |
| HCM 95th %tile Q(veh) | 0     | -   | -   | -   | 0.8   |



Westside Planning Project  
11: Hwy 47 & Martin Rd

2035 PM Peak with Development

| Intersection     |   |  |  |  |  |  |  |  |  |  |
|------------------|---|--|--|--|--|--|--|--|--|--|
| Int Delay, s/veh | 0 |  |  |  |  |  |  |  |  |  |

| Movement                 | EBL  | EBT  | EBR  | WBL  | WBT  | WBR  | NBL  | NBR  | SEL  | SER  |
|--------------------------|------|------|------|------|------|------|------|------|------|------|
| Vol, veh/h               | 75   | 332  | 5    | 100  | 253  | 209  | 510  | 240  | 272  | 346  |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Sign Control             | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free |
| RT Channelized           | -    | -    | None | -    | -    | None | -    | None | -    | -    |
| Storage Length           | 0    | -    | -    | 0    | -    | -    | 0    | 220  | 200  | 0    |
| Veh in Median Storage, # | -    | 1    | -    | -    | 1    | -    | 0    | -    | 0    | -    |
| Grade, %                 | -    | 0    | -    | -    | 0    | -    | 0    | -    | 0    | -    |
| Peak Hour Factor         | 92   | 92   | 92   | 96   | 92   | 96   | 96   | 96   | 96   | 96   |
| Heavy Vehicles, %        | 2    | 2    | 2    | 4    | 2    | 2    | 3    | 3    | 0    | 5    |
| Mvmt Flow                | 82   | 361  | 5    | 104  | 275  | 218  | 531  | 250  | 283  | 360  |

| Major/Minor          | Minor2  |       |       | Minor1 |       |   | Major2 |   |
|----------------------|---------|-------|-------|--------|-------|---|--------|---|
| Conflicting Flow All | 1255    | 1009  | 442   | 1192   | 1090  | 0 | 0      | 0 |
| Stage 1              | 1009    | 1009  | -     | 0      | 0     | - | -      | - |
| Stage 2              | 246     | 0     | -     | 1192   | 1090  | - | -      | - |
| Critical Hdwy        | 7.12    | 6.52  | 6.22  | 7.14   | 6.52  | - | -      | - |
| Critical Hdwy Stg 1  | 6.12    | 5.52  | -     | -      | -     | - | -      | - |
| Critical Hdwy Stg 2  | -       | -     | -     | 6.14   | 5.52  | - | -      | - |
| Follow-up Hdwy       | 3.518   | 4.018 | 3.318 | 3.536  | 4.018 | - | -      | - |
| Pot Cap-1 Maneuver   | 148     | ~ 240 | 615   | 162    | ~ 215 | - | -      | - |
| Stage 1              | 290     | ~ 318 | -     | -      | -     | - | -      | - |
| Stage 2              | -       | -     | -     | 226    | 291   | - | -      | - |
| Platoon blocked, %   |         |       |       |        |       |   |        |   |
| Mov Cap-1 Maneuver   | -       | ~ 240 | 615   | -      | ~ 215 | - | -      | - |
| Mov Cap-2 Maneuver   | ~ -9397 | ~ 303 | -     | -      | 303   | - | -      | - |
| Stage 1              | 290     | ~ 318 | -     | -      | -     | - | -      | - |
| Stage 2              | -       | -     | -     | -      | 291   | - | -      | - |

| Approach             | EB | WB | SE |
|----------------------|----|----|----|
| HCM Control Delay, s |    |    |    |
| HCM LOS              | -  | -  |    |

| Minor Lane/Major Mvmt | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SEL | SER | SER2 |
|-----------------------|-------|-------|-------|-------|-----|-----|------|
| Capacity (veh/h)      | -     | 305   | -     | -     | -   | -   | -    |
| HCM Lane V/C Ratio    | -     | 1.201 | -     | -     | -   | -   | -    |
| HCM Control Delay (s) | -     | 153.8 | -     | -     | -   | -   | -    |
| HCM Lane LOS          | -     | F     | -     | -     | -   | -   | -    |
| HCM 95th %tile Q(veh) | -     | 16.2  | -     | -     | -   | -   | -    |

| Notes                                                                                                                |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|
| ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    *: All major volume in platoon |  |  |  |  |  |  |  |  |  |  |



# MOVEMENT SUMMARY

 Site: Purdin Rd/Verboort Rd at Hwy 47

Projected 2035 Total Westside Volumes  
PM Peak Hour  
Roundabout

| Movement Performance - Vehicles |        |                       |               |                  |                      |                  |                                   |                |              |                                |                      |
|---------------------------------|--------|-----------------------|---------------|------------------|----------------------|------------------|-----------------------------------|----------------|--------------|--------------------------------|----------------------|
| Mov ID                          | OD Mov | Demand Total<br>veh/h | Flows HV<br>% | Deg. Satn<br>v/c | Average Delay<br>sec | Level of Service | 95% Back of Queue<br>Vehicles veh | Distance<br>ft | Prop. Queued | Effective Stop Rate<br>per veh | Average Speed<br>mph |
| South: NB Hwy 47                |        |                       |               |                  |                      |                  |                                   |                |              |                                |                      |
| 3                               | L2     | 27                    | 7.0           | 0.791            | 11.9                 | LOS B            | 11.2                              | 287.8          | 0.79         | 0.57                           | 35.2                 |
| 8                               | T1     | 734                   | 3.0           | 0.791            | 5.9                  | LOS A            | 11.2                              | 287.8          | 0.79         | 0.57                           | 35.3                 |
| 18                              | R2     | 125                   | 6.0           | 0.791            | 5.9                  | LOS A            | 11.2                              | 287.8          | 0.79         | 0.57                           | 34.2                 |
| Approach                        |        | 886                   | 3.5           | 0.791            | 6.1                  | LOS A            | 11.2                              | 287.8          | 0.79         | 0.57                           | 35.1                 |
| East: WB Verboort Rd            |        |                       |               |                  |                      |                  |                                   |                |              |                                |                      |
| 1                               | L2     | 181                   | 1.0           | 0.528            | 19.2                 | LOS B            | 4.6                               | 115.6          | 0.96         | 1.05                           | 31.5                 |
| 6                               | T1     | 94                    | 0.0           | 0.528            | 13.3                 | LOS B            | 4.6                               | 115.6          | 0.96         | 1.05                           | 31.4                 |
| 16                              | R2     | 14                    | 0.0           | 0.528            | 13.3                 | LOS B            | 4.6                               | 115.6          | 0.96         | 1.05                           | 30.6                 |
| Approach                        |        | 289                   | 0.6           | 0.528            | 17.0                 | LOS B            | 4.6                               | 115.6          | 0.96         | 1.05                           | 31.4                 |
| North: SB Hwy 47                |        |                       |               |                  |                      |                  |                                   |                |              |                                |                      |
| 7                               | L2     | 55                    | 14.0          | 1.342            | 174.2                | LOS F            | 122.6                             | 3177.3         | 1.00         | 3.41                           | 10.1                 |
| 4                               | T1     | 960                   | 5.0           | 1.342            | 168.2                | LOS F            | 122.6                             | 3177.3         | 1.00         | 3.41                           | 10.1                 |
| 14                              | R2     | 195                   | 0.0           | 1.342            | 168.1                | LOS F            | 122.6                             | 3177.3         | 1.00         | 3.41                           | 10.0                 |
| Approach                        |        | 1210                  | 4.6           | 1.342            | 168.4                | LOS F            | 122.6                             | 3177.3         | 1.00         | 3.41                           | 10.1                 |
| West: EB Purdin Rd              |        |                       |               |                  |                      |                  |                                   |                |              |                                |                      |
| 5                               | L2     | 15                    | 14.0          | 0.199            | 18.5                 | LOS B            | 1.4                               | 35.0           | 0.93         | 0.91                           | 32.7                 |
| 2                               | T1     | 53                    | 2.0           | 0.199            | 12.4                 | LOS B            | 1.4                               | 35.0           | 0.93         | 0.91                           | 32.9                 |
| 12                              | R2     | 10                    | 0.0           | 0.199            | 12.4                 | LOS B            | 1.4                               | 35.0           | 0.93         | 0.91                           | 32.1                 |
| Approach                        |        | 78                    | 4.0           | 0.199            | 13.5                 | LOS B            | 1.4                               | 35.0           | 0.93         | 0.91                           | 32.8                 |
| All Vehicles                    |        | 2464                  | 3.7           | 1.342            | 87.4                 | LOS F            | 122.6                             | 3177.3         | 0.92         | 2.03                           | 15.8                 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Monday, November 2, 2015 9:49:08 AM

SIDRA INTERSECTION 6.0.24.4877

Project: N:\Projects\0742 City of Forest Grove\0742.01 Forest Grove Westside Plan\Phase 10 - Westside Plan\03-Analysis\Traffic\Operations\2-10-26-15 Version\Sidra\Purdin-Hwy 47 RAB.sip6  
8001450, 6017302, SCJ ALLIANCE, PLUS / 1PC

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**SIDRA**  
**INTERSECTION 6**

## MOVEMENT SUMMARY



Site: David Hill Rd at Hwy 47

Projected 2035 Total Westside Volumes  
PM Peak Hour  
Roundabout

| Movement Performance - Vehicles |        |                             |            |                  |                      |                  |                                      |                |              |                                |                      |
|---------------------------------|--------|-----------------------------|------------|------------------|----------------------|------------------|--------------------------------------|----------------|--------------|--------------------------------|----------------------|
| Mov ID                          | OD Mov | Demand Flows Total<br>veh/h | Flows HV % | Deg. Satn<br>v/c | Average Delay<br>sec | Level of Service | 95% Back of Queue<br>Vehicles<br>veh | Distance<br>ft | Prop. Queued | Effective Stop Rate<br>per veh | Average Speed<br>mph |
| South: NB Hwy 47                |        |                             |            |                  |                      |                  |                                      |                |              |                                |                      |
| 3                               | L2     | 314                         | 2.0        | 0.995            | 47.3                 | LOS D            | 27.8                                 | 705.2          | 1.00         | 1.68                           | 23.0                 |
| 8                               | T1     | 378                         | 2.0        | 0.995            | 41.4                 | LOS D            | 27.8                                 | 705.2          | 1.00         | 1.68                           | 22.9                 |
| Approach                        |        | 692                         | 2.0        | 0.995            | 44.1                 | LOS D            | 27.8                                 | 705.2          | 1.00         | 1.68                           | 22.9                 |
| North: SB Hwy 47                |        |                             |            |                  |                      |                  |                                      |                |              |                                |                      |
| 4                               | T1     | 463                         | 2.0        | 1.329            | 162.5                | LOS F            | 119.3                                | 3030.8         | 1.00         | 3.36                           | 10.3                 |
| 14                              | R2     | 743                         | 2.0        | 1.329            | 162.5                | LOS F            | 119.3                                | 3030.8         | 1.00         | 3.36                           | 10.2                 |
| Approach                        |        | 1207                        | 2.0        | 1.329            | 162.5                | LOS F            | 119.3                                | 3030.8         | 1.00         | 3.36                           | 10.3                 |
| West: EB David Hill Rd          |        |                             |            |                  |                      |                  |                                      |                |              |                                |                      |
| 5                               | L2     | 548                         | 2.0        | 0.830            | 19.8                 | LOS B            | 14.0                                 | 356.1          | 1.00         | 1.05                           | 30.9                 |
| 12                              | R2     | 178                         | 2.0        | 0.830            | 13.9                 | LOS B            | 14.0                                 | 356.1          | 1.00         | 1.05                           | 30.0                 |
| Approach                        |        | 726                         | 2.0        | 0.830            | 18.4                 | LOS B            | 14.0                                 | 356.1          | 1.00         | 1.05                           | 30.7                 |
| All Vehicles                    |        | 2625                        | 2.0        | 1.329            | 91.4                 | LOS F            | 119.3                                | 3030.8         | 1.00         | 2.28                           | 15.4                 |

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



Westside Planning Project  
89: Sunset Dr/ Bend Rd & Hwy 47

2035 PM Peak with Development

|                             |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                    | SEL                                                                               | SET                                                                               | SER                                                                               | NWL                                                                               | NWT                                                                               | NWR                                                                               | NEL                                                                                | NET                                                                                 | NER                                                                                 | SWL                                                                                 | SWT                                                                                 | SWR                                                                                 |
| Lane Configurations         |  |  |  |  |  |                                                                                   |   |  |                                                                                     |  |  |  |
| Volume (veh/h)              | 3                                                                                 | 404                                                                               | 183                                                                               | 60                                                                                | 358                                                                               | 1                                                                                 | 282                                                                                | 5                                                                                   | 39                                                                                  | 1                                                                                   | 5                                                                                   | 1                                                                                   |
| Number                      | 5                                                                                 | 2                                                                                 | 12                                                                                | 1                                                                                 | 6                                                                                 | 16                                                                                | 7                                                                                  | 4                                                                                   | 14                                                                                  | 3                                                                                   | 8                                                                                   | 18                                                                                  |
| Initial Q (Qb), veh         | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ped-Bike Adj(A_pbT)         | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                               |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |
| Parking Bus, Adj            | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj Sat Flow, veh/h/ln      | 1800                                                                              | 1714                                                                              | 1782                                                                              | 1800                                                                              | 1731                                                                              | 1800                                                                              | 1748                                                                               | 1800                                                                                | 1800                                                                                | 1800                                                                                | 1800                                                                                | 1800                                                                                |
| Adj Flow Rate, veh/h        | 3                                                                                 | 434                                                                               | 0                                                                                 | 65                                                                                | 385                                                                               | 1                                                                                 | 303                                                                                | 5                                                                                   | 42                                                                                  | 1                                                                                   | 5                                                                                   | 1                                                                                   |
| Adj No. of Lanes            | 1                                                                                 | 1                                                                                 | 1                                                                                 | 1                                                                                 | 1                                                                                 | 0                                                                                 | 1                                                                                  | 1                                                                                   | 0                                                                                   | 1                                                                                   | 1                                                                                   | 0                                                                                   |
| Peak Hour Factor            | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                               | 0.93                                                                                | 0.93                                                                                | 0.93                                                                                | 0.93                                                                                | 0.93                                                                                |
| Percent Heavy Veh, %        | 0                                                                                 | 5                                                                                 | 1                                                                                 | 0                                                                                 | 4                                                                                 | 4                                                                                 | 3                                                                                  | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Cap, veh/h                  | 317                                                                               | 757                                                                               | 669                                                                               | 317                                                                               | 777                                                                               | 2                                                                                 | 396                                                                                | 40                                                                                  | 340                                                                                 | 365                                                                                 | 356                                                                                 | 71                                                                                  |
| Arrive On Green             | 0.18                                                                              | 0.44                                                                              | 0.00                                                                              | 0.18                                                                              | 0.45                                                                              | 0.43                                                                              | 0.24                                                                               | 0.24                                                                                | 0.24                                                                                | 0.24                                                                                | 0.24                                                                                | 0.24                                                                                |
| Sat Flow, veh/h             | 1714                                                                              | 1714                                                                              | 1515                                                                              | 1714                                                                              | 1726                                                                              | 4                                                                                 | 1391                                                                               | 165                                                                                 | 1389                                                                                | 1380                                                                                | 1457                                                                                | 291                                                                                 |
| Grp Volume(v), veh/h        | 3                                                                                 | 434                                                                               | 0                                                                                 | 65                                                                                | 0                                                                                 | 386                                                                               | 303                                                                                | 0                                                                                   | 47                                                                                  | 1                                                                                   | 0                                                                                   | 6                                                                                   |
| Grp Sat Flow(s),veh/h/ln    | 1714                                                                              | 1714                                                                              | 1515                                                                              | 1714                                                                              | 0                                                                                 | 1730                                                                              | 1391                                                                               | 0                                                                                   | 1555                                                                                | 1380                                                                                | 0                                                                                   | 1749                                                                                |
| Q Serve(g_s), s             | 0.2                                                                               | 22.7                                                                              | 0.0                                                                               | 3.9                                                                               | 0.0                                                                               | 19.0                                                                              | 25.3                                                                               | 0.0                                                                                 | 2.8                                                                                 | 0.1                                                                                 | 0.0                                                                                 | 0.3                                                                                 |
| Cycle Q Clear(g_c), s       | 0.2                                                                               | 22.7                                                                              | 0.0                                                                               | 3.9                                                                               | 0.0                                                                               | 19.0                                                                              | 25.7                                                                               | 0.0                                                                                 | 2.8                                                                                 | 2.9                                                                                 | 0.0                                                                                 | 0.3                                                                                 |
| Prop In Lane                | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.00                                                                              | 1.00                                                                               |                                                                                     | 0.89                                                                                | 1.00                                                                                |                                                                                     | 0.17                                                                                |
| Lane Grp Cap(c), veh/h      | 317                                                                               | 757                                                                               | 669                                                                               | 317                                                                               | 0                                                                                 | 779                                                                               | 396                                                                                | 0                                                                                   | 380                                                                                 | 365                                                                                 | 0                                                                                   | 428                                                                                 |
| V/C Ratio(X)                | 0.01                                                                              | 0.57                                                                              | 0.00                                                                              | 0.21                                                                              | 0.00                                                                              | 0.50                                                                              | 0.76                                                                               | 0.00                                                                                | 0.12                                                                                | 0.00                                                                                | 0.00                                                                                | 0.01                                                                                |
| Avail Cap(c_a), veh/h       | 317                                                                               | 757                                                                               | 669                                                                               | 317                                                                               | 0                                                                                 | 779                                                                               | 537                                                                                | 0                                                                                   | 538                                                                                 | 505                                                                                 | 0                                                                                   | 605                                                                                 |
| HCM Platoon Ratio           | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                               | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Upstream Filter(I)          | 1.00                                                                              | 1.00                                                                              | 0.00                                                                              | 1.00                                                                              | 0.00                                                                              | 1.00                                                                              | 1.00                                                                               | 0.00                                                                                | 1.00                                                                                | 1.00                                                                                | 0.00                                                                                | 1.00                                                                                |
| Uniform Delay (d), s/veh    | 40.0                                                                              | 25.0                                                                              | 0.0                                                                               | 41.5                                                                              | 0.0                                                                               | 23.4                                                                              | 44.1                                                                               | 0.0                                                                                 | 35.5                                                                                | 36.5                                                                                | 0.0                                                                                 | 34.4                                                                                |
| Incr Delay (d2), s/veh      | 0.0                                                                               | 3.1                                                                               | 0.0                                                                               | 0.3                                                                               | 0.0                                                                               | 2.3                                                                               | 4.5                                                                                | 0.0                                                                                 | 0.1                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| Initial Q Delay(d3),s/veh   | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| %ile BackOfQ(50%),veh/ln    | 0.1                                                                               | 11.4                                                                              | 0.0                                                                               | 1.9                                                                               | 0.0                                                                               | 9.5                                                                               | 10.3                                                                               | 0.0                                                                                 | 1.2                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.2                                                                                 |
| LnGrp Delay(d),s/veh        | 40.0                                                                              | 28.2                                                                              | 0.0                                                                               | 41.8                                                                              | 0.0                                                                               | 25.6                                                                              | 48.6                                                                               | 0.0                                                                                 | 35.6                                                                                | 36.5                                                                                | 0.0                                                                                 | 34.4                                                                                |
| LnGrp LOS                   | D                                                                                 | C                                                                                 |                                                                                   | D                                                                                 |                                                                                   | C                                                                                 | D                                                                                  |                                                                                     | D                                                                                   | D                                                                                   |                                                                                     | C                                                                                   |
| Approach Vol, veh/h         |                                                                                   | 437                                                                               |                                                                                   |                                                                                   | 451                                                                               |                                                                                   |                                                                                    | 350                                                                                 |                                                                                     |                                                                                     | 7                                                                                   |                                                                                     |
| Approach Delay, s/veh       |                                                                                   | 28.3                                                                              |                                                                                   |                                                                                   | 27.9                                                                              |                                                                                   |                                                                                    | 46.8                                                                                |                                                                                     |                                                                                     | 34.7                                                                                |                                                                                     |
| Approach LOS                |                                                                                   | C                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| Timer                       | 1                                                                                 | 2                                                                                 | 3                                                                                 | 4                                                                                 | 5                                                                                 | 6                                                                                 | 7                                                                                  | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Assigned Phs                | 1                                                                                 | 2                                                                                 |                                                                                   | 4                                                                                 | 5                                                                                 | 6                                                                                 |                                                                                    | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Phs Duration (G+Y+Rc), s    | 28.2                                                                              | 57.0                                                                              |                                                                                   | 34.8                                                                              | 27.2                                                                              | 58.0                                                                              |                                                                                    | 34.8                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Change Period (Y+Rc), s     | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                    | 6.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Green Setting (Gmax), s | 10.0                                                                              | 51.0                                                                              |                                                                                   | 41.0                                                                              | 9.0                                                                               | 52.0                                                                              |                                                                                    | 41.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Q Clear Time (g_c+1), s | 5.9                                                                               | 24.7                                                                              |                                                                                   | 27.7                                                                              | 2.2                                                                               | 21.0                                                                              |                                                                                    | 4.9                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Green Ext Time (p_c), s     | 0.0                                                                               | 1.6                                                                               |                                                                                   | 1.2                                                                               | 0.1                                                                               | 1.4                                                                               |                                                                                    | 1.5                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2010 Ctrl Delay         |                                                                                   |                                                                                   | 33.4                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2010 LOS                |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



Westside Planning Project  
89: Sunset Dr/ Bend Rd & Hwy 47

2035 PM Peak with Development

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | SEL                                                                               | SET                                                                               | SER                                                                               | NWL                                                                               | NWT                                                                               | NWR                                                                               | NEL                                                                                | NET                                                                                 | NER                                                                                 | SWL                                                                                 | SWT                                                                                 | SWR                                                                                 |
| Lane Configurations               |  |  |  |  |  |                                                                                   |  |  |                                                                                     |  |  |                                                                                     |
| Volume (vph)                      | 3                                                                                 | 404                                                                               | 183                                                                               | 60                                                                                | 358                                                                               | 1                                                                                 | 282                                                                                | 5                                                                                   | 39                                                                                  | 1                                                                                   | 5                                                                                   | 1                                                                                   |
| Ideal Flow (vphpl)                | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                               | 1800                                                                                | 1800                                                                                | 1800                                                                                | 1800                                                                                | 1800                                                                                |
| Total Lost time (s)               | 5.0                                                                               | 4.0                                                                               | 4.0                                                                               | 6.0                                                                               | 4.0                                                                               |                                                                                   | 5.5                                                                                | 5.5                                                                                 |                                                                                     | 5.5                                                                                 | 5.5                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frpb, ped/bikes                   | 1.00                                                                              | 1.00                                                                              | 0.98                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Flpb, ped/bikes                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                               | 0.87                                                                                |                                                                                     | 1.00                                                                                | 0.97                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.95                                                                               | 1.00                                                                                |                                                                                     | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1710                                                                              | 1714                                                                              | 1480                                                                              | 1710                                                                              | 1730                                                                              |                                                                                   | 1660                                                                               | 1559                                                                                |                                                                                     | 1710                                                                                | 1755                                                                                |                                                                                     |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              |                                                                                   | 0.75                                                                               | 1.00                                                                                |                                                                                     | 0.73                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 1710                                                                              | 1714                                                                              | 1480                                                                              | 1710                                                                              | 1730                                                                              |                                                                                   | 1317                                                                               | 1559                                                                                |                                                                                     | 1307                                                                                | 1755                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                              | 0.93                                                                               | 0.93                                                                                | 0.93                                                                                | 0.93                                                                                | 0.93                                                                                | 0.93                                                                                |
| Adj. Flow (vph)                   | 3                                                                                 | 434                                                                               | 197                                                                               | 65                                                                                | 385                                                                               | 1                                                                                 | 303                                                                                | 5                                                                                   | 42                                                                                  | 1                                                                                   | 5                                                                                   | 1                                                                                   |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 98                                                                                | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                  | 30                                                                                  | 0                                                                                   | 0                                                                                   | 1                                                                                   | 0                                                                                   |
| Lane Group Flow (vph)             | 3                                                                                 | 434                                                                               | 99                                                                                | 65                                                                                | 386                                                                               | 0                                                                                 | 303                                                                                | 17                                                                                  | 0                                                                                   | 1                                                                                   | 5                                                                                   | 0                                                                                   |
| Confl. Peds. (#/hr)               |                                                                                   |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)                | 0%                                                                                | 5%                                                                                | 1%                                                                                | 0%                                                                                | 4%                                                                                | 0%                                                                                | 3%                                                                                 | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  | 0%                                                                                  |
| Turn Type                         | Prot                                                                              | NA                                                                                | Perm                                                                              | Prot                                                                              | NA                                                                                |                                                                                   | Perm                                                                               | NA                                                                                  |                                                                                     | Perm                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   |                                                                                    | 4                                                                                   |                                                                                     |                                                                                     | 8                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   |                                                                                   | 4                                                                                  | 4                                                                                   |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 1.8                                                                               | 58.3                                                                              | 58.3                                                                              | 11.3                                                                              | 67.8                                                                              |                                                                                   | 32.4                                                                               | 32.4                                                                                |                                                                                     | 32.4                                                                                | 32.4                                                                                |                                                                                     |
| Effective Green, g (s)            | 2.8                                                                               | 60.3                                                                              | 60.3                                                                              | 11.3                                                                              | 69.8                                                                              |                                                                                   | 32.9                                                                               | 32.9                                                                                |                                                                                     | 32.9                                                                                | 32.9                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.02                                                                              | 0.50                                                                              | 0.50                                                                              | 0.09                                                                              | 0.58                                                                              |                                                                                   | 0.27                                                                               | 0.27                                                                                |                                                                                     | 0.27                                                                                | 0.27                                                                                |                                                                                     |
| Clearance Time (s)                | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               | 6.0                                                                               |                                                                                   | 6.0                                                                                | 6.0                                                                                 |                                                                                     | 6.0                                                                                 | 6.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               |                                                                                   | 3.0                                                                                | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 39                                                                                | 861                                                                               | 743                                                                               | 161                                                                               | 1006                                                                              |                                                                                   | 361                                                                                | 427                                                                                 |                                                                                     | 358                                                                                 | 481                                                                                 |                                                                                     |
| v/s Ratio Prot                    | 0.00                                                                              | c0.25                                                                             |                                                                                   | c0.04                                                                             | c0.22                                                                             |                                                                                   |                                                                                    | 0.01                                                                                |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.07                                                                              |                                                                                   |                                                                                   |                                                                                   | c0.23                                                                              |                                                                                     |                                                                                     | 0.00                                                                                |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.08                                                                              | 0.50                                                                              | 0.13                                                                              | 0.40                                                                              | 0.38                                                                              |                                                                                   | 0.84                                                                               | 0.04                                                                                |                                                                                     | 0.00                                                                                | 0.01                                                                                |                                                                                     |
| Uniform Delay, d1                 | 57.3                                                                              | 19.9                                                                              | 15.9                                                                              | 51.2                                                                              | 13.5                                                                              |                                                                                   | 41.1                                                                               | 31.9                                                                                |                                                                                     | 31.6                                                                                | 31.7                                                                                |                                                                                     |
| Progression Factor                | 0.84                                                                              | 0.51                                                                              | 0.01                                                                              | 1.01                                                                              | 1.09                                                                              |                                                                                   | 1.00                                                                               | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Incremental Delay, d2             | 0.6                                                                               | 1.6                                                                               | 0.3                                                                               | 1.6                                                                               | 1.1                                                                               |                                                                                   | 15.6                                                                               | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Delay (s)                         | 49.0                                                                              | 11.7                                                                              | 0.4                                                                               | 53.3                                                                              | 15.9                                                                              |                                                                                   | 56.7                                                                               | 32.0                                                                                |                                                                                     | 31.6                                                                                | 31.7                                                                                |                                                                                     |
| Level of Service                  | D                                                                                 | B                                                                                 | A                                                                                 | D                                                                                 | B                                                                                 |                                                                                   | E                                                                                  | C                                                                                   |                                                                                     | C                                                                                   | C                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 8.3                                                                               |                                                                                   |                                                                                   | 21.3                                                                              |                                                                                   |                                                                                    | 53.3                                                                                |                                                                                     |                                                                                     | 31.7                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | A                                                                                 |                                                                                   |                                                                                   | C                                                                                 |                                                                                   |                                                                                    | D                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |
| <b>Intersection Summary</b>       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 23.4                                                                              |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                    |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.60                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                    |                                                                                     | 15.5                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 62.0%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                    |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



Westside Planning Project  
27: Hwy 47 & Pacific Ave

2035 PM Peak with Development

|                              |  |  |  |  |  |  |   |  |  |  |  |  |
|------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                     | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations          |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (veh/h)               | 95                                                                                | 660                                                                               | 57                                                                                | 360                                                                               | 1168                                                                              | 188                                                                               | 58                                                                                  | 263                                                                                 | 359                                                                                 | 382                                                                                 | 328                                                                                 | 210                                                                                 |
| Number                       | 5                                                                                 | 2                                                                                 | 12                                                                                | 1                                                                                 | 6                                                                                 | 16                                                                                | 3                                                                                   | 8                                                                                   | 18                                                                                  | 7                                                                                   | 4                                                                                   | 14                                                                                  |
| Initial Q (Qb), veh          | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                 | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   | 0                                                                                   |
| Ped-Bike Adj(A_pbT)          | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 0.99                                                                              | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     | 1.00                                                                                |
| Parking Bus, Adj             | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Adj Sat Flow, veh/h/ln       | 1636                                                                              | 1731                                                                              | 1565                                                                              | 1636                                                                              | 1748                                                                              | 1714                                                                              | 1667                                                                                | 1667                                                                                | 1698                                                                                | 1714                                                                                | 1617                                                                                | 1800                                                                                |
| Adj Flow Rate, veh/h         | 96                                                                                | 667                                                                               | 0                                                                                 | 364                                                                               | 1180                                                                              | 85                                                                                | 59                                                                                  | 266                                                                                 | 0                                                                                   | 386                                                                                 | 331                                                                                 | 192                                                                                 |
| Adj No. of Lanes             | 1                                                                                 | 2                                                                                 | 1                                                                                 | 1                                                                                 | 2                                                                                 | 1                                                                                 | 1                                                                                   | 1                                                                                   | 1                                                                                   | 1                                                                                   | 1                                                                                   | 0                                                                                   |
| Peak Hour Factor             | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                |
| Percent Heavy Veh, %         | 10                                                                                | 4                                                                                 | 15                                                                                | 10                                                                                | 3                                                                                 | 5                                                                                 | 8                                                                                   | 8                                                                                   | 6                                                                                   | 5                                                                                   | 16                                                                                  | 16                                                                                  |
| Cap, veh/h                   | 104                                                                               | 712                                                                               | 288                                                                               | 377                                                                               | 1300                                                                              | 568                                                                               | 66                                                                                  | 278                                                                                 | 241                                                                                 | 395                                                                                 | 352                                                                                 | 204                                                                                 |
| Arrive On Green              | 0.13                                                                              | 0.43                                                                              | 0.00                                                                              | 0.08                                                                              | 0.13                                                                              | 0.13                                                                              | 0.04                                                                                | 0.17                                                                                | 0.00                                                                                | 0.24                                                                                | 0.37                                                                                | 0.37                                                                                |
| Sat Flow, veh/h              | 1558                                                                              | 3288                                                                              | 1330                                                                              | 1558                                                                              | 3320                                                                              | 1450                                                                              | 1587                                                                                | 1667                                                                                | 1443                                                                                | 1633                                                                                | 961                                                                                 | 558                                                                                 |
| Grp Volume(v), veh/h         | 96                                                                                | 667                                                                               | 0                                                                                 | 364                                                                               | 1180                                                                              | 85                                                                                | 59                                                                                  | 266                                                                                 | 0                                                                                   | 386                                                                                 | 0                                                                                   | 523                                                                                 |
| Grp Sat Flow(s),veh/h/ln     | 1558                                                                              | 1644                                                                              | 1330                                                                              | 1558                                                                              | 1660                                                                              | 1450                                                                              | 1587                                                                                | 1667                                                                                | 1443                                                                                | 1633                                                                                | 0                                                                                   | 1519                                                                                |
| Q Serve(g_s), s              | 7.3                                                                               | 23.2                                                                              | 0.0                                                                               | 27.9                                                                              | 42.1                                                                              | 2.9                                                                               | 4.4                                                                                 | 19.0                                                                                | 0.0                                                                                 | 28.2                                                                                | 0.0                                                                                 | 39.9                                                                                |
| Cycle Q Clear(g_c), s        | 7.3                                                                               | 23.2                                                                              | 0.0                                                                               | 27.9                                                                              | 42.1                                                                              | 2.9                                                                               | 4.4                                                                                 | 19.0                                                                                | 0.0                                                                                 | 28.2                                                                                | 0.0                                                                                 | 39.9                                                                                |
| Prop In Lane                 | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                              |                                                                                   | 1.00                                                                              | 1.00                                                                                |                                                                                     | 1.00                                                                                | 1.00                                                                                |                                                                                     | 0.37                                                                                |
| Lane Grp Cap(c), veh/h       | 104                                                                               | 713                                                                               | 288                                                                               | 377                                                                               | 1300                                                                              | 568                                                                               | 66                                                                                  | 278                                                                                 | 241                                                                                 | 395                                                                                 | 0                                                                                   | 557                                                                                 |
| V/C Ratio(X)                 | 0.92                                                                              | 0.94                                                                              | 0.00                                                                              | 0.97                                                                              | 0.91                                                                              | 0.15                                                                              | 0.89                                                                                | 0.96                                                                                | 0.00                                                                                | 0.98                                                                                | 0.00                                                                                | 0.94                                                                                |
| Avail Cap(c_a), veh/h        | 104                                                                               | 713                                                                               | 288                                                                               | 377                                                                               | 1300                                                                              | 568                                                                               | 66                                                                                  | 278                                                                                 | 241                                                                                 | 395                                                                                 | 0                                                                                   | 557                                                                                 |
| HCM Platoon Ratio            | 2.00                                                                              | 2.00                                                                              | 2.00                                                                              | 0.33                                                                              | 0.33                                                                              | 0.33                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |
| Upstream Filter(I)           | 0.60                                                                              | 0.60                                                                              | 0.00                                                                              | 0.66                                                                              | 0.66                                                                              | 0.66                                                                              | 1.00                                                                                | 1.00                                                                                | 0.00                                                                                | 1.00                                                                                | 0.00                                                                                | 1.00                                                                                |
| Uniform Delay (d), s/veh     | 51.7                                                                              | 33.2                                                                              | 0.0                                                                               | 54.7                                                                              | 50.1                                                                              | 7.5                                                                               | 57.2                                                                                | 49.6                                                                                | 0.0                                                                                 | 45.2                                                                                | 0.0                                                                                 | 36.7                                                                                |
| Incr Delay (d2), s/veh       | 47.1                                                                              | 14.8                                                                              | 0.0                                                                               | 29.2                                                                              | 7.5                                                                               | 0.4                                                                               | 74.0                                                                                | 42.4                                                                                | 0.0                                                                                 | 39.4                                                                                | 0.0                                                                                 | 24.1                                                                                |
| Initial Q Delay(d3),s/veh    | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 | 0.0                                                                                 |
| %ile BackOfQ(50%),veh/ln     | 4.5                                                                               | 11.8                                                                              | 0.0                                                                               | 15.1                                                                              | 20.7                                                                              | 1.2                                                                               | 3.3                                                                                 | 12.0                                                                                | 0.0                                                                                 | 17.0                                                                                | 0.0                                                                                 | 20.4                                                                                |
| LnGrp Delay(d),s/veh         | 98.8                                                                              | 48.0                                                                              | 0.0                                                                               | 83.9                                                                              | 57.6                                                                              | 7.9                                                                               | 131.3                                                                               | 92.0                                                                                | 0.0                                                                                 | 84.6                                                                                | 0.0                                                                                 | 60.8                                                                                |
| LnGrp LOS                    | F                                                                                 | D                                                                                 |                                                                                   | F                                                                                 | E                                                                                 | A                                                                                 | F                                                                                   | F                                                                                   |                                                                                     | F                                                                                   |                                                                                     | E                                                                                   |
| Approach Vol, veh/h          |                                                                                   | 763                                                                               |                                                                                   |                                                                                   | 1629                                                                              |                                                                                   |                                                                                     | 325                                                                                 |                                                                                     |                                                                                     | 909                                                                                 |                                                                                     |
| Approach Delay, s/veh        |                                                                                   | 54.4                                                                              |                                                                                   |                                                                                   | 60.9                                                                              |                                                                                   |                                                                                     | 99.1                                                                                |                                                                                     |                                                                                     | 70.9                                                                                |                                                                                     |
| Approach LOS                 |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                     | F                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| Timer                        | 1                                                                                 | 2                                                                                 | 3                                                                                 | 4                                                                                 | 5                                                                                 | 6                                                                                 | 7                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Assigned Phs                 | 1                                                                                 | 2                                                                                 | 3                                                                                 | 4                                                                                 | 5                                                                                 | 6                                                                                 | 7                                                                                   | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Phs Duration (G+Y+Rc), s     | 33.0                                                                              | 30.0                                                                              | 9.0                                                                               | 48.0                                                                              | 12.0                                                                              | 51.0                                                                              | 33.0                                                                                | 24.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Change Period (Y+Rc), s      | 4.0                                                                               | 5.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 5.0                                                                               | 4.0                                                                                 | 4.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Green Setting (Gmax), s  | 29.0                                                                              | 25.0                                                                              | 5.0                                                                               | 44.0                                                                              | 8.0                                                                               | 46.0                                                                              | 29.0                                                                                | 20.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Max Q Clear Time (g_c+I1), s | 29.9                                                                              | 25.2                                                                              | 6.4                                                                               | 41.9                                                                              | 9.3                                                                               | 44.1                                                                              | 30.2                                                                                | 21.0                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Green Ext Time (p_c), s      | 0.0                                                                               | 0.0                                                                               | 0.0                                                                               | 1.0                                                                               | 0.0                                                                               | 1.6                                                                               | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2010 Ctrl Delay          |                                                                                   |                                                                                   | 65.5                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2010 LOS                 |                                                                                   |                                                                                   | E                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



Westside Planning Project  
27: Hwy 47 & Pacific Ave

2035 PM Peak with Development

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |  |  |  |  |  |  |  |  |  |  |  |  |
| Volume (vph)                      | 95                                                                                | 660                                                                               | 57                                                                                | 360                                                                               | 1168                                                                              | 188                                                                               | 58                                                                                | 263                                                                                 | 359                                                                                 | 382                                                                                 | 328                                                                                 | 210                                                                                 |
| Ideal Flow (vphpl)                | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                              | 1800                                                                                | 1800                                                                                | 1800                                                                                | 1800                                                                                | 1800                                                                                |
| Total Lost time (s)               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |                                                                                     |
| Lane Util. Factor                 | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frpb, ped/bikes                   | 1.00                                                                              | 1.00                                                                              | 0.98                                                                              | 1.00                                                                              | 1.00                                                                              | 0.97                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Flpb, ped/bikes                   | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                | 1.00                                                                                |                                                                                     |
| Frt                               | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                                | 0.85                                                                                | 1.00                                                                                | 0.94                                                                                |                                                                                     |
| Flt Protected                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (prot)                 | 1555                                                                              | 3288                                                                              | 1300                                                                              | 1555                                                                              | 3320                                                                              | 1412                                                                              | 1583                                                                              | 1667                                                                                | 1443                                                                                | 1629                                                                                | 1522                                                                                |                                                                                     |
| Flt Permitted                     | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                              | 1.00                                                                              | 0.95                                                                              | 1.00                                                                                | 1.00                                                                                | 0.95                                                                                | 1.00                                                                                |                                                                                     |
| Satd. Flow (perm)                 | 1555                                                                              | 3288                                                                              | 1300                                                                              | 1555                                                                              | 3320                                                                              | 1412                                                                              | 1583                                                                              | 1667                                                                                | 1443                                                                                | 1629                                                                                | 1522                                                                                |                                                                                     |
| Peak-hour factor, PHF             | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                              | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                | 0.99                                                                                |
| Adj. Flow (vph)                   | 96                                                                                | 667                                                                               | 58                                                                                | 364                                                                               | 1180                                                                              | 190                                                                               | 59                                                                                | 266                                                                                 | 363                                                                                 | 386                                                                                 | 331                                                                                 | 212                                                                                 |
| RTOR Reduction (vph)              | 0                                                                                 | 0                                                                                 | 45                                                                                | 0                                                                                 | 0                                                                                 | 106                                                                               | 0                                                                                 | 0                                                                                   | 303                                                                                 | 0                                                                                   | 19                                                                                  | 0                                                                                   |
| Lane Group Flow (vph)             | 96                                                                                | 667                                                                               | 13                                                                                | 364                                                                               | 1180                                                                              | 84                                                                                | 59                                                                                | 266                                                                                 | 61                                                                                  | 386                                                                                 | 524                                                                                 | 0                                                                                   |
| Confl. Peds. (#/hr)               | 4                                                                                 |                                                                                   | 1                                                                                 | 1                                                                                 |                                                                                   | 4                                                                                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Heavy Vehicles (%)                | 10%                                                                               | 4%                                                                                | 15%                                                                               | 10%                                                                               | 3%                                                                                | 5%                                                                                | 8%                                                                                | 8%                                                                                  | 6%                                                                                  | 5%                                                                                  | 16%                                                                                 | 4%                                                                                  |
| Turn Type                         | Prot                                                                              | NA                                                                                | Perm                                                                              | Prot                                                                              | NA                                                                                | Perm                                                                              | Prot                                                                              | NA                                                                                  | Perm                                                                                | Prot                                                                                | NA                                                                                  |                                                                                     |
| Protected Phases                  | 5                                                                                 | 2                                                                                 |                                                                                   | 1                                                                                 | 6                                                                                 |                                                                                   | 3                                                                                 | 8                                                                                   |                                                                                     | 7                                                                                   | 4                                                                                   |                                                                                     |
| Permitted Phases                  |                                                                                   |                                                                                   | 2                                                                                 |                                                                                   |                                                                                   | 6                                                                                 |                                                                                   |                                                                                     | 8                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Actuated Green, G (s)             | 8.0                                                                               | 25.0                                                                              | 25.0                                                                              | 29.0                                                                              | 46.0                                                                              | 46.0                                                                              | 5.0                                                                               | 20.0                                                                                | 20.0                                                                                | 29.0                                                                                | 44.0                                                                                |                                                                                     |
| Effective Green, g (s)            | 8.0                                                                               | 26.0                                                                              | 26.0                                                                              | 29.0                                                                              | 47.0                                                                              | 47.0                                                                              | 5.0                                                                               | 20.0                                                                                | 20.0                                                                                | 29.0                                                                                | 44.0                                                                                |                                                                                     |
| Actuated g/C Ratio                | 0.07                                                                              | 0.22                                                                              | 0.22                                                                              | 0.24                                                                              | 0.39                                                                              | 0.39                                                                              | 0.04                                                                              | 0.17                                                                                | 0.17                                                                                | 0.24                                                                                | 0.37                                                                                |                                                                                     |
| Clearance Time (s)                | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 5.0                                                                               | 5.0                                                                               | 4.0                                                                               | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 | 4.0                                                                                 |                                                                                     |
| Vehicle Extension (s)             | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                               | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Lane Grp Cap (vph)                | 103                                                                               | 712                                                                               | 281                                                                               | 375                                                                               | 1300                                                                              | 553                                                                               | 65                                                                                | 277                                                                                 | 240                                                                                 | 393                                                                                 | 558                                                                                 |                                                                                     |
| v/s Ratio Prot                    | 0.06                                                                              | 0.20                                                                              |                                                                                   | c0.23                                                                             | c0.36                                                                             |                                                                                   | 0.04                                                                              | c0.16                                                                               |                                                                                     | 0.24                                                                                | c0.34                                                                               |                                                                                     |
| v/s Ratio Perm                    |                                                                                   |                                                                                   | 0.01                                                                              |                                                                                   |                                                                                   | 0.06                                                                              |                                                                                   |                                                                                     | 0.04                                                                                |                                                                                     |                                                                                     |                                                                                     |
| v/c Ratio                         | 0.93                                                                              | 0.94                                                                              | 0.04                                                                              | 0.97                                                                              | 0.91                                                                              | 0.15                                                                              | 0.91                                                                              | 0.96                                                                                | 0.25                                                                                | 0.98                                                                                | 0.94                                                                                |                                                                                     |
| Uniform Delay, d1                 | 55.7                                                                              | 46.2                                                                              | 37.2                                                                              | 45.1                                                                              | 34.5                                                                              | 23.6                                                                              | 57.3                                                                              | 49.6                                                                                | 43.5                                                                                | 45.2                                                                                | 36.7                                                                                |                                                                                     |
| Progression Factor                | 0.98                                                                              | 0.86                                                                              | 1.00                                                                              | 0.90                                                                              | 0.94                                                                              | 0.85                                                                              | 1.00                                                                              | 1.00                                                                                | 1.00                                                                                | 0.93                                                                                | 0.90                                                                                |                                                                                     |
| Incremental Delay, d2             | 52.3                                                                              | 16.0                                                                              | 0.2                                                                               | 31.5                                                                              | 8.1                                                                               | 0.4                                                                               | 78.9                                                                              | 43.1                                                                                | 0.6                                                                                 | 40.4                                                                                | 23.7                                                                                |                                                                                     |
| Delay (s)                         | 106.7                                                                             | 55.9                                                                              | 37.4                                                                              | 72.0                                                                              | 40.3                                                                              | 20.4                                                                              | 136.2                                                                             | 92.7                                                                                | 44.0                                                                                | 82.3                                                                                | 56.8                                                                                |                                                                                     |
| Level of Service                  | F                                                                                 | E                                                                                 | D                                                                                 | E                                                                                 | D                                                                                 | C                                                                                 | F                                                                                 | F                                                                                   | D                                                                                   | F                                                                                   | E                                                                                   |                                                                                     |
| Approach Delay (s)                |                                                                                   | 60.6                                                                              |                                                                                   |                                                                                   | 44.8                                                                              |                                                                                   |                                                                                   | 70.8                                                                                |                                                                                     |                                                                                     | 67.4                                                                                |                                                                                     |
| Approach LOS                      |                                                                                   | E                                                                                 |                                                                                   |                                                                                   | D                                                                                 |                                                                                   |                                                                                   | E                                                                                   |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| HCM 2000 Control Delay            |                                                                                   |                                                                                   | 57.2                                                                              |                                                                                   |                                                                                   |                                                                                   | HCM 2000 Level of Service                                                         |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| HCM 2000 Volume to Capacity ratio |                                                                                   |                                                                                   | 0.99                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Actuated Cycle Length (s)         |                                                                                   |                                                                                   | 120.0                                                                             |                                                                                   |                                                                                   |                                                                                   | Sum of lost time (s)                                                              |                                                                                     |                                                                                     | 16.0                                                                                |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 90.6%                                                                             |                                                                                   |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                     |                                                                                     | E                                                                                   |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| c Critical Lane Group             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |





PLANNING COMMISSION MEETING MINUTES  
FOREST GROVE COMMUNITY AUDITORIUM

January 3, 2017–7:00 P.M.

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1. CALL TO ORDER:

Chairman Beck called the meeting to order at 7:00 p.m.

**Planning Commission Present:** Tom Beck, Carolyn Hymes, Sebastian B. Lawler, Lisa Nakajima, Dale Smith.

**Planning Commission Excused:** Phil Ruder and Hugo Rojas

**Staff Present:** James Reitz, Senior Planner; Marcia Phillips, Commission Coordinator.

2. PUBLIC MEETING:

2.1 PUBLIC COMMENT PERIOD FOR NON-AGENDA ITEMS: None.

2.2 PUBLIC HEARING:

**A. File # 311-16-000193-PLNG Conditional use permit to construct a new 9,500-square foot library and meeting hall at 2150 Masonic Way (Washington County Tax Lot 1N3032CC02300).**

Chairman Beck opened the public hearing at 7:07 pm, and asked for disclosure of any conflicts of interest, ex-parte contacts, bias, or abstentions. There were none, and no challenges from the audience. He called for the staff report.

Mr. Reitz gave a PowerPoint presentation showing an aerial view of the site and surrounding neighborhoods.

Chairman Beck asked whether or not the owner is the same for both lots. Mr. Reitz stated it is the same owner, and McMenamin's has a long-term lease with the owner.

In response to a question from Commissioner Nakajima, Reitz said he believed the Masonic Way driveway gate is still there, but was not sure if it still functions.

Mr. Reitz explained that the applicant proposes to rent out the new building for private events with up to 120 attendees, which would create additional demand for parking. He said it was thought that McMenamin's parking could be used, but McMenamin's is an entity unto itself and is at times parked full. Reitz said the applicant has proposed to use an underutilized parking area north of the proposed site, and there is some parking along the administrative building. He said 26 parking spaces exist on-site to serve the administration office with 25 to 31 spaces required, so the minimum has been met. Reitz explained that for this project, two new ADA parking stalls would be constructed on the east side of the administration office, resulting in 28 spaces in the vicinity of the new building. He explained that by using a previous report done in 2015 by Kittleson and Associates Transportation Engineers, for a 120-person event we can estimate that 80%-90% of the attendees will arrive by car, and dividing the 120 attendees by the estimated 1.5 to 2.5 persons per vehicle results in a demand for 39 to 76 parking spaces. He said staffing for events is estimated at 1 staff member per 25 guests which equals 6 spaces, so the total number of parking spaces needed to accommodate a 120-person event would be 45 to 82 spaces. Reitz said the number of parking spaces falls only half a dozen shy of the number needed, so staff concludes that the parking supply appears to be adequate and staff is not proposing any conditions to require additional parking. He said staff recommends a pedestrian connection across Masonic Way.

**PLANNING COMMISSION MEETING MINUTES  
FOREST GROVE COMMUNITY AUDITORIUM**

January 3, 2017–7:00 P.M.

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**APPLICANT:**

**David Wark, 921 SW Washington St. Suite 250, Portland, OR 97204.** Mr. Wark stated that the applicant has been working with staff on the parking, and agrees that Mcmenamin's is busy so their parking is not available. He said the applicant looked north of the site at the 257 spaces near Jennings McCall, and determined that total peak parking use would be 179 spaces (76 for residents, 45 for staff, and 58 for visitors) leaving 78 spaces available. Wark said they need 82 spaces and have 78 available, so they are just 4 short. He said the area behind the administrative building has 8 spaces, and staff could do some kind of valet parking if needed. Wark said the applicant will add a pedestrian pathway to connect across Masonic Way from the parking to the event building.

Chairman Beck commented that it looked like the applicant could add 6-8 spaces near the office building, which would allow people to park closer for smaller events. Commissioner Lawler agreed that would be a good idea.

**PROPONENTS:** None.

**OPPONENTS:**

**Lyle Frank, 3729 19<sup>th</sup> Ave., Forest Grove, OR.** Mr. Frank asked whether or not any traffic studies have been done on Quince Street. He said traffic there is terrible.

Chairman Beck said the State is currently working on moving utilities to put in more lanes on Quince Street, but this proposed project does not trigger any changes.

**COMMISSION DISCUSSION:**

Commissioner Hymes commented that the parking situation seems easy to fix.

Commissioner Nakajima commented that these would be sporadic events. She would like to see the old gate removed.

Commissioner Nakajima made a motion to approve File # 311-16-000193-PLNG Conditional use permit to construct a new 9,500-square foot library and meeting hall at 2150 Masonic Way (Washington County Tax Lot 1N3032CC02300) with an amendment to the Conditions of Approval to add six parking spaces near the administrative building. Commissioner Lawler seconded. Motion passed 5-0.

**B. File # 311-16-000187-PLNG Site plan approval and design review of a proposed 192-unit apartment complex housed in 17 buildings: one recreation building; one garage building; one storage building; one two-suite commercial building and one coffee kiosk drive-through. (Washington County tax lots 1S305AB—400, 401, 500 and a portion of 501.**



**PLANNING COMMISSION MEETING MINUTES  
FOREST GROVE COMMUNITY AUDITORIUM**

January 3, 2017–7:00 P.M.

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Chairman Beck opened the public hearing and asked for disclosure of any conflicts of interest, ex-parte contacts, bias, or abstentions. Commissioner Nakajima stated that she is owner of an adjacent property. Beck called for the staff report.

Mr. Reitz gave a PowerPoint presentation. He showed a site map, and explained that the site plan consists of 17 apartment buildings, a recreation/office/residential building at the east Pacific Avenue driveway with a pool and sport court, and at the northwest corner at the Pacific Avenue driveway would be a commercial building, and a coffee kiosk drive-through. Reitz explained that years ago Haggen did frontage improvements along Pacific Avenue, and some infrastructure on the site before abandoning their project. He said there were easements in place to share parking with Ace Hardware.

Mr. Reitz stated that the site is entirely in the Community Commercial zone with a residential zone (R-7) on the south side of 19<sup>th</sup> Avenue. He said on an adjacent site a different applicant has submitted the Stonewood Center (commercial) project, but the application is not complete. When it is complete it will come before the Commission. Reitz said there is a lot line adjustment in process to straighten the west property line near the garage building. He said that not counting the garage building there is still ample parking on-site with more available on the street. Reitz said staff has issues with the drive aisles around the proposed commercial building and the west entrance. He indicated on the site map the issues staff has with the stacked cars blocking the entrance and the parking spaces near the kiosk. He showed examples of the building elevations, and stated it is clearly a unified complex.

Chairman Beck said a key point is variety of colors and a mix of materials extending around all four sides of the buildings. Mr. Reitz explained that the applicant proposes to extend the materials around all four sides of the buildings, except the commercial buildings which are a little different.

In response to a question from Chairman Beck, Reitz explained that staff had originally anticipated this would be all commercial, and traffic arms were installed. Haggen's did not move forward, so the arms were pulled. He said the grocery store would have generated a lot more traffic than this residential proposal, and the Oregon Department of Transportation (ODOT) concurs warrants are not met for a traffic light. When the Stonewood Center project goes through, ODOT will look at that traffic analysis and the site in total. Reitz said this project will generate about one million dollars in Transportation Development Tax, and the Stonewood Center project another half a million dollars. He stated the City can use this money to contribute to any traffic project along Pacific Avenue. Reitz explained about the proposed three lane driveways and two-stage left turns recommended by ODOT. He said 60% of traffic will go out to Pacific Avenue and 40% to 19<sup>th</sup> Avenue, which is a collector street.

Mr. Reitz went through the proposed Conditions of Approval. Condition #5 - He said everything is oriented towards the center of the project, so it is a concern due to the surrounding single family neighborhood. Staff recommends the three buildings to the south along 19<sup>th</sup> Avenue be turned to face the single-family homes across the street. This would give a more neighborhood-like feel, and allow more eyes on the street. Condition #6 – Staff is looking at applying this condition to just the coffee kiosk area. The Commission can change this. Conditions #7, 8, 9, and 10 – These conditions are from ODOT, and staff encourages the acceptance of them. There is concern about the kiosk being so close to the entrance with no stacking space. ODOT recommends the drive-through access be located at least 50 feet south of the Pacific Avenue right-of-way line, or beyond

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the queue length at the driveway. Commissioner Lawler made the comment that there is a lot of traffic congestion in that area.

Condition #11 – Mr. Reitz said this condition would allow access from the existing building located to the east of the site on Pacific Avenue. At some time in the future the existing building's two driveways would both be abandoned. Condition #13 – This condition would align the proposed east/west drive aisle with the existing drive aisles. Condition #14 – The increase to 6 ½ feet for walkways would make additional curb stops unnecessary. Condition #15 & 16 – The trash enclosure cannot be near the street per code. Staff recommends the one along Pacific Avenue be relocated, and both trash enclosures be roofed as an improvement both visually and environmentally. (People in second and third story apartments would not look down into the trash bin.) Condition #17 – The applicant proposes two and three bedroom units, so there will undoubtedly be young children. Staff recommends a play structure be installed within a fenced enclosure with two benches nearby. Condition #18 – Chain link fences are not aesthetic. Staff recommends the applicant either eliminate the fence or use a different material (such as wrought iron). With the realignment of the three buildings along 19<sup>th</sup> Avenue perhaps no fence would make it look more neighborly. Condition # 19 – Staff could not determine who owns the trees along the adjacent property, so they need to be protected. The applicant could talk to the adjacent property owner about replacing the trees with a better quality. Condition #20 – The existing street trees along Pacific Avenue are suffering from deferred maintenance, and are all proposed to go away. ODOT may or may not agree to street trees in the parkway. There are a limited number of tree varieties that would fit in the narrower parkway along 19<sup>th</sup> Avenue. Condition #22 – Staff recommends a visual barrier for screening along the commercial parking area. Condition #23 - The impervious surface may exist on the site plan, but is not called out. Condition #24 – It is standard in our Development Code to direct lighting downward. Condition #25 – Staff is working with our Washington County counterparts to move towards clarity on addressing, so buildings can be located more easily. Conditions # 25-30 – These conditions were recommended by the Forest Grove Fire Department to ensure the engines and the ladder truck can get through, etc. Condition #31 – Stairwells can be very dark, so by painting them a light color it aids in visibility.

In response to a question from Commissioner Hymes, Mr. Reitz stated that walkways are shown on sheet SDR-3 of the plans.

Chairman Beck said there does not appear to be enough walkways from the north buildings to the center. He directed staff to write a new Condition #32 that crosswalks be installed to connect each cluster of buildings with other clusters of buildings. When clusters have more than two buildings there needs to be a crosswalk on either end. He also proposed Condition #33 that the coffee kiosk not only be at least 50-feet from the street, but also at least 50-feet from the driveway to avoid car backup into the drive space.

**APPLICANT:**

**Mark Grenz, Multi/Tech Engineering, 1155 13<sup>th</sup> NE, Salem, OR 97302.** Mr. Grenz said the applicant is a builder of multi-family residences, and is excited to bring this project to Forest Grove. Grenz described the type of materials to be used, and pointed to the materials board on display for viewing. He said the applicant spent time looking at the constraints on this site. He said the decision was made to put the coffee kiosk near the pool and sports court and along the street where it they would be visible to all. Handout #2 is a copy of the applicant's proposed

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revisions to staff's Conditions of Approval. Grenz said the majority of the conditions were expected, but the applicant requests revisions to some of them.

Condition #5 – The applicant understands that the goal is to have buildings facing the street, but there is only one entrance into the buildings and no corridor front to back, which causes issues with accessing parking (which would then be behind the buildings). Grenz said there is nothing in the Development Code about how buildings should be oriented, so the applicant proposes using fencing and landscape screening for privacy. Mr. Grenz stated that he now understands that staff's intent is the view from the street. He said solid railing could be used to hide stuff that ends up on patios to make the buildings more visually appealing from the homes across the street.

Chairman Beck instructed staff to reword Condition #5 to read "Buildings 7, 8 and 9 shall be reoriented to face 19<sup>th</sup> Avenue or wrought iron fencing landscaping and screening shall be used to reduce the visual intrusion into the first floor patio areas to create some privacy and solid railing on the second and third floor patios.

Commissioner Hymes said the problem with turning the buildings to face the street is that people will park closest to the entrance, which means they will park on 19<sup>th</sup> Avenue – both sides. This would take up parking spaces now used by the single-family home owners.

Mr. Grenz suggested that the applicant could plant more mature twelve foot trees to help screen the second floor patios. He said the applicant would rather work with staff on screening than reorient the three buildings.

Grenz showed an enhanced view of the coffee kiosk area and indicated the proposed traffic pattern. He said the proposed coffee kiosk is out where it is so it can be seen. Chairman Beck said the challenge the applicant is facing is how to keep drivers from turning where they should not and cutting in line. He said with the queue in front of the residential/commercial buildings, it becomes difficult for people to back out of their parking spaces. Beck suggested leaving staff's condition, and working to revise it.

Mr. Grenz said the architect of the Stonewood Center project sent the applicant their site plan, so they could see how things line up. Grenz said he used less rigid words on Condition #13 to give the applicant room to work on the alignment. He said to keep in mind that this is an interior intersection where traffic is moving very slowly – not a street intersection where people are going 30 MPH. Grenz suggested moving the parking spaces to the south side of the commercial building to help with alignment.

Commissioner Lawler made the comment that there is a lot of traffic feeding into this north/south driveway entrance. He would like to see the south side of the existing island go away to align the east/west drive aisle.

Chairman Beck said he understands the argument staff is making about alignment of the drive aisles, but he did not mind a little bit of a hiccup so people do not use it as a through way. He suggested using an internal stop sign at that intersection, and maybe a crosswalk as one more visual warning to make people stop and think. The Commissioners agreed.



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Mr. Grenz said moving the location of the coffee kiosk can be done. Chairman Beck instructed staff to add to proposed new Condition # 33 that the kiosk must be located so stacked traffic does not block people backing out of both commercial and residential parking spaces.

Mr. Grenz said the applicant is happy with the other Conditions of Approval.

**PROPOSERS:** None.

**OPPOSERS:**

**Nathan Miller, 3820 19<sup>th</sup> Avenue, Forest Grove, OR.** Mr. Miller agreed that reorienting the three buildings to face 19<sup>th</sup> Avenue would be a good idea, with a solid fence so people could not cut through to 19<sup>th</sup> Avenue. He stated that drivers use 19<sup>th</sup> Avenue to avoid traffic on Pacific Avenue, and often ignore the 25 MPH speed limit by going 35-40 MPH. He asked what is being done to control traffic on 19<sup>th</sup> Avenue. He said right now it is a big straightaway, two lanes with parking on both sides. Miller said people use it to get to Hwy 47, and to the school on Mountain View Lane. He said this project will add even more traffic. He asked what will happen to property values if this project goes through. Miller said he was glad to see development in Forest Grove, and this project is not a bad idea. He again stated that 19<sup>th</sup> Avenue is already extremely busy with no traffic control.

**OTHER:**

**Mark Nakajima, PO Box 308, Forest Grove, OR.** Mr. Nakajima said he was present to represent Ace Hardware, which is adjacent to the proposed project. He stated his concern was that the coffee kiosk is proposed to be located at the main entrance. He stated there was too much contention, and this was not what was originally proposed, and it may need to be pursued with attorneys. He suggested that flip flopping the commercial to the east driveway might work. Nakajima said the Stonewood Center is a very nice commercial project and shows a coffee shop. He said he could not imagine a 10-foot black fence along Pacific Avenue.

**REBUTTAL:**

Mr. Grenz said if the traffic analysis is correct, then only 20% of the traffic will exit onto 19<sup>th</sup> Avenue, which is less than thirty trips total during PM peak time. He said studies have been done regarding apartment buildings added to an area, and it enhances the residential. It also adds more eyes on the street to watch what is happening. Grenz said this project offers nice architectural features, and is not just a box – it is a good product. He said this project also meets the needs of the community for more housing. Grenz said he could not speak on the agreement between property owners since he was not a part of that.

Chairman Beck closed the public hearing at 9:39 p.m.

**COMMISSION DISCUSSION:**

Chairman Beck asked the Commissioners if they agreed with Mr. Nakajima about solid landscaping instead of black wrought iron fence. Beck suggested hedging then a fence behind that for the sport court.

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Commissioner Lawler liked the idea of hedging as well as fencing around the sport court. He stated his reservations about the queue to the coffee kiosk – drivers taking short cuts and long queues blocking parking spaces.

Chairman Beck stated that he lives on a collector street, and understands the problem, but at least the people on 19<sup>th</sup> Avenue will not be looking at the back of a grocery store. He said in that sense this project is a blessing. Beck instructed staff to write a condition that the kiosk shall have one useable entrance and one exit.

Commissioner Smith said it is going to be difficult to orient the kiosk 50-feet from the intersection. Commissioner Lawler said even if the kiosk is flipped with the commercial building there is still the same problem. Chairman Beck suggested turning the commercial building ninety degrees and allowing traffic to go in one way and out one way. He instructed staff to keep the condition of approval about blocking parking spaces, but also keep it 50-feet from the intersection.

Mr. Reitz clarified with the Commission that the whole streetscape should be screened by vegetation with solid vegetation across the sport court. The Commissioners agreed.

Chairman Beck instructed staff to put into the Conditions of Approval that the buildings should be various colors and shades of colors.

Commissioner Lawler made a motion to accept File # 311-16-000187-PLNG Site plan approval and design review of a proposed 192-unit apartment complex housed in 17 buildings: one recreation building; one garage building; one storage building; one two-suite commercial building and one coffee kiosk drive-through. (Washington County tax lots 1S305AB—400, 401, 500 and a portion of 501 with amendments to the Conditions of Approval as noted. Commissioner Smith seconded. Motion passed 4-0 with one abstention by Commissioner Nakajima.

**2.3 ACTION ITEMS:** None.

**2.4 WORK SESSION ITEMS:** None.

**3.0 BUSINESS MEETING:**

**3.1 APPROVAL OF MINUTES:** Commissioner Smith made a motion to approve the minutes from the October 17, 2016 meeting. Commissioner Nakajima seconded. Motion passed 5-0.

**3.2 REPORTS FROM COMMISSIONERS/SUBCOMMITTEES:** None.

**3.3 DIRECTOR'S REPORT:**

In Mr. Holan's absence, Mr. Reitz reported that the next meeting on January 17, 2017 will have two items on the agenda. He said the Silverstone applicant is requesting an amendment to the Development Code to allow flexibility for driveway widths in residential zones. The current maximum driveway width is 24 feet; the amendment, if approved, would allow some driveways to have a maximum width of 30 feet. He said the second item on the agenda is a work session on the Westside Planning Project.

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Mr. Reitz said the Stonewood Center, and a dental office at Pacific Avenue and Oak Street will both be coming before the Commission at a date to be determined. He said Cedar Manor Apartments are under construction, the Jesse Quinn project had its groundbreaking, and McMenemy's has almost completed their third floor renovation.

3.4 **ANNOUNCEMENT OF NEXT MEETING:** The next meeting will be held on January 17, 2017 at 7 pm.

3.5 **ADJOURNMENT:** The meeting was adjourned at 9:58 pm.

Respectfully submitted by:

Marcia Phillips

Planning Commission Coordinator