

# College Street Improvements Final Report



**WHPacific**



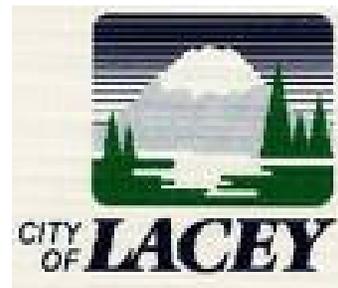
# Final Report

## College Street Improvements Lacey, WA

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For:  
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May 8, 2009



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## Purpose

The purpose of this technical memorandum is to present an overview of findings and recommendations for the College Street corridor study work. The study started in February 2008 and concluded in November. The study consisted of the following elements:

- *Alternatives Analysis* – a technical memorandum to define the recommended dimensions of the cross-sectional elements;
- *Horizontal Alignment and Right-of-Way Limits* – a technical memorandum to define the recommended alignment;
- *Neighborhood Circulation and Access* – a technical memorandum to define the recommended changes to street access and/or driveway access;
- *Improvements Phasing Plan* – a technical memorandum to estimate project costs and define the recommended phasing of the improvements;
- *Public Process* – progress reports to the City of Lacey Transportation Committee and two public open houses; and
- *Width Provided for Bicycles* – a technical memorandum to expand the evaluation of the roadway width provided for bicycles in response to comments from the open houses.

The limits of the corridor study are shown in the vicinity below (Figure 1).

The Summary section of the report provides an overview of each element. Detailed technical memorandums for each element are included as appendices.

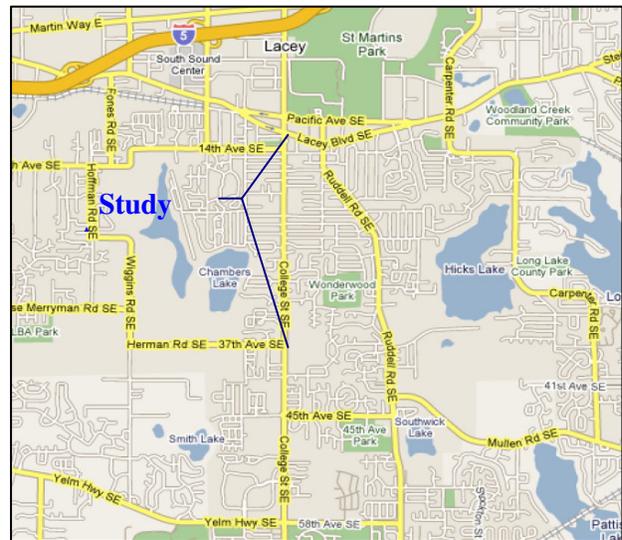


Figure 1 - Vicinity Map

## Background

### Existing Conditions

College Street from Lacey Boulevard to 37<sup>th</sup> Avenue SE is a four-lane National Highway System (NHS) principal arterial with a general right-of-way width of 60 feet. The existing street width is approximately 45 feet from curb to curb. There are narrow sidewalks located along the corridor on each side of the street. The corridor is a built environment fronted by homes, small businesses, apartments, and schools.

College Street provides a primary north-south link for traffic, transit, pedestrians, and bicyclists within the City from south Thurston County to Interstate 5. The corridor currently carries 21,000 (2005 traffic count) and is projected to carry 32,000 vehicles per day by 2020 according to the Lacey Transportation Plan (College Street is identified as a Strategy Corridor in the Lacey Transportation Plan<sup>1</sup>). The corridor also provides local access to many homes fronting the street and provides access to several local streets and collectors.

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<sup>1</sup> City of Lacey, 2004 Lacey Transportation Plan, page 55.

Traffic is heavy along the corridor and congested during peak hours. Vehicles turning left from College Street to homes or local streets increase congestion by occupying the inside through-lane while waiting for breaks in traffic. There are approximately 130 driveways 24 T-intersections, and four 4-way intersection collectively generating significant turn volumes. There are high-frequency collision locations along the corridor due to conflicts between turning vehicles and high volumes of through traffic. Narrow sidewalks, high volumes, and a lack of bike lanes discourage use by pedestrians and bicyclists. A lack of street amenities (i.e., planter strips/vegetation, decorative street lighting, street furniture) conflicts with community values articulated by City staff and City Council.

### **Previous Work**

Previous study work resulted in a report titled, “College Street, Evaluation of Options”, August 2005. This report documented a comprehensive alternatives analysis that scored and ranked ten options (nine build and one no-build) for improvements to College Street that addressed the corridor needs. The corridor needs were grouped into three main categories:

- Preserve/enhance community values;
- Optimize traffic operations and safety; and
- Optimize cost.

After considering options that ranged from no-build to adding a frontage road that widened the overall right-of-way footprint to 121 feet, the report recommended Option 9 as the preferred option. This option best provides a blend of corridor capacity, neighborhood connectivity, non-motorized uses, and corridor aesthetics. The cross-section included a planted center median to control access and provide space for left-turn lanes at key intersections; wide sidewalks with tree wells to promote walk-ability; space for commuting bicycles; and roundabouts at major intersections to provide intersection control. The overall right-of-way width of 72 feet widens to 76 feet at left-turn lane locations.

Option 9 scored best by performing very well for “optimizing traffic operations and safety” by providing two through-lanes, controlling access, and providing left turns at key intersections; performing well in “preserving/enhancing community values” by providing space for commuting bicycles, wide sidewalks with tree wells, and planted medians; and performing average in “optimizing cost”.

The report concluded with a recommendation to further refine Option 9 by considering the following:

- Appropriate locations for median breaks, u-turns, and roundabouts.
- Potential driveway consolidation and/or elimination to reduce the number of conflict points.
- Fine tuning of the cross-sectional elements to minimize impacts to adjacent properties.
- Locations and amounts of corridor aesthetics and pedestrian amenities.
- Appropriate (if any) locations for mid-block crossings that link pedestrian oriented land uses.

The elements included in this corridor study answered these questions. It provides the City with a basis for long range planning in the area and presents a vision for improvements to the corridor. In the near term, the study provides the City a tool to steer decision making in the area – land use, development site plans, right of way acquisition, etc. While the study presents specific recommendations, there is room for flexibility to make refinements as individual projects progress toward realization. As refinements are considered, the study will provide the basic framework and the foundational vision for the corridor.

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**Table 2**  
**Scoring of Alternatives Considered<sup>1</sup>**

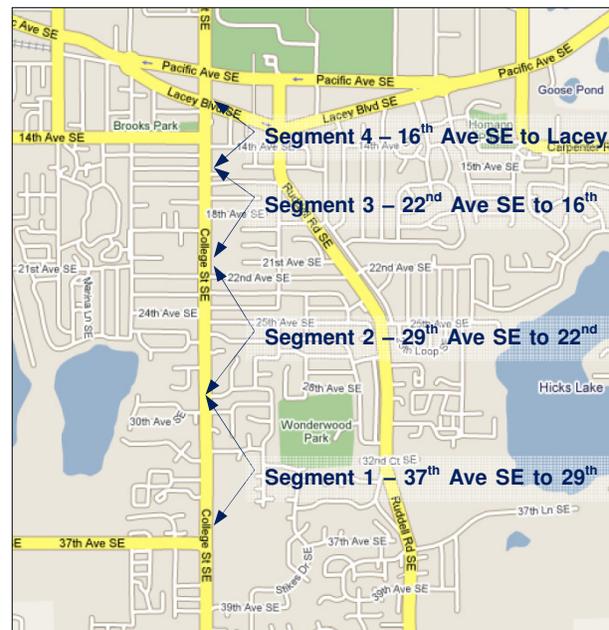
Alternative	Operations/ Safety	Standards	R/W Width and Cost	Grant Funding	Community Values	Total Score
Option 9	2	2	4	3	3	14
NHS/TIB Stds.	4	4	2	4	2	16
Lacey Stds.	3	4	1	4	2	14
Recommended	3	4	3	3	3	16

1. Alternatives are scored from 1 (lowest) to 4 (highest) in each criterion.

Although the “NHS/TIB Standards” alternative scores equally well with the “Recommended” alternative, the “Recommended” alternative is preferred because of the lesser right-of-way width. The “Recommended” alternative is shown above in Figure 2.

### Horizontal Alignment and Right of Way Limits

We evaluated alternative horizontal alignments to determine the least cost alignment considering construction costs and right of way impacts (measured by estimated acquisition costs). The cost differences between alternative alignments are significantly higher for right-of-way acquisition than pavement reconstruction. Therefore, the recommended horizontal alignment is based solely on minimizing right-of-way acquisition costs. We compared costs for three horizontal alignments - centered on existing right-of-way; aligned against the westerly right-of-way; and aligned against the easterly right-of-way. To further refine our comparison, we broke the corridor into four segments. The segment limits correspond to the location of the proposed roundabout locations at 29<sup>th</sup> Avenue SE, 22<sup>nd</sup> Avenue SE, and 16<sup>th</sup> Avenue SE (see Figure 3). Breaking the segments at the roundabout locations allows for transitions between alternative alignments. Therefore, we are not limited to one alignment for the entire corridor.



**Figure 3 – Segment Map**

The estimated costs for right-of-way acquisition for the three horizontal alignments are shown in Table 3. The numbers of full parcel acquisitions are shown in Table 4. Note these numbers exclude impacts from the three roundabouts, since the impacts from roundabouts are mostly independent of the alternative alignments.

We recommend the following horizontal alignments by segment to minimize right-of-way acquisition costs. These alignments are shown in **bold** in Tables 3 and 4. Figure 4 graphically depicts the horizontal alignment by segment.

- Segment 1 - Aligned against the easterly right-of-way line;
- Segment 2 - Aligned against the westerly right-of-way line;
- Segment 3 - Aligned against the easterly right-of-way line; and
- Segment 4 - Aligned against the westerly right-of-way line.

The total cost and the total number of full parcel acquisitions for the recommended alignment are shown in Tables 5 and 6, respectively. These numbers do include impacts for the three roundabouts. Therefore, the totals in Tables 5 and 6 differ from the totals from Tables 3 and 4.



Figure 4 – Horizontal Alignment by Segment

**Table 3**  
Estimated Right-of-Way Acquisition Costs (Excl. Roundabouts)

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1	\$1,157,827	\$3,046,962	<b>\$864,618</b>
2	\$4,942,902	<b>\$1,934,930</b>	\$7,324,351
3	\$2,417,583	\$1,665,844	<b>\$1,292,543</b>
4	\$3,687,493	<b>\$2,568,042<sup>1</sup></b>	\$3,570,840

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 4**  
Full Parcel Acquisitions for Structures and/or Driveways Impacted (Excl. Roundabouts)

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1	2	8	<b>1</b>
2	14	<b>5</b>	22
3	7	5	<b>3</b>
4	11	<b>6<sup>1</sup></b>	11

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 5**  
Estimated Right-of-Way Acquisition Costs – Recommended Alignment (Incl. Roundabouts)

Segment	Estimated R/W Costs
1	\$1.50 M
2	\$3.04 M
3	\$1.91 M
4	\$3.14 M <sup>1</sup>
<b>TOTAL</b>	<b>\$9.59 M<sup>1</sup></b>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 6**  
**Full Parcel Acquisitions – Recommended Alignment (Incl. Roundabouts)**

Segment	Number of Full Parcel Acquisitions
1	3
2	8
3	5
4	7 <sup>1</sup>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

The total right-of-way costs shown in Table 5 are preliminary and they are represented in 2008 dollars. We recommend \$13.0M as a reasonable planning level estimate at this stage of project development.

## Neighborhood Circulation and Access

### Strategic Corridor

The City of Lacey recognizes College Street as a Strategy Corridor. Strategy Corridors are major arterials in dense urban areas where traditional approaches to address congestion such as roadway widening are not practical or conflict with community values. Traditional performance measures, such as Level of Service, do not apply to Strategy Corridors because they would not allow increased densities in the urban core.

### Neighborhood Circulation and Access Management Plan (NCAMP)

The NCAMP recommends a raised median to manage access. Access management is a tool to reduce traffic congestion and reduce traffic collisions. The intent of access management is to provide access for abutting properties while preserving the flow of traffic. The NCAMP also identifies measures recommended for College Street as a Strategy Corridor. The recommendations include identifying roundabout locations, median break locations (allowing for left turns), street grid connections to increase access to alternate routes, and driveways consolidations. Figure 5 shows the recommended roundabouts, median breaks, and street grid connections.



**Figure 5 – Neighborhood Circulation Access & Management Plan**

### Traffic Analyses

Traffic analysis was conducted to evaluate how the recommended improvements will impact traffic operations in 2030. The results show the recommended access control measures will not adversely affect neighborhoods, although left turn movements at some neighborhoods will be difficult in the PM peak hour. The roundabouts will operate well under expected future volumes on College Street.

### Findings

The proposed improvements for the College Street Corridor from 37<sup>th</sup> Avenue SE to Lacey Boulevard comply with Strategic Corridor requirements. The proposed access management shown on the

Neighborhood Circulation and Access Management Plan strikes a reasonable balance between throughput operations and neighborhood access. Driveway revisions can maintain access while improving safety by reducing the number of conflict points. Potential grid connections can further enhance neighborhood access and circulation by providing access to other north-south arterials, such as Golf Club Road SE, Judd Street SE, and Ruddell Road SE. Some stop control intersections will experience delays making left turns in the PM peak hour due to heavy volumes on College Street. Alternatively, vehicles can turn right and make a u-turn at the nearest roundabout or median break. Left-turns from side streets are more likely that during off peak periods. The roundabouts operate well in the build out year.

### Improvement Phasing Plan

We evaluated alternative construction phasing options for improvements to College Street from 37<sup>th</sup> Avenue SE to Lacey Boulevard. We based the phasing options based on operational benefit and practical project size. First, we gave priority to projects providing more operational benefit. Second, we defined project limits to keep the costs for individual projects roughly between \$1M and \$5M (in 2008 dollars), specifically to match a range of project sizes typically funded by grant opportunities. We developed two viable options described below. Note that any of the identified projects could be increased or decreased in scope to match funding opportunities.

Both approaches construct the roundabouts first, and the three roundabouts are ordered by highest entering volumes (22<sup>nd</sup> Avenue SE first, 29<sup>th</sup> Avenue SE second, and 16<sup>th</sup> Avenue SE third). The roundabouts are constructed first to provide u-turn opportunities for properties before center medians are constructed and access points are modified. The segments between roundabouts are ordered from north to south, since the traffic volumes are higher for the northerly segments.

Option 1 has seven phases ranging in cost from \$2.1M to \$5.7M. Option 2 has five phases ranging in cost from \$3.1M to \$7.5M.

**Table 7**  
**Phasing Options with Phase Costs**

Option 1			Option 2		
Phase	Cost <sup>1</sup>	Description	Phase	Cost <sup>1</sup>	Description
Phase 1	\$2,050,000	22 <sup>nd</sup> Ave RAB	Phase 1	\$4,990,000	22 <sup>nd</sup> & 29 <sup>th</sup> RABs
Phase 2	\$2,940,000	29 <sup>th</sup> Ave RAB	Phase 2	\$7,463,000	16 <sup>th</sup> RAB/Lacey to 16 <sup>th</sup>
Phase 3	\$3,100,000	16 <sup>th</sup> Ave RAB	Phase 3	\$3,060,000	16 <sup>th</sup> to 22 <sup>nd</sup>
Phase 4	\$4,363,000	Lacey to 16 <sup>th</sup>	Phase 4	\$5,736,000	22 <sup>nd</sup> to 29 <sup>th</sup>
Phase 5	\$3,060,000	16 <sup>th</sup> to 22 <sup>nd</sup>	Phase 5	\$4,754,000	29 <sup>th</sup> to 37 <sup>th</sup>
Phase 6	\$5,736,000	22 <sup>nd</sup> to 29 <sup>th</sup>	----	----	
Phase 7	\$4,754,000	29 <sup>th</sup> to 37 <sup>th</sup>	----	----	
<b>TOTALS</b>	<b>\$26,003,000</b>			<b>\$26,003,000</b>	

1. Costs are in 2008 dollars.

The total phase costs (right of way and construction) shown in Table 7 are preliminary and they are represented in 2008 dollars. We recommend \$30M as a reasonable planning level estimate at this stage of project development.

### Public Process

The public process included progress reports to the City Transportation Committee and two open houses. The progress reports to the Transportation Committee occurred after each step of the study – Alternative Analysis, Horizontal Alignment and Right of Way, Neighborhood Circulation and Access, and Improvement Phasing Plan. These reports occurred on April 11, 2008, June 13, 2008, and September 12, 2008 (Access and Phasing), respectively.

At the conclusion of work to prepare the four technical memorandums listed above, the City held an open house at Mountain View Elementary School on Thursday, October 9, 2008 from 4:30 p.m. to 7:30 p.m. The open house was hosted by City staff and WHPacific staff. There were roll plot exhibits placed on table spread throughout the cafeteria area. The exhibits depicted results from each of the four technical memorandums prepared for the study. Citizens were able to review the material and ask questions. Citizens were also asked to complete a feedback form (see Appendix E).

The October 9 open house was very well attended – 81 persons completed feedback form. Based on these attendance numbers, the City Council requested a second open house scheduled on a different day of the week. The second open house was held on Wednesday, November 5, 2008 from 4:30 p.m. to 7:30 p.m. During the November 5 open house, 45 persons completed the feedback form.

The following are key points from the public feedback:

- Most persons learned of the meeting through direct mailing.
- Over 70% of respondents live/work in the vicinity of College Street. Nearly 95% of respondents live/work near College Street or commute along College Street.
- The majority of respondents rated congestion below average or poor for vehicles, bicycles, and pedestrians.
- Over 80% of respondents generally agreed with the plan.
- Respondents generally agreed with the order of projects in the phasing plan.

Detailed results from the feedback forms are included in Appendix E.

### ***Responses to Public Process***

As a result of the input received during the public process, we made the following refinements to the planned improvements:

- **Circulation Routes:** We added the following connections to enhance the neighborhood connections:
  - Connect 18<sup>th</sup> Ave SE to 22<sup>nd</sup> Ave SE along a new route immediately east of Mountain View Elementary.
  - Connect Judd Street between 24<sup>th</sup> Ave SE and 25<sup>th</sup> Ave SE.
- **Design Flexibility:** We committed to flexibility during the final design to minimize specific project impacts at spot locations.
- **Space for Bicycles:** We prepared a technical memorandum to document a cost/benefit evaluation of providing additional space for bicycles. The memorandum concludes the added costs of \$1.7M are greater than the benefits provided by additional space for bicycles, since it is anticipated bicyclists will be primarily Type A users (i.e., commuters) and the nearby Chehalis-Western Trail provides an alternative route for bicyclists.

## **Appendices**

Appendix A – Alternatives Analysis Technical Memorandum

Appendix B – Horizontal Alignment and Right of Way Limits

Appendix C – Neighborhood Circulation and Access

Appendix D – Improvements Phasing Plan

Appendix E – Public Process

Open House Public Feedback Form

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Open House Public Feedback Summary – Combined from Oct. 9 and Nov. 5  
Appendix F – Bike Lane Technical Memorandum

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# Appendix A

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**TECHNICAL MEMORANDUM**

**Date:** April 11 , 2008. Rev 4/17/09

**RE: Alternative Analysis Technical Memorandum**

**To:** Martin Hoppe, P.E., PTOE

**From:** Scott Sawyer, P.E.

**Company:** City of Lacey

**Title:** Senior Project Manager

**Phone:** 360.438.2681

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**Address:** 420 College Street SE

Lacey, WA 98509-3400

**Project #:** 34709

**Project Name:** College Street Improvement Report

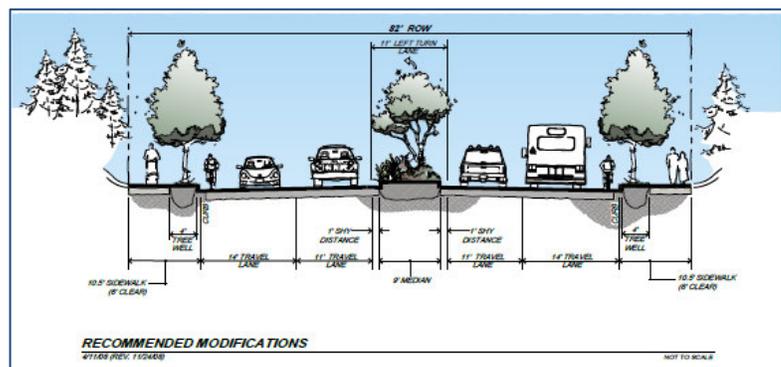
**Purpose**

The purpose of this technical memorandum is to present ranges of dimensions for roadway cross-sectional elements for College Street from 37<sup>th</sup> Avenue SE to Lacey Boulevard; median width, left-turn lane width, through-lane width, space for bicyclists, planter/tree well width, and sidewalk width (clear width); and recommend a proposed cross-section for College Street for use in subsequent preliminary and final design.

**Summary**

We scored four alternatives against the following criteria; operations and safety, adherence to standards, right-of-way width and cost, eligibility for grant funding, and community values. Based on these criteria, the “Recommended” alternative performs best (see Figure 1).

This alternative uses 11-foot lanes as a practical minimum width (since the 10-foot lanes provide no buffer for trucks and/or buses considering width from outside of mirror to outside of mirror). It uses 14-foot outside lanes with space for bicyclists to decrease the impact to right-of-way width. The planted median is a consistent 11 feet to accommodate the possibility of future lane turn lanes. A reduced median width could still be considered at spot locations along the corridor.



**Figure 1 – Recommended Alternative**

The biggest benefit of this alternative is the minimal right-of-way width. One drawback is lesser space provided for bicyclists. Since the width provided is less than 5 feet wide, the project will not score bike route points (2 points maximum) on a Transportation Improvement Board (TIB) grant application under the Urban Arterial Program (UAP). The bike points fall under the Sustainability criteria (15 points maximum). There are 100 points available on the UAP grant application, so bike points are only two percent of the available points.

## Background

### Existing Conditions

College Street from Lacey Boulevard to 37<sup>th</sup> Avenue SE is a four-lane National Highway System (NHS) principal arterial with a general right-of-way width of 60 feet. The existing street width is approximately 45 feet from curb to curb. There are narrow sidewalks located along the corridor on each side of the street. The corridor is a built environment fronted by homes, small businesses, apartments, and schools.

College Street provides a primary north-south link for traffic, transit, pedestrians, and bicyclists within the City from south Thurston County to Interstate 5. The corridor currently carries 21,000 (2005 traffic count) and is projected to carry 32,000 vehicles per day by 2020 according to the Lacey Transportation Plan (College Street is identified as a Strategy Corridor in the Lacey Transportation Plan<sup>1</sup>). The corridor also provides local access to many homes fronting the street and provides access to several local streets and collectors.

Traffic is heavy along the corridor and congested during peak hours. Vehicles turning left from College Street to homes or local streets increase congestion by occupying the inside through-lane while waiting for breaks in traffic. There are approximately 130 driveways, 24 T-intersections, and four 4-way intersections collectively generating significant turn volumes. There are high-frequency collision locations along the corridor due to conflicts between turning vehicles and high volumes of through traffic. Narrow sidewalks, high volumes, and a lack of bike lanes discourage use by pedestrians and bicyclists. A lack of street amenities (i.e., planter strips/vegetation, decorative street lighting, street furniture) conflicts with community values articulated by City staff and City Council.

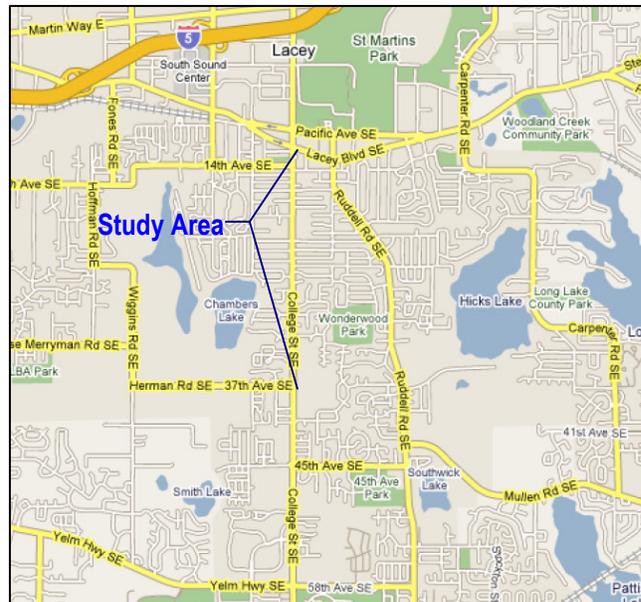


Figure 2 - Vicinity Map

### Previous Work

Previous study work resulted in a report, “College Street, Evaluation of Options”, August 2005. This report documented a comprehensive alternatives analysis that scored and ranked ten options (nine build and one no-build) for improvements to College Street that addressed the corridor needs. The corridor needs were grouped into three main categories:

<sup>1</sup> City of Lacey, 2004 Lacey Transportation Plan, page 55.

- Preserve/enhance community values;
- Optimize traffic operations and safety; and
- Optimize cost.

After considering options that ranged from no-build to adding a frontage road that widened the overall right-of-way footprint to 121 feet, the report recommended Option 9 as the preferred option. This option best provides a blend of corridor capacity, neighborhood connectivity, non-motorized uses, and corridor aesthetics. The cross-section included a planted center median to control access and provide space for left-turn lanes at key intersections; wide sidewalks with tree wells to promote walk-ability; space for bicyclists; and roundabouts at major intersections to provide intersection control. The overall right-of-way width of 72 feet widens to 76 feet at left-turn lane locations.

Option 9 scored best by performing very well for “optimizing traffic operations and safety” by providing two through-lanes, controlling access, and providing left turns at key intersections; performing well in “preserving/enhancing community values” by providing space for bicyclists, wide sidewalks with tree wells, and planted medians; and performing average in “optimizing cost”. The Option 9 cross-section is shown graphically in Figure 3.

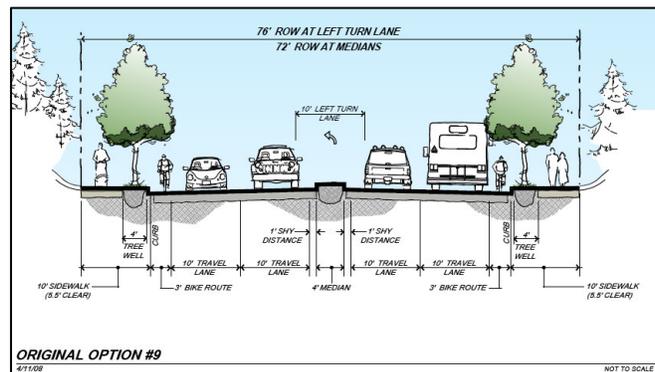


Figure 3 – Option 9 Alternative

The report concluded with a recommendation to further refine Option 9 considering the following:

- Appropriate locations for median breaks, U-turns, and roundabouts.
- Potential driveway consolidation and/or elimination to reduce the number of conflict points.
- Fine tuning of the cross-sectional elements to minimize impacts to adjacent properties.
- Locations and amounts of corridor aesthetics and pedestrian amenities.
- Appropriate (if any) locations for mid-block crossings that link pedestrian oriented land uses.

This technical memorandum addresses the third bullet above. Subsequent technical memorandums will address other bullets.

## Alternatives Analysis

### Range of Dimensions

The work from the report, “College Street, Evaluation of Options”, August 2005 set the cross-sectional elements that comprise the preferred option, Option 9. These elements are raised median, left-turn lane, through-lanes, space for bicyclists, tree wells/planter strips, and sidewalks. During presentation of the report to the Lacey City Council, the Council agreed with Option 9 as the recommended option, but asked for further consideration of the specific widths shown for the cross-sectional elements. Below are descriptions for each element, the range of dimensions considered, and evaluations for each element considering the following:

- Operations/Safety

- Design Standards (City of Lacey standards<sup>2</sup> and/or AASHTO Greenbook guidance<sup>3</sup>)
- Cost/Right-of-Way Width
- Grant Funding Requirements
- Community Values

### **Median**

**Description:** The raised median is intended to provide access control through the corridor to manage the number of left turn movements and the associated number of conflict points between vehicles. More access control will benefit traffic operations (increasing the throughput of vehicles), and reduce collisions (by reducing conflicting movements). The width of the median is driven by two factors; (1) minimum area practical to provide for planting, and (2) compatibility with the width of left-turn lanes.

**Range of Dimensions:** The minimum width considered is six feet (edge of lane to edge of lane, which yields one foot of planting area after subtracting one foot of shy distance, six inches of curb, and one foot of maintenance strip on each side). The maximum width considered is 12 feet (similarly yields 7 feet of planting area). The minimum width of six feet is based on providing four feet of raised median width for pedestrian refuge (the minimum refuge width for wheelchairs<sup>4</sup>). The maximum width is based on the City of Lacey standard for median width.<sup>5</sup>

**Benefits/Drawbacks:** Each of the median widths control access, thereby improving operations and safety. There are no grant funding requirements tied specifically to median width. A narrow median reduces costs (less material) and right-of-way width. The wider median increases costs and right-of-way width, but eliminates the need for tapers at left-turn locations. The wider median also provides greater flexibility in the future for changes (i.e., more median breaks and/or left turn pockets) without additional widening to the outside. The narrow median does not provide sufficient width for planting. A minimum of three feet is needed for planting, which requires a median width of eight feet considering shy distance, curbs, and maintenance curbs. The wider median does provide space for planting, which promotes community values through improved aesthetics.

### **Left-Turn Lane and Through-Lanes**

**Description:** The left-turn lanes are provided at median breaks at key intersections for left-turn and u-turn access. These key intersections are stop-controlled for the side street. They are located between roundabouts.

The through-lanes provide throughput for the corridor and provide access to local destination within the study area.

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<sup>2</sup> City of Lacey, *Development Guidelines and Public Works Standards*, July 2005.

<sup>3</sup> American Association of State Highway Transportation Officials (AASHTO), *Policy on Geometric Design of Highways and Streets*, 5<sup>th</sup> Edition, 2004.

<sup>4</sup> AASHTO, *Policy on Geometric Design of Highways and Streets*, 5<sup>th</sup> Edition, 2004, Page 366.

<sup>5</sup> City of Lacey, *Development Guidelines and Public Works Standards*, July 2005, Street Design Arterial – DWG NO. 4-2.2.

**Range of Dimensions:** The minimum left-turn width considered is 10 feet based on AASHTO Greenbook guidance for an urban arterial.<sup>6</sup> The maximum left-turn width considered is 12 feet based on City of Lacey standards.<sup>7</sup>

The minimum through-lane width considered is 10 feet based on AASHTO Greenbook guidance for an urban arterial.<sup>8</sup> However, the guidance states 10 feet “may be used in highly restricted areas having little or no truck traffic.” The maximum width considered is 12 feet based on AASHTO Greenbook guidance for maximum through-lane width for an urban arterial.<sup>9</sup>

The lanes widths presume the use of a bike lane. Without a bike lane, the outside lane width should be increased to better accommodate turning vehicles. If the outside lane isn’t widened, it will require a larger curb return radius, which is counter to encouraging pedestrian users.

**Benefits/Drawbacks:** The narrow lane widths will slightly increase side-swipe collisions. Based on AASHTO Greenbook guidance, ten feet is appropriate for arterials with little to no truck traffic. There is sufficient truck volumes to exclude the use of 10-foot lanes since they provide no buffer between adjacent lanes for trucks (or buses) when considering their width from outside of mirror to outside of mirror. The narrow width does not meet minimum width for left-turn lanes and through-lanes per AASHTO Greenbook guidance (considering trucks)<sup>10</sup>, and it does not meet City of Lacey standards.<sup>11</sup> The narrow lane widths reduce cost and right-of-way width. All of the lane widths meet requirements for grant funding, since they meet AASHTO Greenbook guidance. The narrow lane widths may have a slight positive affect on community values since it will tend to reduce speeds and reduce street width at pedestrian crossings, making the corridor friendlier to non-motorized users.

### **Space for Bicyclists**

**Description:** Delineated space for bicyclists promotes non-motorized uses. It is expected that most bicyclists will be Type A users (advanced or experienced riders), as defined by the AASHTO, *Guide for the Development of Bicycle Facilities*.<sup>12</sup>

**Range of Dimensions:** The widths considered for bicyclists match the classes of bike lanes used by the City of Lacey.<sup>13</sup> A Class III is a non-striped lane created by widening the outside travel lane approximately three feet (i.e., lane width of 14 feet). A Class 2.5 is a three-foot striped bike route, an enhanced Class III bike route used by the City. A Class II is a five-foot striped bike lane. The Lacey Transportation Plan calls for a Class II bike lane on College Street.<sup>14</sup> Therefore, the minimum width

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<sup>6</sup> AASHTO, *Policy on Geometric Design of Highways and Streets*, 5<sup>th</sup> Edition, 2004, Page 473.

<sup>7</sup> City of Lacey, *Development Guidelines and Public Works Standards*, Street Design Arterial – DWG NO. 4-2.2.

<sup>8</sup> AASHTO, *Policy on Geometric Design of Highways and Streets*, 5<sup>th</sup> Edition, 2004, Page 472-473.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> City of Lacey, *Development Guidelines and Public Works Standards*, Street Design Arterial – DWG NO. 4-2.2.

<sup>12</sup> AASHTO, *Guide for the Development of Bicycle Facilities*, 1999, page 6.

<sup>13</sup> Ibid, at Bikeway Classes – DWG NO. 4-16.

<sup>14</sup> City of Lacey, *1998 Lacey Transportation Plan*, Figure 5.

considered is three feet and the maximum width considered is five feet. This range of widths also generally complies with AASHTO guidelines.<sup>15</sup>

**Benefits/Drawbacks:** Because bicycles will be closer to cars, the narrow width may slightly reduce throughput by decreasing speeds in the outside lane, and may slightly increase side-swipe collisions (between cars, and between cars and bicycles). However, data suggests the difference in operations and safety may not be distinguishable.<sup>16</sup> Most vehicle/bicycle collisions are related to maneuvers at intersections.<sup>17</sup> The narrow width meets City of Lacey standards and AASHTO Greenbook guidance. The narrow width will reduce costs and right-of-way width. The narrow width does not meet the 5-foot minimum requirement for bike route points (2 points maximum) for UAP grant funding from TIB.<sup>18</sup> The bike route points fall under the Sustainability criteria (15 points maximum). There are 100 points maximum on the UAP grant application, so bike route points are only two percent of the available points. The narrow width still meets requirements for federal funding and other state grants since it meets AASHTO Greenbook and AASHTO guidance. The wider lane may be slightly better at promoting community values associated with non-motorized uses.

### ***Tree Wells/Planter Strips and Sidewalks***

**Description:** The tree wells (or planter strips) provide plantings to improve the corridor aesthetic and provide a buffer between the travel lanes and pedestrians, which dramatically increases comfort for pedestrians.

The sidewalks promote non-motorized uses in the corridor.

**Range of Dimensions:** The width of a tree well for the City of Lacey is four feet with an offset from back of curb for constructability.<sup>19</sup> We did not consider other tree well widths since the City uses a standard grate size so parts are interchangeable, improving maintenance efficiency. Coupled with the tree well, we used a total sidewalk width of 10 feet, providing five feet of clearance at the tree wells.

We did consider a planter strip instead of the tree well. We considered a planter strip width of 6.5 feet per City of Lacey standards.<sup>20</sup> Coupled with the planter strip, we considered a sidewalk width of eight feet per City of Lacey standards.<sup>21</sup> This yields a total width of 14.5 feet compared to a sidewalk width of 10.5 feet.

**Benefits/Drawbacks:** Neither of the combinations (tree well/sidewalk and planter strip/sidewalk) has a distinguishable affect on operations or safety. Both the tree well width and the planter strip width meet AASHTO Greenbook guidance. The tree well is based on a City of Lacey standard width; however, the

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<sup>15</sup> AASHTO, *Guide for the Development of Bicycle Facilities*, 1999, pages 16-17.

<sup>16</sup> Federal Highway Administration (FHWA), *Bicycle Lanes Versus Wide Curb Lanes: Operational and Safety Finding and Countermeasure Recommendations*, October 1999, page 23.

<sup>17</sup> Michael Amsden and Thomas Huber, *Bicycle Crash Analysis Using Crash Typing Tools and Geographic Information Systems*, (Wisconsin DOT Final Report No. 0092-05-18, June 2006), page 19.

<sup>18</sup> Transportation Improvement Board, <http://www.tib.wa.gov/Sustainability/NewCriteria.htm>.

<sup>19</sup> City of Lacey, *Development Guidelines and Public Works Standards*, Tree Well and Grate – DWG NO. 4-30.

<sup>20</sup> Ibid, at Street Design Arterial – DWG NO. 4-2.2.

<sup>21</sup> Ibid.

standard for an arterial calls for a planter strip and sidewalk. The tree well/sidewalk width is narrower, so it reduces costs and right-of-way width. Both combinations meet grant funding requirements. The planter strip/sidewalk combination better promotes community values by providing more space for non-motorized uses and increasing the amount of planting.

### **Alternative Combinations Considered**

Based on the range of dimensions for the cross-sectional elements described above, we developed the following alternatives (see Table 1 for specific dimensions).

#### **Option 9**

**Description:** This alternative matches exactly Option 9 from the previous study report<sup>22</sup> (see Figure 3 above).

**Benefits/Drawbacks:** The biggest benefit of this alternative is the minimal right-of-way width (72 feet to 76 feet). The biggest drawback is the use of 10-foot lanes, since they provide no buffer for trucks and/or buses considering width from outside of mirror to outside of mirror. This excludes this alternative as operationally impractical.

This alternative has operational deficiencies and may adversely impact safety and capacity in the corridor. The narrow lanes will increase side-swipe collisions. The 10-foot lane widths are less than City of Lacey standards, and the 3-foot bike routes preclude bike route points (2 points maximum) under UAP grant funding from TIB. The alternative provides the minimum right-of-way width and cost of the four alternatives considered. Narrower lanes at pedestrian crossings will help promote non-motorized uses.

#### **NHS/TIB Standards**

**Description:** This alternative takes the standard width for each cross-sectional element as dictated by the AASHTO Greenbook (a 12-foot lane width is used as the “desirable” lane width<sup>23</sup>) and TIB policy (5-foot bike lanes).

**Benefits/Drawbacks:** This alternative does not have a clear biggest benefit. The biggest drawback is the extra right-of-way width due to the 12-foot lanes.

This alternative will tend to increase speeds, which will slightly increase throughput and may increase overall collision and/or increase collision severity. The consistent median width eliminates changes in direction caused by the narrow median from Option 9. Each of the elements meets AASHTO Greenbook guidance and TIB standards, making it eligible for all grants. It creates the maximum right-of-way width and cost of the four alternatives considered. The medians, tree wells, and wide sidewalks promote community values, but the wider lanes create a less inviting environment for non-motorized users.

#### **City of Lacey Standards**

**Description:** This alternative takes the standard width for each cross-sectional element as dictated by City of Lacey standards, including use of a planter strip.<sup>24</sup>

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<sup>22</sup> CH2M Hill for the City of Lacey, “College Street, Evaluation of Options”, August 2005

<sup>23</sup> AASHTO, *Policy on Geometric Design of Highways and Streets*, 5<sup>th</sup> Edition, 2004, Page 472.

<sup>24</sup> City of Lacey, *Development Guidelines and Public Works Standards*, Street Design Arterial – DWG NO. 4-2.2.

**Benefits/Drawbacks:** The biggest benefit of this alternative is the added non-motorized amenities created by the planter strip. Conversely, the biggest drawback is the extra right-of-way width due to the planter strip.

This alternative provides a reasonable balance between operational/safety goals and community value goals. It exactly matches City of Lacey standards. It also meets AASHTO Greenbook guidance and TIB standards, making it eligible for all grants. It is the most expensive of the four alternatives with the widest right-of-way (95 feet). The median, planter strip, and wide sidewalk promote community values.

**Recommended**

**Description:** This alternative uses 11-foot lanes as a practical minimum width (since the 10-foot lanes provide no buffer for trucks and/or buses considering width from outside of mirror to outside of mirror). It provides 14-foot outside lanes to provide space for bicyclists. The lesser width decreases the impact to right-of-way width. The planted median is a consistent 11 feet, but a reduced median width could still be considered at spot locations along the corridor.

**Benefits/Drawbacks:** The biggest benefit of this alternative is the minimal right-of-way width (the least right-of-way, excluding Option 9 since 10-foot lanes are operationally impractical). The drawback is the lesser space for bicyclists.

Similar to the “Lacey Standards” alternative, this alternative provides a reasonable balance between operational/safety goals and community value goals. The alternative meets AASHTO Greenbook guidance and City of Lacey standards (except for median width). It does not include a planter strip, but tree wells and wide sidewalks promote community values. It is eligible for all grants, except TIB grant funding as stated above.

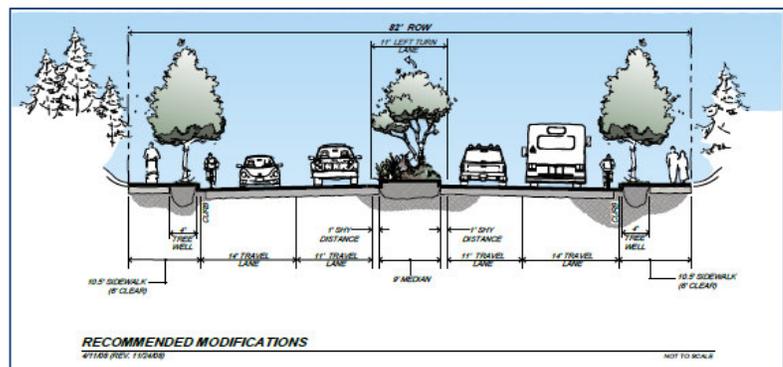


Figure 4 – Recommended Alternative

**Table 1**  
**Alternative Combinations Considered**

Alternative	Median	Lanes	Space for Bikes	Planter	Tree Well	Sidewalk	Total R/W
Option 9	6'-10' <sup>1</sup>	10'	3'	N/A	Yes	10'	72'-76'
NHS/TIB Stds.	12'	12'	5'	N/A	Yes	10.5'	91'
Lacey Stds.	12'	11'	5'	6.5	No	8'	95'
Recommended	11'	11'	3'	N/A	Yes	10.5'	82'

1. The median tapers to 10 feet at left turn locations.

**Recommendation**

We qualitatively scored each of the alternatives against the following criteria; operations and safety, adherence to standards, right-of-way width and cost, eligibility for grant funding, and community values. The scoring is shown below in Table 2.

**Table 2**  
**Scoring of Alternatives Considered<sup>1</sup>**

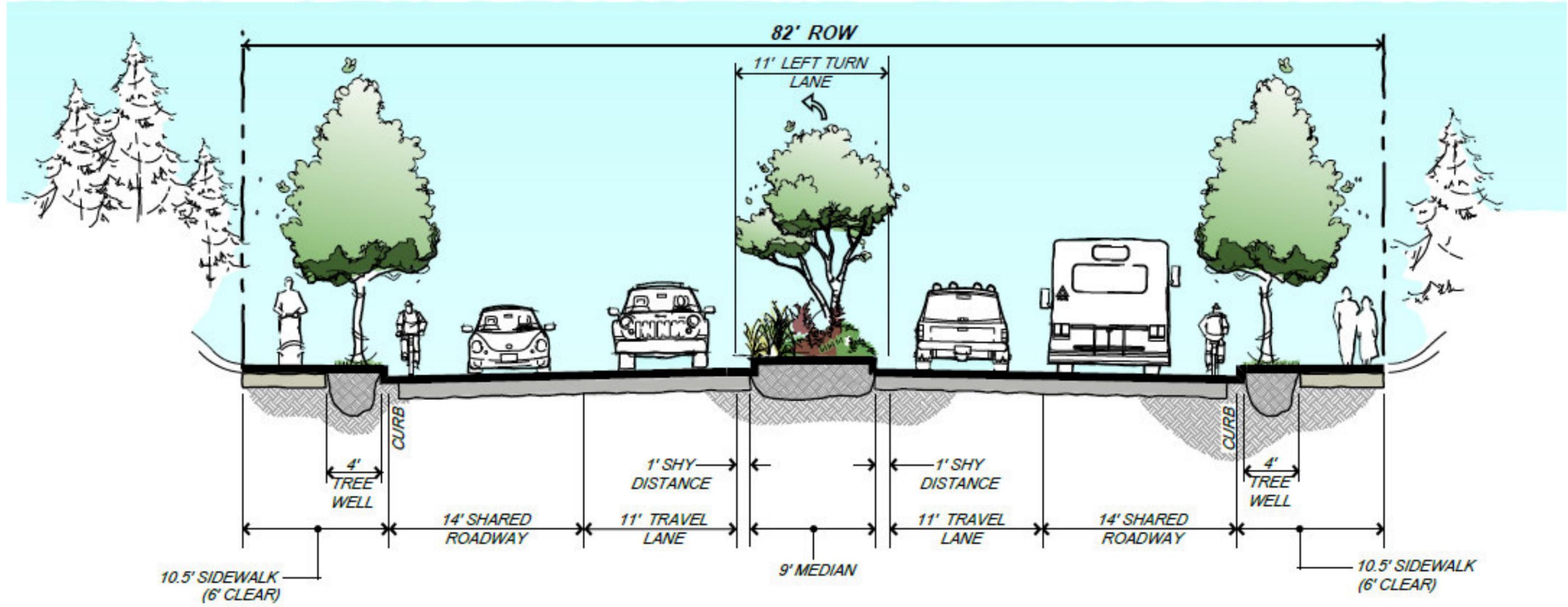
<b>Alternative</b>	<b>Operations/ Safety</b>	<b>Standards</b>	<b>R/W Width and Cost</b>	<b>Grant Funding</b>	<b>Community Values</b>	<b>Total Score</b>
Option 9	2	2	4	3	3	14
NHS/TIB Stds.	4	4	2	4	2	16
Lacey Stds.	3	4	1	4	2	14
Recommended	3	4	3	3	3	16

1. Alternatives are scored from 1 (lowest) to 4 (highest) in each criterion.

Although the “NHS/TIB Standards” alternative scores equally well with the “Recommended” alternative, the “Recommended” alternative is preferred because of the lesser right-of-way width. The “Recommended” alternative is shown above in Figure 4.

## **Attachments**

1. Recommended Alternative
2. Option 9 Alternative



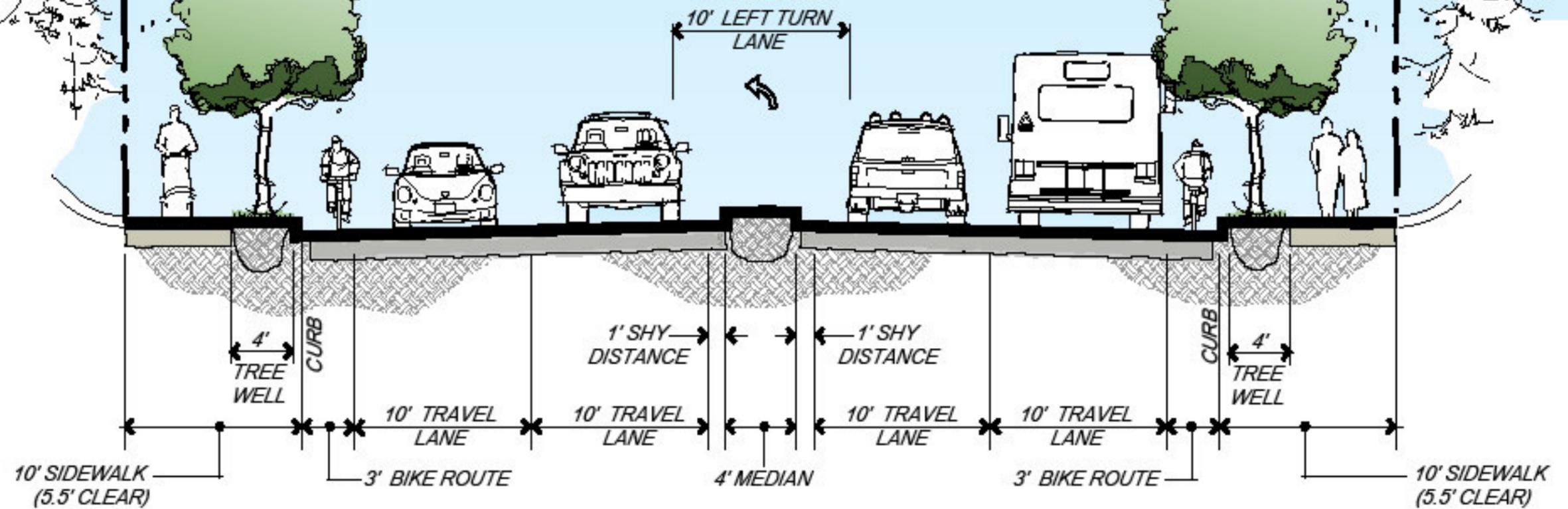
**RECOMMENDED MODIFICATIONS**

4/11/08 (REV. 11/17/08)

NOT TO SCALE

76' ROW AT LEFT TURN LANE

72' ROW AT MEDIANS



**ORIGINAL OPTION #9**

4/11/08

NOT TO SCALE

# Appendix B

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**TECHNICAL MEMORANDUM**

**Date:** July 29, 2008 Rev. 4/17/09

**RE:** **Horizontal Alignment and Right of Way Limits**

**To:** Martin Hoppe, P.E., PTOE

**From:** Scott Sawyer, P.E. and Mike Johnson

**Company:** City of Lacey

**Title:** Sr. Project Manager

**Phone:** 360.438.2681

**Phone:** 360.918.5305

**Fax:** 360.456.7799

**Fax:** 360.754.1195

**Address:** 420 College Street SE

Lacey, WA 98509-3400

**Project #:** 34709

**Project Name:** College Street Improvement Report

**Purpose**

The purpose of this technical memorandum is to present a recommended horizontal alignment for College Street from 37<sup>th</sup> Avenue SE to Lacey Boulevard. The recommendation is based on a cost evaluation of pavement construction (Crown/Cross-Slope Analysis) and right-of-way impacts (Right-of-Way Analysis).

**Summary**

We evaluated alternative horizontal alignments by determining cost estimates for pavement reconstruction and right-of-way acquisition. The cost differences between alternative alignments are significantly higher for right-of-way acquisition than pavement reconstruction. Therefore, the recommended horizontal alignment is based solely on minimizing right-of-way acquisition costs. We compared costs for three horizontal alignments - centered on existing right-of-way; aligned against the westerly right-of-way; and aligned against the easterly right-of-way. To further refine our comparison, we broke the corridor into four segments. The segment limits

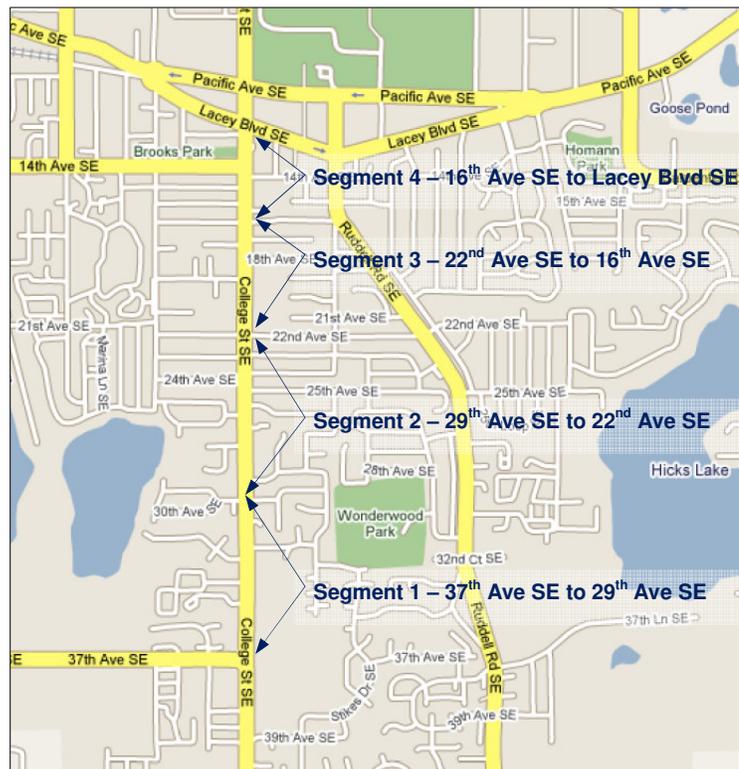


Figure 1 – Segment Map

correspond to the location of the proposed roundabout locations at 29<sup>th</sup> Avenue SE, 22<sup>nd</sup> Avenue SE, and 16<sup>th</sup> Avenue SE (see Figure 1). Breaking the segments at the roundabout locations allows for transitions between alternative alignments. Therefore, we are not limited to one alignment for the entire corridor.

The estimated costs for right-of-way acquisition for the three horizontal alignments are shown in Table 1. The numbers of full parcel acquisitions are shown in Table 2. Note, these numbers exclude impacts from the three roundabouts, since the impacts from roundabouts are mostly independent of the alternative alignments.

**Table 1**  
**Estimated Right-of-Way Acquisition Costs (Excluding Roundabout Impacts)**

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1	\$1,157,827	\$3,046,962	<b>\$864,618</b>
2	\$4,942,902	<b>\$1,934,930</b>	\$7,324,351
3	\$2,417,583	\$1,665,844	<b>\$1,292,543</b>
4	\$3,687,493	<b>\$2,568,042<sup>1</sup></b>	\$3,570,840

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 2**  
**Full Parcel Acquisitions for Structures and/or Driveways Impacted (Excluding Roundabout Impacts)**

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1	2	8	<b>1</b>
2	14	<b>5</b>	22
3	7	5	<b>3</b>
4	11	<b>6<sup>1</sup></b>	11

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

We recommend the following horizontal alignments by segment to minimize right-of-way acquisition costs. These alignments are shown in **bold** in Tables 1 and 2.

- Segment 1 - Aligned against the easterly right-of-way line;
- Segment 2 - Aligned against the westerly right-of-way line;
- Segment 3 - Aligned against the easterly right-of-way line; and
- Segment 4 - Aligned against the westerly right-of-way line.

The total cost and the total number of full parcel acquisitions for the recommended alignment are shown in Tables 3 and 4, respectively. These numbers do include impacts for the three roundabouts. Therefore, the totals in Tables 3 and 4 differ from the totals from Tables 1 and 2.

**Table 3**  
**Estimated Right-of-Way Acquisition Costs – Recommended Alignment (Including Roundabouts)**

Segment	Estimated R/W Costs
1	\$1.50 M
2	\$3.04 M
3	\$1.91 M
4	\$3.14 M <sup>1</sup>
<b>TOTAL</b>	<b>\$9.59 M<sup>1</sup></b>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 4**

**Full Parcel Acquisitions for Structures and/or Driveways Impacted – Recommended Alignment (Including Roundabouts)**

Segment	Number of Full Parcel Acquisitions
1	3
2	8
3	5
4	7 <sup>1</sup>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

The total right-of-way costs shown in Table 3 are preliminary and they are represented in 2008 dollars. We recommend \$13.0 M as a reasonable planning level estimate at this stage of project development.

## Background

### Existing Conditions

College Street from Lacey Boulevard to 37<sup>th</sup> Avenue SE is a four-lane National Highway System (NHS) principal arterial with a general right-of-way width of 60 feet. The existing street width is approximately 45 feet from curb to curb. There are narrow sidewalks located along the corridor on each side of the street. The corridor is a built environment fronted by homes, small businesses, apartments, and schools.

College Street provides a primary north-south link for traffic, transit, pedestrians, and bicyclists within the City from south Thurston County to Interstate 5. The corridor currently carries 21,000 (2005 traffic count) and is projected to carry 32,000 vehicles per day by 2020 according to the Lacey Transportation Plan (College Street is identified as a Strategy Corridor in the Lacey Transportation Plan<sup>1</sup>). The corridor also provides local access to many homes fronting the street and provides access to several local streets and collectors.

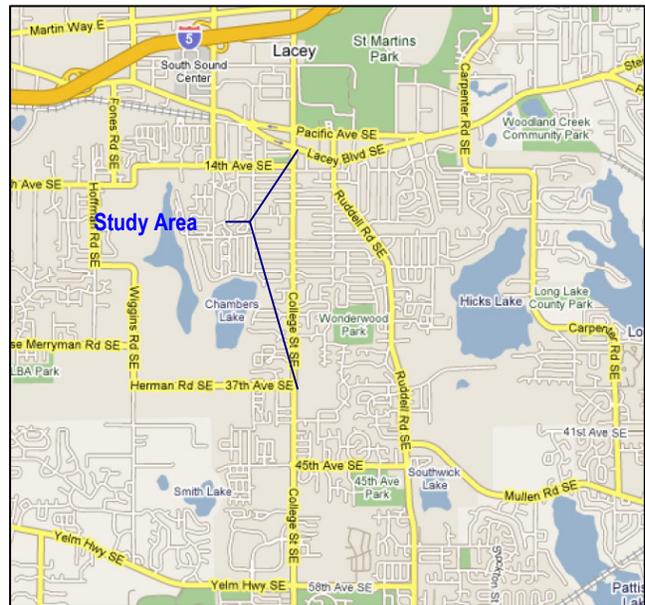


Figure 2 - Vicinity Map

Traffic is heavy along the corridor and congested during peak hours. Vehicles turning left from College Street to homes or local streets increase congestion by occupying the inside through-lane while waiting for breaks in traffic. There are approximately 130 driveways, 24 T-intersections, and four 4-way intersection collectively generating significant turn volumes. There are high-frequency collision locations along the corridor due to conflicts between turning vehicles and high volumes of through traffic. Narrow sidewalks, high volumes, and a lack of bike lanes discourage use by pedestrians and bicyclists. A lack of street amenities (i.e., planter strips/vegetation, decorative street lighting, street furniture) conflicts with community values articulated by City staff and City Council.

<sup>1</sup> City of Lacey, 2004 Lacey Transportation Plan, page 55.

## Previous Work

Previous study work resulted in a report, “College Street, Evaluation of Options”, August 2005. This report documented a comprehensive alternatives analysis that scored and ranked ten options (nine build and one no-build) for improvements to College Street that addressed the corridor needs. The report recommended Option 9 as the preferred option, because it best provides a blend of corridor capacity, neighborhood connectivity, non-motorized uses, and corridor aesthetics. The cross-section included a planted center median to control access and provide space for left-turn lanes at key intersections; wide sidewalks with tree wells to promote walk-ability; space for commuting bicycles; and roundabouts at major intersections to provide intersection control. The overall right-of-way width of 72 feet widens to 76 feet at left-turn lane locations.

The current study work began in February 2008 and consists of the following tasks:

- *Alternatives Analysis* to define the recommended dimensions of the cross-sectional elements;
- *Horizontal Alignment and Right-of-Way* to define the recommended alignment;
- *Neighborhood Circulation and Access* to define recommended changes to street access and/or driveway access; and
- *Improvements Phasing Plan* to estimate project costs and define recommended phasing for the improvements.

WHPacific prepared an Alternatives Analysis technical memorandum, dated April 11, 2008. The memorandum presented ranges of dimensions for roadway cross-sectional elements (median width, left-turn lane width, through-lane width, space for bicyclists, planter/tree well width, and sidewalk width), and recommended a proposed cross-section for College Street for use in subsequent study work, including the *Horizontal Alignment and Right-of-Way* work presented herein. The recommended cross-section is shown in Figure 3.

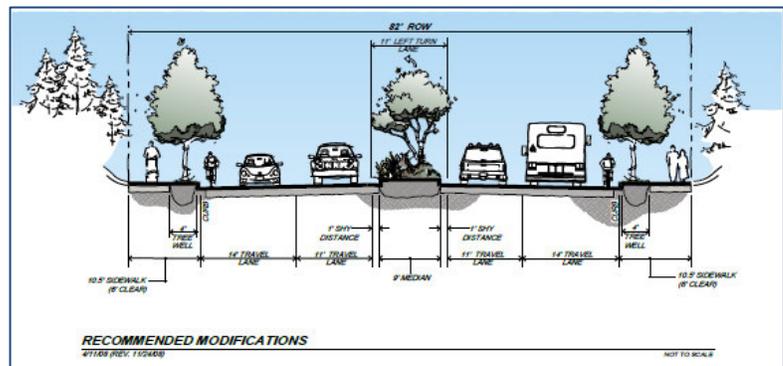


Figure 3 – Recommended Alternative

## Crown/Cross Slope Analysis

### Approach

#### Available Data

The City of Lacey provided survey data from February 2004 used for an overlay project in 2006. The data contains curbs, crowns, utilities, storm drainage, topography behind curb at intersections, right-of-way centerlines, right-of-way lines, parcel limits, and elevation information to create a TIN file. After discussions with the City of Lacey regarding changes to elevation data due to the 2006 overlay work, we determined a uniform upward adjustment to pavement elevations (2 inches) is adequate to create elevation data for this study work. The survey data limits generally extend from curb to curb, begin approximately 900 feet south of 29<sup>th</sup> Avenue SE, and end approximately at 13<sup>th</sup> Avenue Ct. SE. We used the survey data to create cross-sections every 50 feet. The cross-sections show the existing roadway has three distinct cross-section conditions, (1) one-side of the road is steeper than the other (asymmetrical crown); (2) normal crown with cross-slopes approximating 2-percent (normal symmetrical crown); and (3) normal crown with steep cross-slopes (steep symmetrical crown). These conditions change through the corridor as shown in Figure 4.

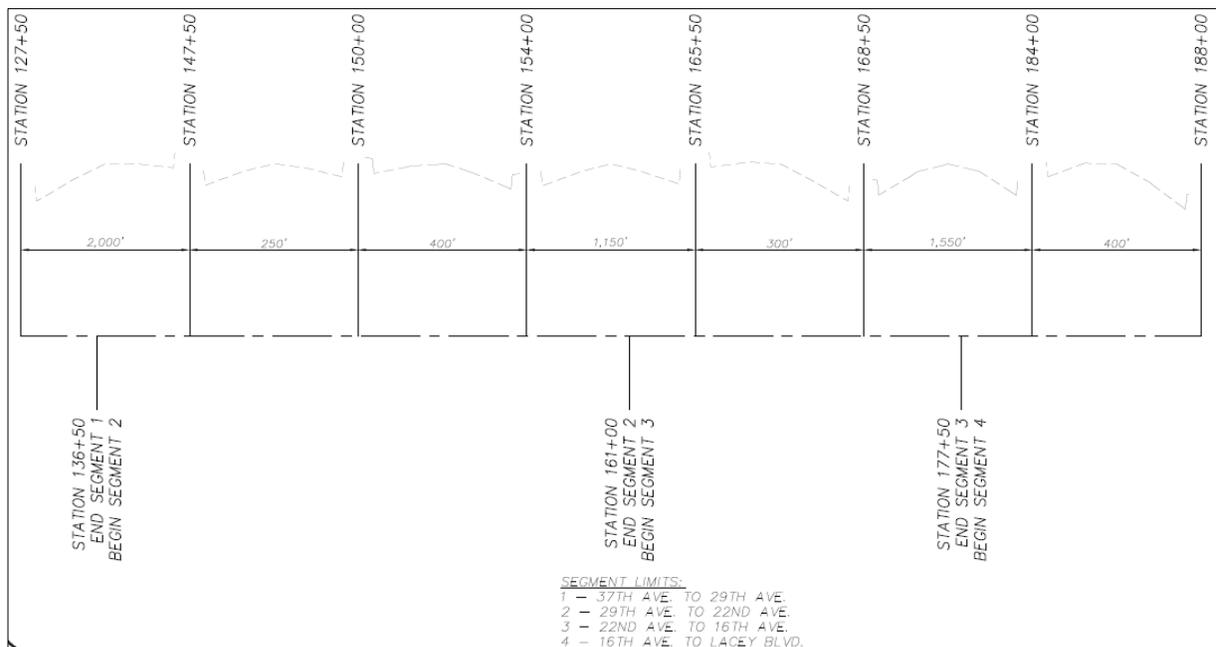


Figure 4 – Existing Cross-Slope Variation

### Assumptions

After reviewing the cross-sections, we used two conditions (asymmetrical crown and normal symmetrical crown) to evaluate pavement costs. We limited the evaluation of costs from proposed curb to curb (61 feet). Therefore, we did not consider grading behind the curbs. Other key assumptions include:

- Grinding is not required;
- Existing pavement will be overlaid with a 2-inch HMA wearing course;
- The new roadway is crowned with 2-percent cross-slopes;
- HMA will be used for all fill to flatten steep cross-slopes; and
- The new pavement section for widening is 4-inch of HMA over 12-inches of crushed rock.

## Findings

### Alternatives

The purpose of the Crown/Cross-Slope Analysis is to evaluate differences in pavement construction costs based on alternative crown locations. We considered three horizontal alignments;

- Aligned on the right-of-way centerline;
- Aligned against the westerly right-of-way line; and
- Aligned against the easterly right-of-way line.

Using the two representative cross-slope conditions, we generated quantities and cost estimates for the three alignment alternatives. We broke the corridor into four segments (see Figure 5). The segment limits correspond to the location of the proposed roundabout locations at 29<sup>th</sup> Avenue SE, 22<sup>nd</sup> Avenue SE and 16<sup>th</sup> Avenue SE. Breaking the segments at the roundabout locations allows for transitions between alternative alignments. Therefore, we are not limited to one alignment for the entire corridor.

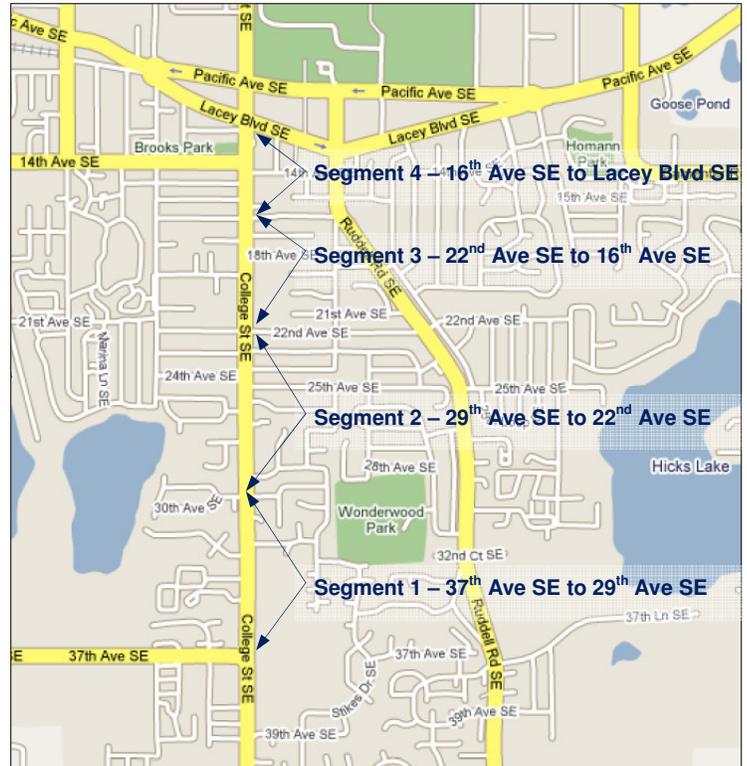


Figure 5 – Segment Map

The differences in pavement costs are shown below in Table 5. The least cost alignment is shown as \$0 for each segment since we are interested only in the cost differences. The costs shown do not represent full pavement cost estimates. The costs shown in Table 5 indicate there are no significant differences in costs between the alignment alternatives.

**Table 5**  
**Alternative Analysis Comparison**

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1 <sup>1</sup>	\$25,020	\$0	\$27,090
2	\$18,070	\$0	\$26,075
3	\$0	\$17,160	\$5,295
4 <sup>1</sup>	\$0	\$8,850	\$2,445

1. The cost differences for these segments are based on the limits of available survey data, not the actual segment length.

## Right-of-Way Analysis

### Approach

#### **Available Data**

The City of Lacey provided Geographical Information System (GIS) information, planimetrics for the corridor, survey data, and aerial photography. The GIS data provided comes from the Thurston County Assessor's Office (February 2008) and contains land values, building values, total values, lot size, property owner, site address, and property owner's address. The planimetric files (1998) contain buildings, driveways, roadway, fences, and other features above ground. The survey data (February 2004) contains curbs, crowns, utilities, storm drainage, topography behind curb at intersections, right-of-way centerlines, right-of-way lines, parcel limits, and elevation information. The aerial photography was flown in 2006.

#### **Assumptions**

For estimating the cost of right-of-way acquisitions we used assessed values from the GIS data. We increased the assessed values by a factor of 1.4 to estimate market values. We used land values for strip acquisitions, and we used total values for full parcel acquisitions. We also included administrative costs based on averages provided by the City of Lacey<sup>2</sup> and WSDOT Real Estate Services<sup>3</sup> as shown in Table 6. All right-of-way costs (acquisition and administrative) are estimated in 2008 dollars.

We assumed a full parcel acquisition if either of the following conditions is met:

- The proposed right-of-way reduces the driveway length to less than 20 feet, the minimum driveway length per City of Lacey guidelines<sup>4</sup>. We used aerial photography, planimetric data, and project photos to locate and verify driveways.
- The proposed right-of-way line encroaches within two feet of a structure. We used aerial photography, planimetric data, and project photos to locate structures.

For full parcel acquisitions, we did not offset the acquisitions cost by potential re-sale value of a remnant parcel.

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<sup>2</sup> Miller, Angelea, *e-mail* (College Street Right-of-Way Costs), March 2008.

<sup>3</sup> Lovgren, Paul, *phone conversation*, March 2008.

<sup>4</sup> City of Lacey, *Development Guidelines and Public Works Standards*, July 2005, page 4-45.

**Table 6**  
**Right-of-Way Administrative Costs**

Description	Cost
Negotiation costs (right-of-way costs ≤ \$25k)	\$4,500 per parcel
Negotiation costs (right-of-way costs > \$25k)	\$6,750 per parcel
Title and escrow costs (right-of-way costs ≤ \$25k)	\$1,100 per parcel
Title and escrow costs (right-of-way costs > \$25k)	\$1,650 per parcel
Appraisal costs (only for right-of-way costs > \$25k)	\$5,500 per parcel
Appraisal review costs (only for right-of-way costs > \$25k)	\$1,000 per parcel
Statutory evaluation allowance (all right-of-way purchases)	\$750 per parcel
Relocation services (full take from a rental home or commercial) <sup>1</sup>	\$80,000 per parcel
Relocation services (full take from a single family home owner)	\$30,000 per parcel

1. We assumed a property is a rental property if the owner's address is different than site address.

## Findings

### Alternatives

The purpose of the Right-of-Way Analysis is to evaluate differences in acquisitions costs based on alternative horizontal alignments. We considered three horizontal alignments:

- Aligned on the right-of-way centerline;
- Aligned against the westerly right-of-way line; and
- Aligned against the easterly right-of-way line.

We laid the proposed cross-section (82 feet) against the existing right-of-way and the GIS parcel data to generate right-of-way acquisition costs for the three alternative alignments. We broke the results into the same four segments used in the Crown/Cross-Slope Analysis. We found significant differences in costs for the alternative alignments as shown in Table 7 below. Full parcel acquisitions are shown in Table 8. The right-of-way acquisition costs for Segment 4, Aligned Against the Westerly Right-of-Way are based on the assumption full acquisition is not required at the apartment buildings at 1510 College Street SE. The proposed right-of-way line does encroach on the existing buildings, but it is assumed the buildings may be remodeled to remove end units to avoid full acquisition. The estimated cost shown includes \$800K as costs to cure for impacts to the existing buildings.

**Table 7**  
**Estimated Right-of-Way Acquisition Costs**

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1	\$1,157,827	\$3,046,962	<b>\$864,618</b>
2	\$4,942,902	<b>\$1,934,930</b>	\$7,324,351
3	\$2,417,583	\$1,665,844	<b>\$1,292,543</b>
4	\$3,687,493	<b>\$2,868,042<sup>1</sup></b>	\$3,570,840

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 8**  
**Full Parcel Acquisitions for Structures and/or Driveways Impacted**

Segment	Aligned on the Centerline	Aligned Against the Westerly Right-of-Way	Aligned Against the Easterly Right-of-Way
1	2	8	1
2	14	5	22
3	7	5	3
4	11	6 <sup>1</sup>	11

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

## Recommendation

Based on the significant cost differences for right-of-way acquisition costs, we recommend the following horizontal alignments by segment. Figure 6 graphically depicts the horizontal alignment by segment:

- Segment 1 - Aligned against the easterly right-of-way line;
- Segment 2 - Aligned against the westerly right-of-way line;
- Segment 3 - Aligned against the easterly right-of-way line; and
- Segment 4 - Aligned against the westerly right-of-way line.

The total cost and the total number of full parcel acquisitions for the recommended alignment are shown in Tables 9 and 10, respectively. These numbers do include impacts for the three roundabouts. Therefore, the totals in Tables 3 and 4 differ from the totals from Tables 1 and 2.



Figure 6 – Horizontal Alignment by Segment

**Table 9**  
**Estimated Right-of-Way Acquisition Costs – Recommended Alignment (Including Roundabouts)**

Segment	Estimated R/W Costs
1	\$1.50 M
2	\$3.04 M
3	\$1.91 M
4	\$3.14 M <sup>1</sup>
<b>TOTAL</b>	<b>\$9.59 M<sup>1</sup></b>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

**Table 10**  
**Full Parcel Acquisitions for Structures and/or Driveways Impacted – Recommended Alignment (Including Roundabouts)**

Segment	Number of Full Parcel Acquisitions
1	3
2	8
3	5
4	7 <sup>1</sup>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE.

Table 11 shows strip acquisitions and full parcel acquisitions by segment. Table 11 also shows potential ways to avoid some of the full parcel acquisitions (i.e., reduce the median width, reduce the sidewalk width and remove tree wells, and/or shift the horizontal alignment. For a shift in the horizontal alignment there will be an increase in the parcels impacted and a corresponding increase in administrative costs. The full parcel acquisitions due to the three roundabouts are shown in Table 11, but the square footages for strip acquisitions shown in Table 11 do not include acquisition for roundabouts as shown on the Right-of-Way Analysis Maps, Attachment A, since the roundabout layouts are very conceptual.

## **Attachments**

**Attachment A – Right-of-Way Analysis Maps – Acquisition Summary**  
**Attachment B – Right-of-Way Analysis Maps – Aerial Photography**

**Table 11**  
**Strip and Full Parcel Acquisitions by Segment**

**Segment 1 – 37<sup>th</sup> to 29<sup>th</sup> (Aligned Against the Easterly Right-of-Way Line) - Strip Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Right-of-Way Required (SQFT)	Remaining Parcel (SQFT)
11829130502	3023 College Street SE	8,979	1,904	7,075
62810004400	3029 College Street SE	16,734	2,503	14,231
62810004300	3035 College Street SE	12,960	2,066	10,894
62810004200	3041 College Street SE	15,166	2,114	13,052
11829410400	3201 College Street SE	41,563	2,863	38,700
11829410103	3301 College Street SE	387,746	4,462	383,284
11829410900	3307 College Street SE	261,512	3,042	258,470
11829410702	3407 College Street SE	20,787	1,429	19,358
11829410701	3409 College Street SE	20,758	1,430	19,328
11829410300	3413- 3507 College St SE	28,751	5,127	23,624
11829410301	3511 College St	18,002	3,207	14,795
11829410101		17,995	3,203	14,792
58090006700	4513 SE 29th Ct	10,693	2,797	7,896
58090006800	4515 SE 29th Ct	8,174	1,746	6,428
58090006900	4517 SE 29th Ct	9,883	1,748	8,135
11829130800	4520 32ND Lane SE	10,282	312	9,970
62810000100	4529 Montclair Drive SE <sup>1</sup>	11,634	2,598	9,036
62810004100	4530 Montclair Drive SE	11,951	2,662	9,289

1. A shed is impacted.

**Segment 1 - 37<sup>th</sup> to 29<sup>th</sup> (Aligned Against the Easterly Right-of-Way Line) – Full Parcel Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Structure/ Roundabout Impact	Driveway Impact	Remaining Driveway Depth (FT)	Potential Mitigation*
58090006900	4517 29th Court SE	9,883	R			N/A
33750001000	4605 Bel Air Drive SE	8,986	R			N/A
11829410102	3515 College Street SE	17,974		D	10'	1

\*Potential Mitigation Options:

1. Construct College St aligned on the centerline to the north side of parcel then transition to the west. This will align with existing conditions at the intersection of 37<sup>th</sup> Ave. SE.

**Table 11**  
**Strip and Full Parcel Acquisitions by Segment**

**Segment 2 - 29<sup>th</sup> to 22<sup>nd</sup> (Aligned Against the Westerly Right-of-Way Line) - Strip Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Right-of-Way Required (SQFT)	Remaining Parcel (SQFT)
11821330100	2406 College Street SE	37,992	4,438	33,554
84850000100	2602 College Street SE	21,162	3,439	17,723
84850000101	2606 College Street SE	15,512	2,523	12,989
11828220400	2626 College Street SE	39,886	2,433	37,453
11828220500	2702 College Street SE	49,877	3,649	46,228
11828220600	2706 College Street SE	51,346	3,749	47,597
11828230202	2818 College Street SE	9,392	1,484	7,908
11828220703	4600 28th Ave SE	6,970	468	6,502
11828220704	4604 28th Ave SE	8,793	285	8,508
33750000100	4604 Bel Air Drive SE	9,511	2,208	7,303
58700002100	4705 SE 22nd Avenue	83,375	5,358	78,017
11828220205	4805 27th Lane SE	5,283	303	4,980

**Segment 2 - 29<sup>th</sup> to 22<sup>nd</sup> (Aligned Against the Westerly Right-of-Way Line) – Full Parcel Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Structure/ Roundabout Impact	Driveway Impact	Remaining Driveway Depth (FT)	Potential Mitigation*
84800002100	2502 College Street SE	13,047	S			1
84800002101	2506 College Street SE	9,496	S			1
11828230201	2822 College Street SE	9,407		D	8'	2
58090000100	4520 29th Avenue SE	11,214	R			N/A
62000000100	4525 22nd Avenue SE	11,965	R			N/A
43550000100	4602 SE 24th Avenue	10,201	S			3
58700002000	4603 SE 23rd Avenue	10,638	S			N/A
33750000100	4604 Bel Air Drive SE	9,511	R			N/A

\*Potential Mitigation Options:

1. Reduce both sidewalk and median width.
2. Move Roundabout entrance to the west and transition out to the east.
3. Reduce both sidewalk and median width. Curb return could possibly impact driveway even with this mitigation.

**Table 11**  
**Strip and Full Parcel Acquisitions by Segment**

**Segment 3 – 22<sup>nd</sup> to 16<sup>th</sup> (Aligned Against the Easterly Right-of-Way Line) - Strip Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Right-of-Way Required (SQFT)	Remaining Parcel (SQFT)
59100001600	1605 College Street SE	10,670	1,486	9,184
59100001500	1613 College Street SE	10,656	1,485	9,171
11820413202	1915 College Street SE	11,462	1,981	9,481
11820440100	2109 College Street SE	133,096	990	132,106
11820440200	2121 College Street SE	14,864	2,959	11,905
59100000101	4533 17th Avenue SE	5,710	1,561	4,149
11820410700	4550 19th Avenue SE	39,956	6,569	33,387
11820413201	4553 19th Avenue SE	10,831	1,848	8,983

**Segment 3 – 22<sup>nd</sup> to 16<sup>th</sup> (Aligned Against the Easterly Right-of-Way Line) – Full Parcel Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Structure/ Roundabout Impact	Driveway Impact	Remaining Driveway Depth (FT)	Potential Mitigation*
71400000100	1601 College Street SE	10,639	S & R			N/A
59100000100	1705 College Street SE	4,968	S & D			N/A
11820413200	1921 College Street SE	16,022	S			1
11820440200	2121 College Street SE	14,864	R			N/A
64720001200	4603 16th Avenue SE	7,998	R			N/A

\*Potential Mitigation Measures:

1. Reduce both sidewalk and median width

**Segment 4 – 16<sup>th</sup> to Lacey (Aligned Against the Westerly Right-of-Way Line) - Strip Acquisitions**

Parcel Number	Site Address	Existing Parcel (SQFT)	Right-of-Way Required (SQFT)	Remaining Parcel (SQFT)
79800000400	1324-1326 College St SE	11,712	1,650	10,062
74700001500	1418 College Street SE	12,095	1,811	10,284
11821231900	1510 College Street SE <sup>1</sup>	226,466	10,119	216,347

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE, assuming three building can be remodeled to remove six end units.

**Table 11**  
**Strip and Full Parcel Acquisitions by Segment**

**Segment 4 – 16<sup>th</sup> to Lacey (Aligned Against the Westerly Right-of-Way Line) – Full Parcel Acquisitions**

<b>Parcel Number</b>	<b>Site Address</b>	<b>Existing Parcel (SQFT)</b>	<b>Structure/ Roundabout Impact</b>	<b>Driveway Impact</b>	<b>Remaining Driveway Depth (FT)</b>	<b>Potential Mitigation*</b>
79800000100	1302 College Street SE	7,527		D	13'	N/A
79800000200	1308 College Street SE	7,431	S			N/A
79800000300	1320 College Street SE	7,527	S			N/A
11821231800	1328 College Street SE	9,359	S & D			N/A
71400001601	4524 SE 16th Avenue	5,516	R			N/A
74700000100	4602 SE 14th Avenue	12,237	S			1
74700001300	4603 SE 14th Avenue	10,662	S			N/A

\*Potential Mitigation Measures:

1. Reduce both sidewalk and median width. Curb return could possibly impact driveway even with this mitigation.

# Appendix C

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## TECHNICAL MEMORANDUM

Date: October 22, 2008 Rev 4/17/09

RE: Neighborhood Circulation and Access

To: Martin Hoppe, P.E., PTOE

From: Scott Sawyer, P.E.

Company: City of Lacey

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Address: 420 College Street SE

Project #: 034709

Lacey, WA 98509-3400

Project Name: College Street Improvement Report

### Purpose

The three purposes of this memorandum are to present the recommended improvements to College Street as a Strategy Corridor; present the recommendations for the College Street Neighborhood Circulation and Access Management Plan (NCAMP); and present results of traffic analyses to evaluate the performance of College Street with the recommended improvements.

### Summary

#### Strategic Corridor

The City of Lacey recognizes College Street as a Strategy Corridor. Strategy Corridors are major arterials in dense urban areas where traditional approaches to address congestion such as roadway widening are not practical or conflict with community values. Traditional performance measures, such as Level of Service, do not apply to Strategy Corridors because they would not allow increased densities in the urban core.

#### Neighborhood Circulation and Access Management Plan (NCAMP)

The NCAMP recommends a raised median to manage access. Access management is a tool to reduce traffic congestion and reduce traffic collisions. The intent of access management is to provide access for abutting properties while preserving the flow of traffic. The NCAMP also

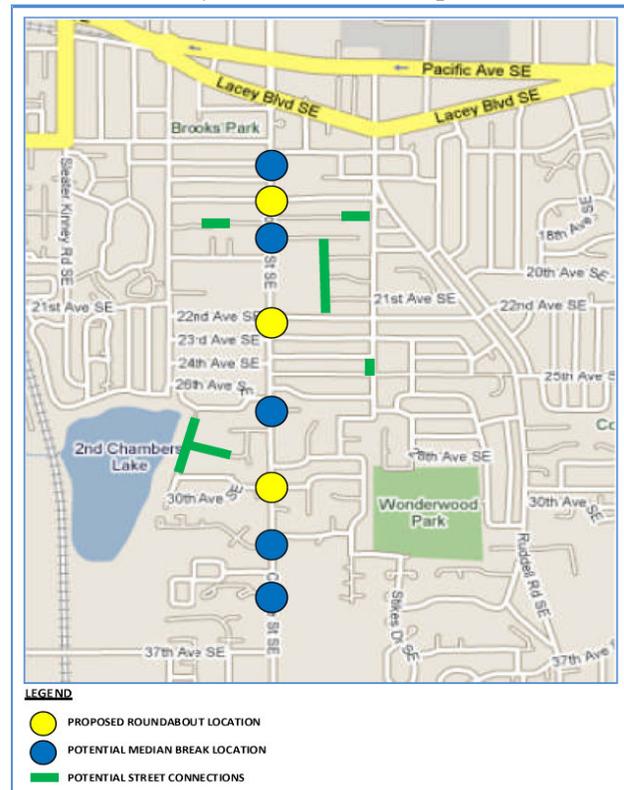


Figure 1 – Neighborhood Circulation Access and Management Plan

identifies measures recommended for College Street as a Strategy Corridor. The recommendations include identifying roundabout locations, median break locations (allowing for left turns), street grid connections to increase access to alternate routes, and driveways consolidations. Figure 1 shows the recommended roundabouts, median breaks, and street grid connections.

### **Traffic Analyses**

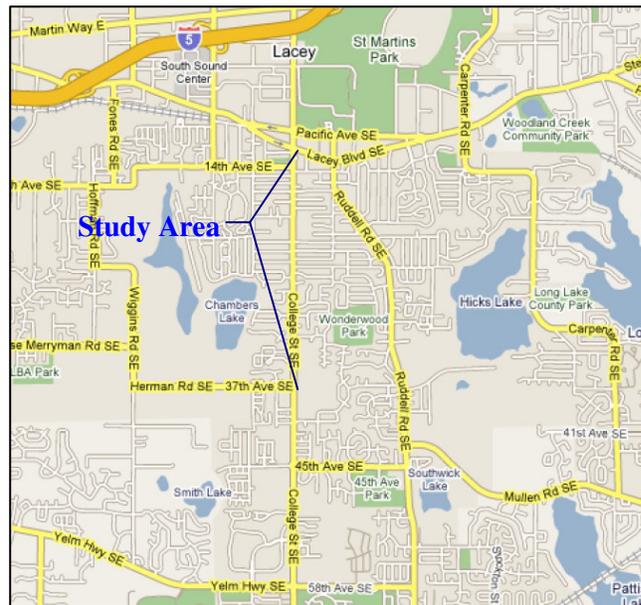
Traffic analysis was conducted to evaluate how the recommended improvements will impact traffic operations in 2030. The results show the recommended access control measures will not adversely affect neighborhoods, although left turn movements at some neighborhoods will be difficult in the PM peak hour. The roundabouts will operate well under expected future volumes on College Street.

## **Background**

### **Existing Conditions**

College Street is a four-lane National Highway System (NHS) principal arterial from Lacey Boulevard to 37<sup>th</sup> Avenue SE with a general right-of-way width of 60 feet. The existing street width is approximately 45 feet from curb to curb. There are narrow sidewalks located along the corridor on each side of the street. The corridor is a built-environment fronted by homes, small businesses, apartments, and schools.

College Street provides a primary north-south link for traffic, transit, pedestrians, and bicyclists within the City from south Thurston County to Interstate 5. The corridor currently carries 21,000 vehicles per day (2005 traffic count) and is projected to carry 32,000 by 2020 according to the Lacey Transportation Plan. The corridor also provides local access to several homes fronting the street and to several local streets and collectors.



**Figure 2 - Vicinity Map**

Traffic is heavy along the corridor and congested during peak hours. Vehicles turning left from College Street to homes or local streets increase congestion by occupying the inside through-lane while waiting for breaks in traffic. There are approximately 130 driveways, 24 T-intersections, and four 4-way intersection collectively generating significant turn volumes. There are high-frequency collision locations along the corridor due to conflicts between turning vehicles and high volumes of through traffic. Narrow sidewalks, high volumes, and a lack of bike lanes discourage use by pedestrians and bicyclists. A lack of street amenities (i.e., planter strips/vegetation, decorative street lighting, street furniture) conflicts with community values articulated by City staff and City Council.

### **Previous Work**

Previous study work resulted in a report, “College Street, Evaluation of Options”, August 2005. This report documented a comprehensive alternatives analysis that scored and ranked ten options (nine build and one no-build) for improvements to College Street that addressed the corridor needs. The report recommended Option 9 as the preferred option, because it best provides a blend of corridor capacity, neighborhood connectivity, non-motorized uses, and corridor aesthetics. The cross-section included a planted center median to control access and provide space for left-turn lanes at key intersections; wide sidewalks with tree wells to promote walk-ability; space for commuting bicycles; and roundabouts at

## Technical Memorandum – Neighborhood Circulation and Access

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major intersections to provide intersection control. The overall right-of-way width of 72 feet widens to 76 feet at left-turn lane locations.

The current study work began in February 2008 and consists of the following tasks:

- *Alternatives Analysis* to define the recommended dimensions of the cross-sectional elements;
- *Horizontal Alignment and Right-of-Way* to define the recommended alignment;
- *Neighborhood Circulation and Access* to define recommended changes to street access and/or driveway access; and
- *Improvements Phasing Plan* to estimate project costs and define recommended phasing for the improvements.

WHPacific prepared an *Alternatives Analysis* technical memorandum, dated April 11, 2008. The memorandum presented ranges of dimensions for roadway cross-sectional elements (median width, left-turn lane width, through-lane width, space for bicyclists, planter/tree well width, and sidewalk width), and recommended a proposed cross-section for College Street for use in subsequent study work. The recommended cross-section is shown in Figure 3.

WHPacific also prepared a *Horizontal Alignment and Right-of-Way Limits* technical memorandum dated June 6, 2008. The memo recommended aligning the cross-section shown in Figure 3 as follows:

- Segment 1 (37<sup>th</sup> Ave SE to 29<sup>th</sup> Ave SE) - Aligned against the easterly right-of-way line;
- Segment 2 (29<sup>th</sup> Ave SE to 22<sup>nd</sup> Ave SE) - Aligned against the westerly right-of-way line;
- Segment 3 (22<sup>nd</sup> Ave SE to 16<sup>th</sup> Ave SE) - Aligned against the easterly right-of-way line; and
- Segment 4 (16<sup>th</sup> Ave SE to Lacey Boulevard SE) - Aligned against the westerly right-of-way line.

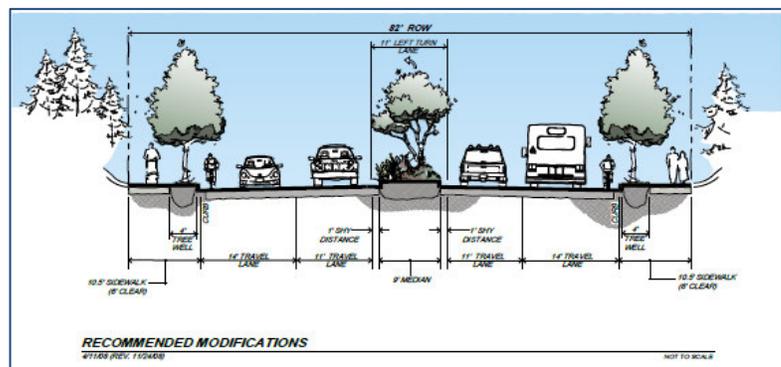


Figure 3 – Recommended Alternative

## Strategic Corridor

College Street is classified as a four-lane Principal Arterial under the National Highway System classification system; however, the NHS classification allows the City to have jurisdictional control of College Street. Under the City of Lacey functional classification, College Street is classified as a Major Arterial.

Thurston Regional Planning Council 2025 Transportation Plan has designated College Street from Martin Way to Yelm Highway as a Strategy Corridor. Strategy Corridors are roadways where traditional performance measures based on capacity do not apply because community values or physical environmental constraints will not allow capacity improvements beyond a 5-lane section. Strategy Corridors occur in areas where increased density and infill are encouraged. Without the designation of a Strategy Corridor, growth may move to less dense areas where it is more practical to increase capacity. This could lead to urban sprawl which contradicts the Growth Management Act goals of limiting sprawl by increasing infill and density.

The City of Lacey recognizes College Street as a Strategy Corridor. The City considers the following factors in evaluating proposed improvements to Strategy Corridors:

- Provide high quality and fully intergraded bike, pedestrian, carpool, and transit services.
- Complete and connected grids
- Utilize Access Management Strategies
- Manage Parking
- Use aggressive Travel Demand Management Strategies
- Intensity Land Use in the urban core.

The recommended improvements for the College Street Corridor are consistent with the City’s guidelines for Strategy Corridors as summarized below:

### **High Quality and Fully Intergraded Bike, Pedestrian, Carpool, and Transit Services**

College Street is constrained by right of way limits with businesses and homes fronting College Street. The sidewalks are narrow and there are no bicycle lanes. Currently, Intercity Transit Route 64 provides hourly service to College Street with transfer stations near Lacey City Hall and Yelm Highway.

The Recommended Alternative provides Type III bicycle lanes (3-foot) and 10.5-foot sidewalks to improve non-motorized facilities, and access to transit routing.

### **Complete and Connected Grids**

Connected grid streets provide multiple route options and encourage local traffic to use these routes over arterials. Potential grid connections are discussed under Neighborhood Circulation and Access Management Plan below.

### **Access Management**

Access management for College Street is discussed under Neighborhood Circulation and Access Management Plan below.

### **Parking Management**

There is currently no parking on College Street and the Recommended Alternative does not provide on-street parking due to limited rights-of-way.

### **Aggressive Travel Demand Management Strategies**

The City of Lacey is implementing travel demand management strategies on a regional level:

- Encouragement of land use policies that provide public-private partnerships to develop parking prices consistent with demand in urban and employment areas
- Encouragement of travel during non-peak periods to take advantage of wasted capacity
- Encouragement of schools and large employers to implement travel demand management strategies

### **Land Use Intensification**

Traditional capacity based concurrency requires added capacity to mitigate increased trips from development. College Street is mostly built-out and fronted by residences and business. Therefore, adding capacity would require significant right-of-way acquisition with displacement of homes and businesses. Designating College Street as a Strategy Corridor allows for land use intensification and infill. It centers growth in the urban core and discourages sprawl.

## **Neighborhood Circulation and Access Management Plan**

The Neighborhood Circulation and Access Management Plan (NCAMP) recommends access management along College Street to balance throughput operations with left-turn access to abutting neighborhoods. The NCAMP calls for (1) raised-median access control along College Street, (2) median breaks to provide left-turn access to neighborhoods lacking access to other north-south arterials, (3)

driveway revisions to reduce the number of access points, and (4) street grid connections to give neighborhood access to other north-south arterials. Key recommendations of the NCAMP are shown in Figure 4. Detailed recommendations are shown on the attached roll map.

### Raised-Median Access Control and Median Breaks

The NCAMP recommends a raised median to manage access. Access Management is a tool to address to reduce traffic congestion and reduce traffic collisions. The intent of Access Management is to provide access for abutting properties while preserving the flow of traffic in terms of safety, capacity and speed of travel. Studies show the uncontrolled proliferation of driveways and intersections along a corridor reduces the capacity, increases the number and severity of collisions, and inhibits bicycle and pedestrian usage. The benefits of access management include:

- Improved Safety - by reducing the number and severity of collisions;
- Improved Operations - by reducing delays while maximizing the potential roadway capacity;
- Reduced Environmental Impacts - by lowering the amount of air pollution caused by stop-and-go operation thereby increasing fuel economy; and
- Improved Economics - by preserving public investment in the roadway infrastructure, avoiding the need for roadway widening or other roadway improvements.

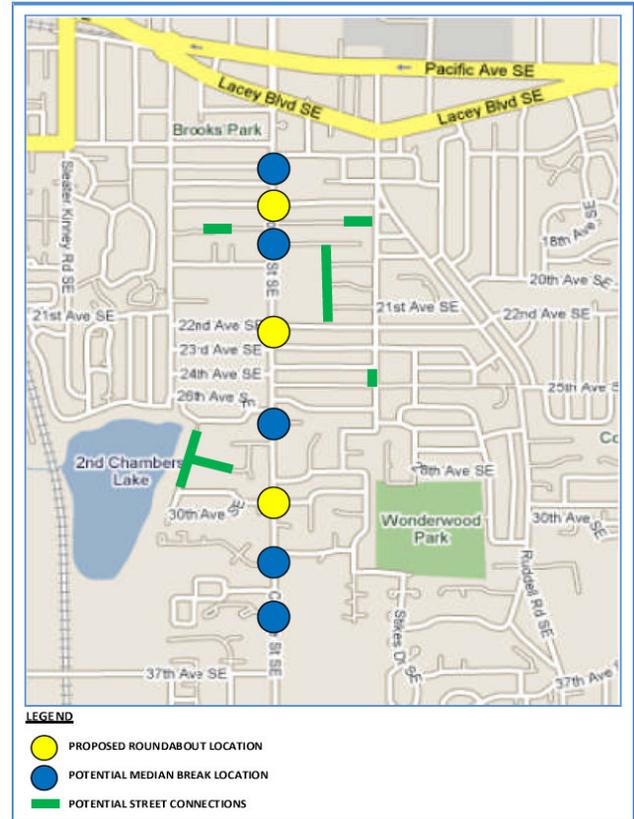


Figure 4 – Neighborhood Circulation Access and Management Plan

The NCAMP also recommends roundabouts at major intersections and median breaks at other key intersections to provide left-turn access. We considered the following approaches to identifying median break locations:

- Space median breaks to match the 660-foot standard spacing for College Street as a Major Arterial.
- Locate median breaks at the intersections with the highest left-turn volumes to/from side-streets.
- Locate median breaks at locked neighborhoods (i.e., abutting neighborhoods that lack access to other north-south arterials - Golf Club Road SE, Judd Street SE, or Ruddell Road SE).
  - Locate medians at the locked neighborhoods with the highest number of units (aka residences) in the neighborhood.
  - Located median breaks to book-end locked neighborhoods to minimize the longest distance traveled to a median break or roundabout for any neighborhood.

For the purpose of this memorandum, we are recommending one possible approach to locating medians. We are recommending median breaks to book-end locked neighborhoods so left-turn and/or u-turn access is less than ¼-mile from any locked neighborhood. As projects progress for implementing the recommended improvements, the median break locations should be revisited and other approaches considered. The median break locations could change in the future.

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There are 14 locked neighborhoods/apartment complexes:

- College Park Apartments
- Chambers Crest Apartments
- Driveway across from 32<sup>nd</sup> Lane SE Private
- 32<sup>nd</sup> Lane SE Private
- Montclair Avenue SE
- College Lane SE
- 29<sup>th</sup> Avenue SE
- Driveway (west side of College) between 27<sup>th</sup> Court SE and 29<sup>th</sup> Avenue SE
- 27<sup>th</sup> Court SE
- 27<sup>th</sup> Lane SE Private
- 18<sup>th</sup> Avenue SE East
- 17<sup>th</sup> Avenue SE West Leg
- 17<sup>th</sup> Avenue SE East Leg
- Diamond Head Apartments
- 13<sup>th</sup> Court SE

Median breaks are recommended at the following intersections:

- College Park Apartments
- Montclair Avenue SE
- 27<sup>th</sup> Lane SE Private
- 18<sup>th</sup> Ave SE
- Diamond Head Apartments/14<sup>th</sup> Way SE (west leg)

### Driveway Revisions

There are approximately 130 driveways on College Street between 37<sup>th</sup> Avenue SE and Lacey Boulevard. There is a potential conflict point at each driveway for vehicle traffic, pedestrians, and/or bicyclists. Reducing the number of conflict points will improve safety by decreasing the potential for collisions. The majority of driveways are the single access points for residences and businesses fronting College Street.

The NCAMP reviewed the driveways along College Street and identified potential consolidation, relocation, and removal of driveways. There are locations where adjacent properties could share one driveway (Shared). Single properties with multiple driveways are candidates for consolidation (Consolidation) or removal of one driveway (Removal). Properties with additional side street access are candidates for relocation (Relocation). Driveways to properties that are identified as potential full parcel takes (per the Horizontal Alignment and Right of Way Limits technical memorandum) were not evaluated (Right of Way Take). Lastly, there are two driveways marked for removal that front a vacant lot at 1326/1324 College Street (Vacant). The following is a summary of revisions:

- Shared – 1
- Consolidation – 7
- Relocation – 5
- Right of Way Take – 24
- Vacant – 2

A detailed listing of driveways and revisions is included as Attachment A.

### Identifying Additional Neighborhood Connections

There is a grid system currently in place on the west side of College Street, Golf Club Road SE, 26<sup>th</sup> Avenue SE, and Lacey Boulevard. There is also a grid system on the east side between College Street,

Judd Street SE/Ruddell Road SE, 31<sup>st</sup> Avenue SE, and Lacey Boulevard. A review of the street network identified potential connection points to enhance the network and provide locked neighborhoods with access to other north-south arterials (i.e., Golf Club Road SE, Judd Street SE, or Ruddell Road SE). The potential connection points are as follows:

- Connect Lakeside Drive and Lakeview Drive and connect Muriel Dr to Lakeview Drive
- Connect 17<sup>th</sup> Ave SE (west leg) to Golf Club Road SE
- Connect 18<sup>th</sup> Ave SE (east leg) to Judd Street SE
- Connect 18<sup>th</sup> Ave SE to 22<sup>nd</sup> Ave SE immediately east of Mountain View Elementary
- Connect Judd Street between 24<sup>th</sup> Ave SE and 25<sup>th</sup> Ave SE

### Traffic Analysis

The designation of College Street as a Strategy Corridor allows for implementation of policy points that encourage multi-modal travel while limiting the increase of single occupancy vehicles. While traditional capacity based concurrency does not apply to College Street, it is valuable to forecast how the corridor will operate.

The traffic data used for analysis is from counts during the PM peak hour. Turning movements to and from the side streets were collected. Previously, turning movement counts were collected on College Street at the intersections of Lacey Boulevard, 22<sup>nd</sup> Avenue SE, and 37<sup>th</sup> Avenue SE. A concept-level traffic analysis was conducted based on the information collected and future conditions from the regional planning model. The data and forecast volumes used for the analysis were collected from one peak hour.

Approaches to analyze College Street for existing conditions and for a build out year are described below.

#### Existing Condition

- Turning movement counts collected for Lacey Boulevard, 22<sup>nd</sup> Avenue SE and 37<sup>th</sup> Avenue were used to approximate the through volumes for College Street at the other intersections in the study limits.
- Side Street and driveway turning movement counts were added to the College Street through movements.
- The Level of Service (LOS) for stop controlled intersections was calculated for each intersection using Highway Capacity Software. LOS for stop controlled intersection is based on the worst movement with the most delay and does not report on the overall performance of the intersection.

#### Build Out

- The build out forecast volume is 32,000 vehicles per day on College Street per the Thurston County Regional Planning Council travel demand model.
- The Design Hourly Volume was assumed to be 10 percent to determine an hourly rate of 800 vehicles per lane per hour.
- Side street traffic was re-routed to account for medians, median breaks, and roundabouts.
- The LOS for stop controlled intersections was calculated for each side street using Highway Capacity Software.
- The LOS for roundabout intersections was calculated using SDIRA software and is based on the average delay of the entire intersection. The following steps were used to calculate the LOS:
  - Assume a two-lane approach on College
  - Assume a one-lane approach on Side Street
  - Use a degree of saturation equal to .85 which is recommended for design applications. (Ratio of volume versus theoretical capacity)
  - Increase the side street volume until the degree of saturation reaches 0.85
  - Compare the side street volume at saturation with current traffic counts.

**Results for Existing Stop Controlled Intersections**

A review of the traffic data shows some patterns indicating the side street access is constrained in the PM peak by the heavy volume on College Street. The highest right-turn volume counted from a side street was 142 vehicles at 14<sup>th</sup> Avenue SE. In contrast, the highest left turn volume counted from a side street was 11 vehicles at 29<sup>th</sup> Avenue SE and Chamber Crest Apartments. The LOS at 14<sup>th</sup> Avenue SE, including the 142 right turning vehicles, is C. However, the LOS at 29<sup>th</sup> Avenue SE and at Chamber Crest Apartments is E, even though the volume is much less than at 14<sup>th</sup> Avenue SE. The LOS for 2008 PM peak hour stop controlled intersections is shown in the table below.

**Table 1  
2008 PM Peak Hour Stop Controlled Intersection LOS**

<b>Intersection</b>	<b>Worst Movement</b>	<b>LOS</b>	<b>Delay(sec)</b>	<b>Overall I/S LOS</b>
13th Ave	EB	C	15.4	C
13th CT	WB	B	14.6	B
14th Ave West Leg	EB	D	30.2	C
14th Ave East Leg	WB	C	15.8	B
14th Way	WB	C	15.8	C
Diamond Head Apartments N Dr	WB	B	11	B
15th Ave SE	EB	B	14.9	B
Diamond Head Apartments S Dr	EB	B	11	A
16th Ave SE	EB	B	14.9	B
17th Ave SE West Leg	EB	C	22.9	C
17th Ave SE East Leg	WB	B	14.5	B
18th Ave SE	WB	B	14.2	B
19th Ave/Mountain View	EB	C	19.1	C
22nd Ave SE	WB	C	16.6	C
23rd Ave SE	EB	D	27.2	D
24th Ave SE West Leg	EB	C	15.1	B
24th Ave SE East Leg	WB	D	30.7	B
25th Ave SE	WB	B	12.4	B
26th Ave SE West Leg	EB	C	21.5	B
26th Ave SE East Leg	WB	C	15.1	C
27th Ave SE	EB	D	32.3	D
27th CT SE	EB	E	50	D
28th Ave SE	WB	C	19.3	B
29th/Belair	EB	E	40.5	C
College Ln SE	WB	B	10.4	A
31st Ave SE	WB	C	18.5	B
Montclair Dr	EB	C	17.7	C
32nd Lane	EB	E	48.9	E
Chambers Crest Apartments N Dr	EB	E	43.2	D
College Park Apartments	EB	E	39.2	D
Komachin Middle School N DR	WB	B	10.4	A

**Results for Build-Out PM Peak Hour**

The raised median changes many intersections by eliminating left turns. Since the left turn movements add the most delay, the LOS does not degrade on College Street even with growth in volume. In the areas where left turns are allowed the LOS is F for stop controlled intersections due to heavy volumes on College Street. In these areas it will be very difficult to make left turns during peak hours, but the ability

# Technical Memorandum – Neighborhood Circulation and Access

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to make left turns will increase in the off peak areas. The results of the Build-Out PM Peak Hour LOS are shown in the table below.

**Table 2**  
**Build Out PM Peak Stop Controlled Intersection LOS**

Intersection	Southbound		Northbound		Intersection
	LOS <sup>1</sup>	Delay	LOS <sup>1</sup>	Delay	
13th Ave SE	C	17.4			
			C	16.0	13th CT
14th Ave West Leg	D	30.2			
			C	15.5	14th Ave East Leg
<b>14th Way SE</b>	(F/D)	(69.8/34.1)			<b>Diamond Head Apts (Median Break)</b>
15th Ave SE	B	14.5			
<b>16th Ave SE</b>		<b>ROUNDABOUT</b>			<b>16th Ave SE</b>
17th Ave SE West Leg	C	15.8			
			B	14.5	17th Ave SE East Leg
			(E/D)	(41.7/30)	<b>18th Ave SE (Median Break)</b>
19th Ave / Mountain View	C	15.7	C	15.0	19th Ave/Mountain View
<b>22nd Ave SE</b>		<b>ROUNDABOUT</b>			<b>22nd Ave SE</b>
23rd Ave SE	C	15.9	B	14.8	23rd Ave SE
24th Ave SE West Leg	B	14.7			
			B	14.6	24th Ave SE East Leg
			A	8.4	25th Ave SE
26th Ave SE West Leg	C	15.5			
			B	14.9	26th Ave SE East Leg
					27th Ave SE
<b>27th CT SE (Median Break)</b>	(F/F)	(147.1/69.1)			
			C	15.2	28th Ave SE
<b>29th/Belair</b>		<b>ROUNDABOUT</b>			<b>29th/Belair</b>
			B	14.3	College Ln SE
			C	15.2	31st Ave SE
<b>Montclair Dr (Median Break)</b>	(F/C)	(61.2/30)			
32nd Lane	B	14.3			
Chambers Crest Apartments	B	14.9			
<b>College Park (Median Break)</b>	(D/D)	(31.4/26.8)			
			B	14.4	Komachin Middle School N DR

1. LOS is reported as (worst movement/overall intersection) for stop-controlled side streets.

## Results for Build-Out PM Peak Hour Roundabout Controlled Intersections

The analysis shows roundabouts will handle 325 vehicles per hour from side streets when College Street volumes are 800 vehicles per lane and 271 vehicles per hour from side streets when College Street volumes are 900 vehicles per lane. The highest volume counted on a side street at a proposed roundabout location is 64 vehicles in the peak hour. At the volume rates used for College Street, the side street would have to increase by over 400 percent before the roundabout operation would begin to degrade. Even at these volumes the level of service for the side street approaches is C with a maximum delay of 32.1 seconds.

**Table 3**  
**Test Case 800 Vehicles Per Lane**

Approach	Demand Flow Rate (veh/h)	Degree of Saturation	LOS	Ave Delay (sec)
Northbound	1957	0.75	A	8.7
Southbound	1957	0.75	A	8.7
Eastbound	325	0.839	C	27.9
Westbound	325	0.839	C	27.9

**Table 4**  
**Test Case 900 Vehicles Per Lane**

Approach	Demand Flow Rate (veh/h)	Degree of Saturation	LOS	Ave Delay (sec)
Northbound	2174	0.8	A	8.8
Southbound	2174	0.8	A	8.8
Eastbound	271	0.81	C	32.1
Westbound	271	0.81	C	32.1

**Findings**

The proposed improvements for the College Street Corridor from 37<sup>th</sup> Avenue SE to Lacey Boulevard comply with Strategic Corridor requirements per Lacey Municipal Code 14.21. The proposed access management shown on the Neighborhood Circulation and Access Management Plan strikes a reasonable balance between throughput operations and neighborhood access. Driveway revisions can maintain access while improving safety by reducing the number of conflict points. Potential grid connections can further enhance neighborhood access and circulation by providing access to other north-south arterials, such as Golf Club Road SE, Judd Street SE, and Ruddell Road SE. Some stop control intersections will experience significant delays making left turns in the PM peak hour due to heavy volumes on College Street. Alternatively, vehicles can turn right and make a u-turn at the nearest roundabout or median break. Left-turns from side streets are more likely that during off peak periods. The roundabouts operate well in the build out year.



**Figure 5 – Neighborhood Circulation Access and Management Plan**

**Recommendations**

WHPacific recommends the access management strategies as shown on the Neighborhood Circulation and Access Management Plan (roll plan) for medians, median breaks, roundabouts, driveway revisions, and grid connections. Key recommendations from the plan are shown in Figure 5.

## **Attachments**

**Attachment A – Detailed Driveway Inventory and Revisions**

**Attachment A – Detailed Driveway Inventory and Revisions**

NUMBER	STATION	OFFSET	EXISTING WIDTH	SITE ADDRESS	SITE USE	DRIVEWAY REVISION	COMMENT
1	116+75.39	LT	22'	3515 COLLEGE ST. SE	RENTAL/POSSIBLY BUSINESS	RW FULL TAKE	FULL TAKE DW - HAS ACCESS TO REAR OF PROPERTY FROM 3511
2	117+43.86	LT	32'	3511 COLLEGE ST. SE	DUPLEX - SHARED WITH 3515	REMAIN	MAY BE ABLE TO SHARE WITH 3515
3	118+71.62	LT	25'	3501 TO 3507 COLLEGE ST. SE	SHARED FOR TWO DUPLEXES	REMAIN	
4	119+40.13	LT	24'	3413 AND 3415 COLLEGE ST. SE	DUPLEX	REMAIN	
5	119+61.03	RT	36'	KOMACHIN MIDDLE SCHOOL	SCHOOL	REMAIN	
6	120+54.81	LT	30'	3407 AND 3409 COLLEGE ST. SE	SHARED - RESIDENTIAL	REMAIN	
7	120+79.31	RT	22'	3460 TO 3548 COLLEGE ST. SE	SHARED - RESIDENTIAL	REMAIN	
8	122+80.21	RT	26'	3320 TO 3430 COLLEGE ST. SE	SHARED - RESIDENTIAL	REMAIN	
9	124+46.65	RT	22'	3206 A & B COLLEGE ST. SE	SHARED - RESIDENTIAL	REMAIN	
10	125+19.41	LT	40'	3201 COLLEGE ST. SE	RESIDENTIAL	RELOCATE	CONSTRUCT OFF 32ND LANE SE
11	126+24.02	RT	29'	CITY OF LACEY AND RESIDENTS	SHARED	REMAIN	3108, 3110 A&B, AND 3112 AND WATER TOWER ACCESS
12	126+45.64	LT	21'	32ND LN. SE PVT.	SHARED - RESIDENTIAL	REMAIN	
13	127+32.95	RT	16'	3106 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
14	127+90.59	LT	20'	4529 MONTCLAIR AVE. SE	RESIDENTIAL	REMAIN	ACCESS OFF MONTCLAIR
15	128+16.88	LT	22'	4530 MONTCLAIR AVE. SE	RESIDENTIAL	REMAIN	ACCESS OFF MONTCLAIR
16	128+96.20	RT	17'			REMAIN	ACCESS OF COLLEGE, GARAGE FACES COLLEGE
17	129+51.46	RT	31'	4601 31ST AVE. SE	RESIDENTIAL	REMAIN	ACCESS OF 31ST
18	129+79.14	RT	21'	4602 31ST AVE. SE	RESIDENTIAL	REMAIN	ACCESS OF 31ST
19				3041 COLLEGE ST. SE	VACANT LOT	FUTURE	
20	131+18.86	LT	21'	3001 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
21	131+61.25	LT	18'				DUAL ACCESS OFF COLLEGE
22	132+14.64	LT	12'	2905 COLLEGE ST. SE	RESIDENTIAL	CONSOLIDATION	DUAL ACCESS OFF COLLEGE
23	131+69.13	RT	10'	3032 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
24	132+96.06	RT	17'	3026 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
25	133+29.15	LT	16'	3015 & 3023 COLLEGE ST. SE	SHARED 2-DUPLEXES	REMAIN	
26	133+52.12	RT	20'	COLLEGE LN HOME OWNERS ASSOC.	SHARED	REMAIN	
27	135+16.02	RT	19'	3006 COLLEGE ST. SE	RESIDENTIAL	REMAIN	VERT. CHALLENGE
28	136+44.85	RT	23'	4605 29TH AVE. SE	RESIDENTIAL	RW FULL TAKE	FULL TAKE FOR ROUNDABOUT
29	136+74.55	RT	16'	4604 29TH AVE. SE	RESIDENTIAL	RW FULL TAKE	FULL TAKE FOR ROUNDABOUT
30	136+77.67	LT	19'	4520 29TH AVE. SE	RESIDENTIAL	RW FULL TAKE	FULL TAKE FOR ROUNDABOUT
31			17'	4517 29TH CT. SE	RESIDENTIAL	RW FULL TAKE	FULL TAKE FOR ROUNDABOUT
32	137+98.33	RT	19'	2822 COLLEGE ST. SE	RESIDENTIAL	RELOCATE/RW FULL TAKE	FULL TAKE DW IMPACT-COULD CONSTRUCT NEW GARAGE 4604
33	138+43.60	LT	28'	2721 COLLEGE ST. SE & OTHERS	SHARED - RESIDENTIAL	REMAIN	
34	138+82.14	RT	13'	2818 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
35				4600 28TH AVE. SE	RESIDENTIAL	REMAIN	NEW HOUSE NOT SURE WHERE IT'S AT (OFF 28TH AVE. ?)
36				4604 28TH AVE. SE	RESIDENTIAL	REMAIN	NEW HOUSE NOT SURE WHERE IT'S AT MAY SHARE WITH 4600
37	139+72.18	LT	21'	2719 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
38	141+02.65	LT	24'	2717 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
39	141+71.89	LT	19'	2713 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
40	141+90.66	RT	15'				DUAL ACCESS OFF COLLEGE
41	143+33.82	RT	16'	2706 COLLEGE ST. SE	RESIDENTIAL	CONSOLIDATION	DUAL ACCESS OFF COLLEGE
42	142+12.95	LT	20'	2709 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
43	142+93.38	LT	28'	2705 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
44	143+55.28	RT	14'	2702 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
45	143+67.58	LT	19'	2701 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
46	144+77.53	LT	36'	2617 COLLEGE ST. SE	RESIDENTIAL	REMAIN	DRIVEWAY IS OFF 27TH CT. SE

**Attachment A – Detailed Driveway Inventory and Revisions**

NUMBER	STATION	OFFSET	EXISTING WIDTH	SITE ADDRESS	SITE USE	DRIVEWAY REVISION	COMMENT
47	144+94.62	RT	12'	2700 COLLEGE ST. SE	RESIDENTIAL	REMAIN	THICK TREES NOT SURE WHATS IN THERE
48	145+40.36	RT	18'	2626 COLLEGE ST. SE	DAYCARE FACILITY	REMAIN	
49	146+84.63	LT	26'	2613 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
50	147+19.20	RT	18'	4805 27TH LN. SE PVT.	RESIDENTIAL	REMAIN	NEW HOUSE THIS LOT
51	147+30.24	RT	20'	27TH LN. SE PVT.	SHARED - RESIDENTIAL	REMAIN	27TH LN. SE PVT. - 7 HOUSES
52	147+60.94	LT	23'	2609 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
53	148+72.63	RT	20'	2606 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
54	149+03.51	LT	18'	4529 26TH AVE. SE	RESIDENTIAL	REMAIN	OFF 26TH
55	149+13.19	RT	15'				DUAL ACCESS OFF COLLEGE
56	149+42.68	RT	12'	2602 COLLEGE ST. SE	RESIDENTIAL	CONSOLIDATION	DUAL ACCESS OFF COLLEGE
57	149+33.53	LT	13'	4530 26TH AVE. SE	RESIDENTIAL	REMAIN	DUAL ACCESS OFF 26TH - THIS ONE IS CLOSE TO INTERSECTION
58	149+34.34	LT	13'	4530 26TH AVE. SE	RESIDENTIAL	REMAIN	DUAL ACCESS OFF 26TH AND GO TO GARAGE
59	150+74.65	LT	18'	2509 COLLEGE ST. SE	BUSINESS/RESIDENTIAL ?	REMOVE	DUAL ACCESS US SHARED
60	151+27.34	LT	18'	2505 & 2509 COLLEGE ST. SE	BUSINESS/RESIDENTIAL ?	SHARED	KEEP THIS ONE
61	151+42.49	LT	12'	2505 COLLEGE ST. SE	BUSINESS/RESIDENTIAL ?	REMOVE	DUAL ACCESS US SHARED
62	152+05.95	LT	34'	2501 & 2505 COLLEGE ST. SE	BUSINESS - SHARED	REMAIN	
63	150+82.02	RT	7'				FULL TAKE - HAD DUAL ACCESS
64	151+46.79	RT	10'	2506 COLLEGE ST. SE	RESIDENTIAL	RW FULL TAKE	FULL TAKE - HAD DUAL ACCESS
65	152+59.67	RT	22'	2502 COLLEGE ST. SE	RESIDENTIAL	RW FULL TAKE	ACCESS OFF 25TH
66	153+24.88	LT	14'	2405 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
67	154+26.22	LT	41'	2401 COLLEGE ST. SE	RESIDENTIAL	REMAIN	ACCESS OFF 24TH AVE. SE
68	154+47.43	LT	16'	2315 COLLEGE ST. SE	RESIDENTIAL	REMAIN	ACCESS OFF 24TH AVE. SE
69	155+19.53	RT	20'	2406 COLLEGE ST. SE	RESIDENTIAL	REMAIN	ACCESS OFF 24TH AVE. SE
70	155+46.95	LT	21'	2309 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
71	155+51.41	RT	24'	4602 24TH AVE. SE	RESIDENTIAL	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF 24TH AVE. SE
72				4531 23RD AVE. SE	RESIDENTIAL	REMAIN	ACCESS OFF 23RD AVE. SE
73	157+56	LT	20'	4537 23RD AVE. SE	RESIDENTIAL	REMAIN	ACCESS OFF 23RD AVE. SE
74	157+85.94	RT	21'	4603 23RD AVE. SE	RESIDENTIAL	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF 23RD AVE. SE
75	158+72.58	LT	20'	2213 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
76	160+83.87	RT	16'	4705 22ND AVE. SE	CHURCH	REMAIN	ACCESS OFF 22ND AVE. SE
77	160+87.79	LT	28'	4525 22ND AVE. SE	BUSINESS	RW FULL TAKE	ROUNDBABOUT FULL TAKE ACCESS OFF 22ND AVE.
78	161+09.29	LT	28'	4514 & 4516 22ND AVE. SE	DUPLEX	REMAIN	
79	161+18.65	LT	29'	2121 & 2119 COLLEGE ST. SE	DUPLEX	RW FULL TAKE	ROUNDBABOUT FULL TAKE ACCESS IN INTERSECTION OF 22ND AND COLLEGE
80	162+44.84	LT	19'	2121, 2119 & 2117 COLLEGE ST. SE	SHARED	RELOCATE	2117 IS ACTUALLY WEST ON 22ND AVE. CONSTRUCT OFF 22ND
81	162+90.29	LT	23'			REMAIN	
82	165+52.19	LT	25'	2109 COLLEGE ST. SE	CHURCH	REMAIN	DUAL ACCESS - CLOSE TO PED X-ING SIGNAL
83	164+66.30	RT	28'			REMAIN	LT/RT IN - RT OUT ONLY (EXISTING)
84	169+16.51	RT	40'	1900 COLLEGE ST. SE	SCHOOL	REMAIN	EXIT ONLY - MAIN ACCESS OUT FOR SCHOOL
85	166+05.13	LT	22'	1921 COLLEGE ST. SE	BUSINESS	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF COLLEGE
86	167+31.63	LT	15'	1915 A & B COLLEGE ST. SE	DUPLEX	REMAIN	
87	169+08.68	LT	30'	1903 COLLEGE ST. SE	DUPLEX	REMAIN	ACCESS IS OFF 19TH AVE. SE ALREADY
88	171+14.97	RT	17'				DUAL ACCESS OFF COLLEGE - THIS ONE GOES TO GARAGE
89	171+54.34	RT	10'	4605 18TH AVE. SE	RESIDENTIAL	CONSOLIDATION	DUAL ACCESS OFF COLLEGE - REMOVE THIS ONE
90	172+29.57	RT	22'	4604 18TH AVE. SE	RESIDENTIAL	REMAIN	ACCESS OF 18TH, BUT TIGHT AT INTERSECTION
91	173+06.04	LT	9'	1705 COLLEGE ST. SE	RESIDENTIAL	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF COLLEGE
92	174+33.91	LT	118'				DUAL ACCESS-THIS IS OFF 17TH

**Attachment A – Detailed Driveway Inventory and Revisions**

NUMBER	STATION	OFFSET	EXISTING WIDTH	SITE ADDRESS	SITE USE	DRIVEWAY REVISION	COMMENT
93	174+98.51	LT	32'	1613 COLLEGE ST. SE	MINI-MART	CONSOLIDATION	DUAL ACCESS-THIS IS OFF COLLEGE - REMOVE BECAUSE OF STRIP TAKE
94	174+84.51	RT	25'	4603 17TH AVE. SE	RESIDENTIAL	REMAIN	TIGHT TO INTERSECTION
95	175+10.42	RT	34'	4604 17TH AVE. SE	RESIDENTIAL	REMAIN	TIGHT TO INTERSECTION
96	175+66.35	LT	14'	1605 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
97	176+07.18	LT	17'			RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF COLLEGE
98	177+41.66	LT	28'	1601 COLLEGE ST. SE	BUSINESS	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OF 16TH AVE. SE
99	177+44.64	RT	14'	4603 16TH AVE. SE	RESIDENTIAL	RW FULL TAKE	ROUNDAABOUT FULL TAKE ACCESS OFF 16TH AVE. SE
100	177+62.58	LT	14'	4524 16TH AVE. SE	RESIDENTIAL	RW FULL TAKE	ROUNDAABOUT FULL TAKE ACCESS OFF 16TH AVE. SE
101	179+04.43	LT	18'	1507 COLLEGE ST. SE	RESIDENTIAL	REMAIN	
102	177+68.74	RT	38'	1510 COLLEGE ST. SE	APARTMENT COMPLEX	REMAIN	ACCESS OFF OF 16TH AVE. SE
103	179+32.51	RT	25'	1510 COLLEGE ST. SE	APARTMENT COMPLEX	REMAIN	ACCESS OFF OF COLLEGE
104	180+29.49	RT	31'				OFFICE DUAL ACCESS - MAY BE ABLE TO REDUCE TO ONE
105	181+42.47	RT	28'	1510 COLLEGE ST. SE	APARTMENT COMPLEX	CONSOLIDATION	OFFICE DUAL ACCESS - MAY BE ABLE TO REDUCE TO ONE
106	182+31.66	RT	24'	1510 COLLEGE ST. SE	APARTMENT COMPLEX	REMAIN	ACCESS OFF COLLEGE
107	180+22.65	LT	34'	4525 15TH AVE SE	RESIDENTIAL	REMAIN	
108	180+44.47	LT	29'				DUAL ACCESS - THIS IS OFF 15TH
109	181+36.23	LT	27'	1423 COLLEGE ST. SE	RESIDENTIAL	RELOCATE	DUAL ACCESS - THIS IS OFF COLLEGE AND TO GARAGE MAY BE ABLE TO CLOSE
110	181+75.53	LT	18'				DUAL ACCESS - THIS IS OFF COLLEGE AND TO GARAGE MAY BE ABLE TO CLOSE
111	182+55.28	LT	15'	1419 COLLEGE ST. SE	RESIDENTIAL	RELOCATE	DUAL ACCESS - THIS IS OFF 14TH WAY
112	182+79.74	LT	21'	1415 COLLEGE ST. SE	BUSINESS	REMAIN	ACCESS IS OFF 14TH WAY
113	184+13.72	RT	23'	4601 14TH AVE. SE	RESIDENTIAL	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF 14TH AVE. SE
114	184+19.16	LT	29'	1415, 1407 & OTHERS COLLEGE ST. SE	RESIDENTIAL & BUSINESS	REMAIN	
115	184+39.88	RT	26'	4602 14TH AVE. SE	RESIDENTIAL	RW FULL TAKE	STRUCT. FULL TAKE ACCESS OFF 14TH AVE. SE
116	185+66.56	LT	40'	1407 COLLEGE ST. SE	BUSINESS	REMAIN	ACCESS IS OFF 14TH AVE. SE
117	185+96.18	LT	10'	4560 14TH AVE. SE	RESIDENTIAL	REMAIN	DUAL ACCESS - THIS GOES TO HOUSE
118	186+20.38	RT	20'	1328 COLLEGE ST. SE	RESIDENTIAL	RW FULL TAKE	STRUCT FULL TAKE ACCESS OFF COLLEGE
119	186+46.46	RT	10'	1326 COLLEGE ST. SE	VACANT LOT	VACANT	
120	186+84.48	RT	10'	1324 COLLEGE ST. SE	VACANT LOT	VACANT	
121	187+35.80	LT	16'	RIGHT-OF-WAY	RESIDENTIAL & BUSINESS	REMAIN	
122	188+12.21	RT	30'	1320 COLLEGE ST. SE	RESIDENTIAL	RW FULL TAKE	STRUCT. FULL TAKE - ACCESS IS OFF 13TH CT.
123	188+51.27	RT	70'	1308 COLLEGE ST. SE	BUSINESS	RW FULL TAKE	STRUCT. FULL TAKE - ACCESS IS OFF 13TH CT.
124	188+56.19	LT	22'				DUAL ACCESS - THIS GOES TO PARKING LOT
125	189+13.46	LT	18'	1307 COLLEGE ST. SE	BUSINESS	CONSOLIDATION	REMOVE, DON'T THINK THIS IS USED
126	189+70.48	RT	32'	1302 COLLEGE ST. SE	BUSINESS	RW FULL TAKE	DW FULL TAKE UNLESS WE USE 1308 PARCEL AND REBUILD A PORTION
127	190+31.88	LT	40'	1303 COLLEGE ST. SE	BUSINESS	REMAIN	ACCESS IS OFF 13TH AVE. SE

# Appendix D

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**TECHNICAL MEMORANDUM**

<b>Date:</b> <u>October 10, 2008 Rev 4/17/09</u>	<b>RE:</b> <u>Improvements Phasing Plan</u>
<b>To:</b> <u>Martin Hoppe, P.E., PTOE</u>	<b>From:</b> <u>Scott Sawyer, P.E.</u>
<b>Company:</b> <u>City of Lacey</u>	<b>Title:</b> <u>Sr. Project Manager</u>
<b>Phone:</b> <u>360.438.2681</u>	<b>Phone:</b> <u>360.918.5305</u>
<b>Fax:</b> <u>360.456.7799</u>	<b>Fax:</b> <u>360.754.1195</u>
<b>Address:</b> <u>420 College Street SE</u>	
<u>Lacey, WA 98509-3400</u>	<b>Project #:</b> <u>34709</u>
	<b>Project Name:</b> <u>College Street Improvement Report</u>

**Purpose**

The purpose of this technical memorandum is (1) present a recommended phasing for improvements to College Street, and (2) to summarize planning-level project cost estimates for each phase.

**Summary**

We evaluated alternative construction phasing options for improvements to College Street from 37<sup>th</sup> Avenue SE to Lacey Boulevard. We based the phasing options based on operational benefit and practical project size. First, we gave priority to projects providing more operational benefit. Second, we defined project limits to keep the costs for individual projects between \$1M and \$5M (in 2008 dollars), specifically to match a range of project sizes typically funded by grant opportunities. We developed two viable approaches as shown in Attachment A. Note that any of the identified projects could be increased or decreased in scope to match funding opportunities.

Both approaches construct the roundabouts first, and the three roundabouts are ordered by highest entering volumes (22<sup>nd</sup> Avenue SE first, 29<sup>th</sup> Avenue SE second, and 16<sup>th</sup> Avenue SE third). The roundabouts are constructed first to provide u-turn opportunities for properties before center medians are constructed and access points are modified. The segments between roundabouts are ordered from north to south, since the traffic volumes are higher for the northerly segments.

Option 1 has seven phases ranging in cost from \$2.1M to \$5.7M. Option 2 has five phases ranging in cost from \$3.1M to \$7.5M.

**Table 1  
Phasing Options with Phase Costs**

Option 1			Option 2		
Phase	Cost <sup>1</sup>	Description	Phase	Cost <sup>1</sup>	Description
Phase 1	\$2,050,000	22 <sup>nd</sup> Ave RAB	Phase 1	\$4,990,000	22 <sup>nd</sup> & 29 <sup>th</sup> RABs
Phase 2	\$2,940,000	29 <sup>th</sup> Ave RAB	Phase 2	\$7,463,000	16 <sup>th</sup> RAB/Lacey to 16 <sup>th</sup>
Phase 3	\$3,100,000	16 <sup>th</sup> Ave RAB	Phase 3	\$3,060,000	16 <sup>th</sup> to 22 <sup>nd</sup>
Phase 4	\$4,363,000	Lacey to 16 <sup>th</sup>	Phase 4	\$5,736,000	22 <sup>nd</sup> to 29 <sup>th</sup>
Phase 5	\$3,060,000	16 <sup>th</sup> to 22 <sup>nd</sup>	Phase 5	\$4,754,000	29 <sup>th</sup> to 37 <sup>th</sup>
Phase 6	\$5,736,000	22 <sup>nd</sup> to 29 <sup>th</sup>	---	---	
Phase 7	\$4,754,000	29 <sup>th</sup> to 37 <sup>th</sup>	---	---	
<b>TOTALS</b>	<b>\$26,003,000</b>			<b>\$26,003,000</b>	

1. Costs are in 2008 dollars

## Background

### Existing Conditions

College Street from Lacey Boulevard to 37<sup>th</sup> Avenue SE is a four-lane National Highway System (NHS) principal arterial with a general right-of-way width of 60 feet. The existing street width is approximately 45 feet from curb to curb. There are narrow sidewalks located along the corridor on each side of the street. The corridor is a built environment fronted by homes, small businesses, apartments, and schools.

College Street provides a primary north-south link for traffic, transit, pedestrians, and bicyclists within the City from south Thurston County to Interstate 5. The corridor currently carries 21,000 (2005 traffic count) and is projected to carry 32,000 vehicles per day by 2020 according to the Lacey Transportation Plan (College Street is identified as a Strategy Corridor in the Lacey Transportation Plan<sup>1</sup>). The corridor also provides local access to many homes fronting the street and provides access to several local streets and collectors.

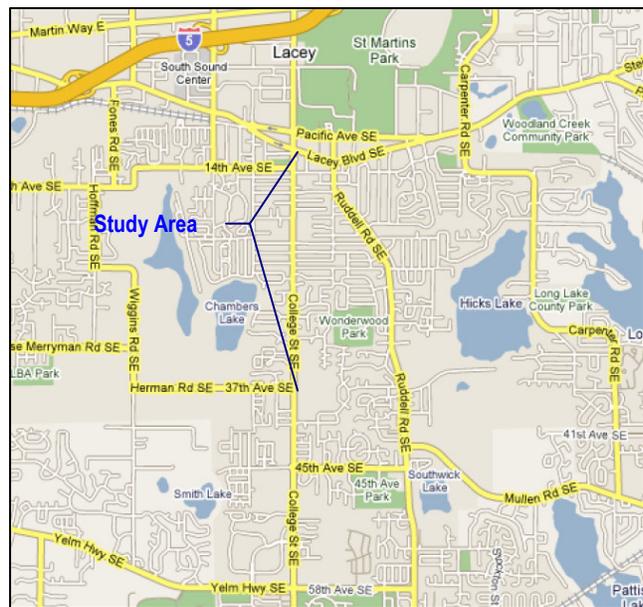


Figure 1 - Vicinity Map

Traffic is heavy along the corridor and congested during peak hours. Vehicles turning left from College Street to homes or local streets increase congestion by occupying the inside through-lane while waiting for breaks in traffic. There are approximately 130 driveways, 24 T-intersections, and four 4-way intersection collectively generating significant turn volumes. There are high-frequency collision locations along the corridor due to conflicts between turning vehicles and high volumes of through traffic. Narrow sidewalks, high volumes, and a lack of bike lanes discourage use by pedestrians and bicyclists. A lack of

<sup>1</sup> City of Lacey, 2004 Lacey Transportation Plan, page 55.

street amenities (i.e., planter strips/vegetation, decorative street lighting, street furniture) conflicts with community values articulated by City staff and City Council.

## Previous Work

Previous study work resulted in a report, “College Street, Evaluation of Options”, August 2005. This report documented a comprehensive alternatives analysis that scored and ranked ten options (nine build and one no-build) for improvements to College Street that addressed the corridor needs. The report recommended Option 9 as the preferred option, because it best provides a blend of corridor capacity, neighborhood connectivity, non-motorized uses, and corridor aesthetics. The cross-section included a planted center median to control access and provide space for left-turn lanes at key intersections; wide sidewalks with tree wells to promote walk-ability; space for commuting bicycles; and roundabouts at major intersections to provide intersection control. The overall right-of-way width of 72 feet widens to 76 feet at left-turn lane locations.

The current study work began in February 2008 and consists of the following tasks:

- *Alternatives Analysis* to define the recommended dimensions of the cross-sectional elements;
- *Horizontal Alignment and Right-of-Way* to define the recommended alignment;
- *Neighborhood Circulation and Access* to define recommended changes to street access and/or driveway access; and
- *Improvements Phasing Plan* to estimate project costs and define recommended phasing for the improvements.

WHPacific prepared an *Alternatives Analysis* technical memorandum, dated April 11, 2008. The memorandum presented ranges of dimensions for roadway cross-sectional elements (median width, left-turn lane width, through-lane width, space for bicyclists, planter/tree well width, and sidewalk width), and recommended a proposed cross-section for College Street for use in subsequent study work. The recommended cross-section is shown in Figure 2.

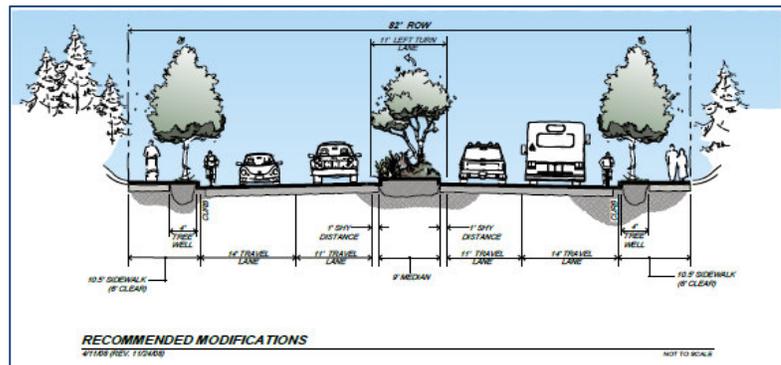


Figure 2 – Recommended Alternative

WHPacific prepared a *Horizontal Alignment and Right-of-Way Limits* technical memorandum dated July 29, 2008. The memo recommended aligning the cross-section shown in Figure 2 as follows:

- Segment 1 (37<sup>th</sup> Ave SE to 29<sup>th</sup> Ave SE) - Aligned against the easterly right-of-way line;
- Segment 2 (29<sup>th</sup> Ave SE to 22<sup>nd</sup> Ave SE) - Aligned against the westerly right-of-way line;
- Segment 3 (22<sup>nd</sup> Ave SE to 16<sup>th</sup> Ave SE) - Aligned against the easterly right-of-way line; and
- Segment 4 (16<sup>th</sup> Ave SE to Lacey Boulevard SE) - Aligned against the westerly right-of-way line.

Lastly, WHPacific prepared a *Neighborhood Circulation and Access* technical memorandum dated August 7, 2008. The memo recommended access management strategies (center medians, median-beak locations, driveway modifications, and street connections), and reported traffic operational performance for the recommended roundabout locations.

Median breaks are recommended at the following intersections:

- College Park Apartments

- Montclair Avenue SE
- 27<sup>th</sup> Lane SE Private
- 18<sup>th</sup> Ave SE
- Diamond Head Apartments/14<sup>th</sup> Way SE (west leg)

The potential street connections are as follows:

- Connect Lakeside Drive and Lakeview Drive and connect Muriel Dr to Lakeview Drive
- Connect 17<sup>th</sup> Ave SE (west leg) to Golf Club Road SE
- Connect 18<sup>th</sup> Ave SE (east leg) to Judd Street SE

The all legs of the proposed roundabouts are predicted to operate at Level of Service C or better in the Build-Out condition (2030).

## Recommended Phasing

### Approach

#### ***Traffic Operational Benefit***

Precedent was given to improvements that provide the best operational benefit. The primary operational deficiency in the corridor is the high number of left-turns degrading through-put and increasing collisions. Controlling access with center medians is the recommended solution. However, we are recommending construction of the roundabouts before the center medians. If the roundabouts are built first, they provide opportunities for vehicles to u-turn as soon as the center-median construction alters access. Therefore, we recommend construction of the roundabouts first. We phased the roundabouts in order of highest traffic volume with 22<sup>nd</sup> Avenue SE built first, 29<sup>th</sup> Avenue SE built second, and 16<sup>th</sup> Avenue SE built third. After the roundabouts we phased the segments (roadway improvements between roundabouts) from north to south, since the corridor experiences the highest volumes at the north end of the corridor.

#### ***Rough Order of Magnitude (ROM) Costs for Defining Project Limits***

We sought to size the projects between \$1M and \$5M in project costs to keep projects are at a practical size for funding and City staffing. We developed rough order of magnitude (ROM) cost estimates to help us define project limits falling within the desired size range. We use the following assumptions/methods to develop the ROM estimates:

- We used right-of-way costs from the *Horizontal Alignment and Right-of-Way Limits* technical memorandum.
- We used City-provided quantities from the College/45<sup>th</sup> roundabout project and updated unit costs to current market rates using bid tabs from Mullen Road and other sources to estimate the construction cost for the roundabouts.
- We used project costs from the Mullen Road project to estimate costs for the following items based on prorating the square-footage of pavement for College Street compared to Mullen Road:
  - storm drainage; and
  - channelization.
- We generated an estimated per linear foot cost for roadway improvements by calculating rough quantities over a mile long road segment with assumptions based on City of Lacey, *Development Guidelines and Public Works Standards*, July 2005. We also refined our assumptions based a field walk through. We calculated quantities for the following bid items:
  - roadway excavation – assumed 1’ depth;
  - embankment compaction – assumed 1’ depth;
  - street lights;

- street trees and tree grates;
- median planting (shrubs and plants per square foot costs and street trees);
- median irrigation per square foot;
- curb and gutter – a percentage of the total distance of the one mile segment;
- traffic curb for medians – a percentage of the total distance of the one mile segment;
- sidewalks – a percentage of the total distance of the one mile segment;
- driveways – a percentage of the total distance of the one mile segment;
- driveway approaches;
- asphalt and crushed rock based on horizontal alignment comparison cost breakdown from the *Horizontal Alignment and Right-of-Way Limits* technical memorandum;
- clear and grub;
- Puget Sound Energy conversion, joint trench, and electrical conversion;
- curb, sidewalk, and driveway removal based on a percentage of the total distance of the one mile segment; and
- seeding for yards based on assumed impact for excavation and embankment;

## Findings

Based on traffic operational benefit and project sizing, we recommended the following two options for phasing the improvements to College Street between Lacey Boulevard and 37<sup>th</sup> Avenue SE.

### **Option 1**

Option 1 has seven phases ranging in cost from \$2.1M to \$5.7M.

- Phase 1 – construct the roundabout at 22<sup>nd</sup> Avenue SE;
- Phase 2 – construct the roundabout at 29<sup>th</sup> Avenue SE;
- Phase 3 – construct the roundabout at 16<sup>th</sup> Avenue SE;
- Phase 4 – construct the roadway segment between Lacey Boulevard and 16<sup>th</sup> Avenue SE;
- Phase 5 – construct the roadway segment between 16<sup>th</sup> Avenue SE and 22<sup>nd</sup> Avenue SE;
- Phase 6 – construct the roadway segment between 22<sup>nd</sup> Avenue SE and 29<sup>th</sup> Avenue SE;
- Phase 7 – construct the roadway segment between 29<sup>th</sup> Avenue SE and 37<sup>th</sup> Avenue SE.

### **Option 2**

Option 2 has five phases ranging in cost from \$3.1M to \$7.5M.

- Phase 1 – construct the roundabouts at 22<sup>nd</sup> Avenue SE and 29<sup>th</sup> Avenue SE;
- Phase 2 – construct the roundabout at 16<sup>th</sup> Avenue SE and the roadway segment between Lacey Boulevard and 16<sup>th</sup> Avenue SE;
- Phase 3 – construct the roadway segment between 16<sup>th</sup> Avenue SE and 22<sup>nd</sup> Avenue SE;
- Phase 4 – construct the roadway segment between 22<sup>nd</sup> Avenue SE and 29<sup>th</sup> Avenue SE;
- Phase 5 – construct the roadway segment between 29<sup>th</sup> Avenue SE and 37<sup>th</sup> Avenue SE.

## Phasing Cost Estimates

### Approach

We developed planning-level cost estimates for the recommended phases using the following assumptions and methodologies:

- We used right-of-way costs from the *Horizontal Alignment and Right-of-Way Limits* technical memorandum.

- We used City-provided quantities from the College/45<sup>th</sup> roundabout project and updated unit costs to current market rates to estimate the construction cost for the roundabouts.
- We generated quantities for each segment with assumptions per City of Lacey, *Development Guidelines and Public Works Standards*, July 2005. We also refined our assumptions based a field walk through. We calculated quantities for the following bid items:
  - roadway excavation and embankment compaction – generated rough areas per sections from the work performed for cross-section analyses reported in the *Horizontal Alignment and Right-of-Way Limits* technical memorandum;
  - street lights;
  - street trees and tree grates;
  - median planting (shrubs and plants per square foot costs and street trees);
  - median irrigation per square foot;
  - curb and gutter;
  - traffic curb for medians;
  - sidewalks;
  - driveways;
  - driveway approaches – based on driveway modifications reported in the *Neighborhood Circulation and Access* and technical memorandum;
  - asphalt and crushed rock based on the work performed for cross-section analyses reported in the *Horizontal Alignment and Right-of-Way Limits* technical memorandum;
  - Puget Sound Energy conversion, joint trench, and electrical conversion;
  - storm drainage conveyance based on basic calculations to size facilities;
  - storm drainage water quality based on basic calculations to size facilities (including land costs);
  - storm drainage outfall assuming existing conveyance systems can handle additional flows;
  - channelization;
  - curb, sidewalk, and driveway removal; and
  - seeding for yards based on estimated excavation.

## Findings

The planning-level project costs for the recommended phases are shown in Table 2.

**Table 2**  
**Phasing Options with Phase Costs**

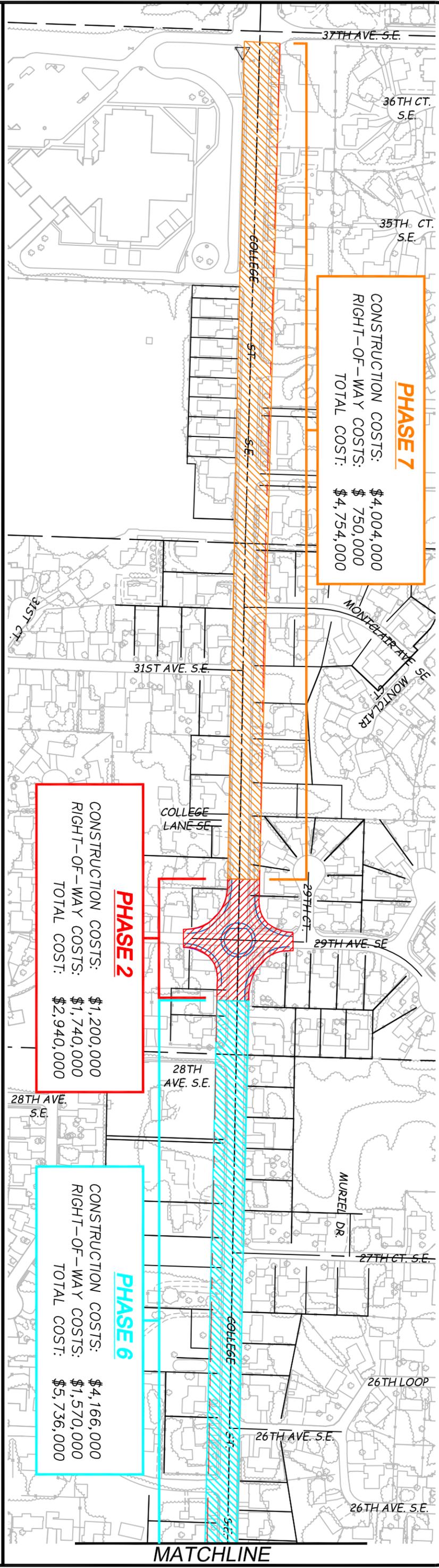
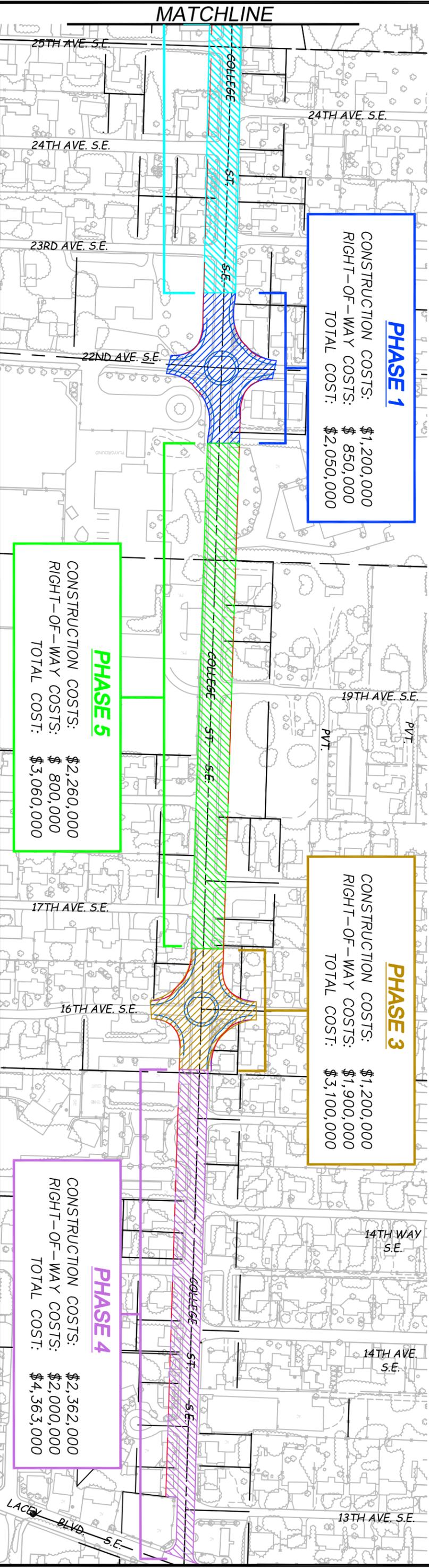
Option 1			Option 2		
Phase	Cost <sup>1</sup>	Description	Phase	Cost <sup>1</sup>	Description
Phase 1	\$2,050,000	22 <sup>nd</sup> Ave RAB	Phase 1	\$4,990,000	22 <sup>nd</sup> & 29 <sup>th</sup> RABs
Phase 2	\$2,940,000	29 <sup>th</sup> Ave RAB	Phase 2	\$7,463,000	16 <sup>th</sup> RAB/Lacey to 16 <sup>th</sup>
Phase 3	\$3,100,000	16 <sup>th</sup> Ave RAB	Phase 3	\$3,060,000	16 <sup>th</sup> to 22 <sup>nd</sup>
Phase 4	\$4,363,000	Lacey to 16 <sup>th</sup>	Phase 4	\$5,736,000	22 <sup>nd</sup> to 29 <sup>th</sup>
Phase 5	\$3,060,000	16 <sup>th</sup> to 22 <sup>nd</sup>	Phase 5	\$4,754,000	29 <sup>th</sup> to 37 <sup>th</sup>
Phase 6	\$5,736,000	22 <sup>nd</sup> to 29 <sup>th</sup>	---	---	
Phase 7	\$4,754,000	29 <sup>th</sup> to 37 <sup>th</sup>	---	---	
<b>TOTALS</b>	<b>\$26,003,000</b>			<b>\$26,003,000</b>	

1. Costs are in 2008 dollars

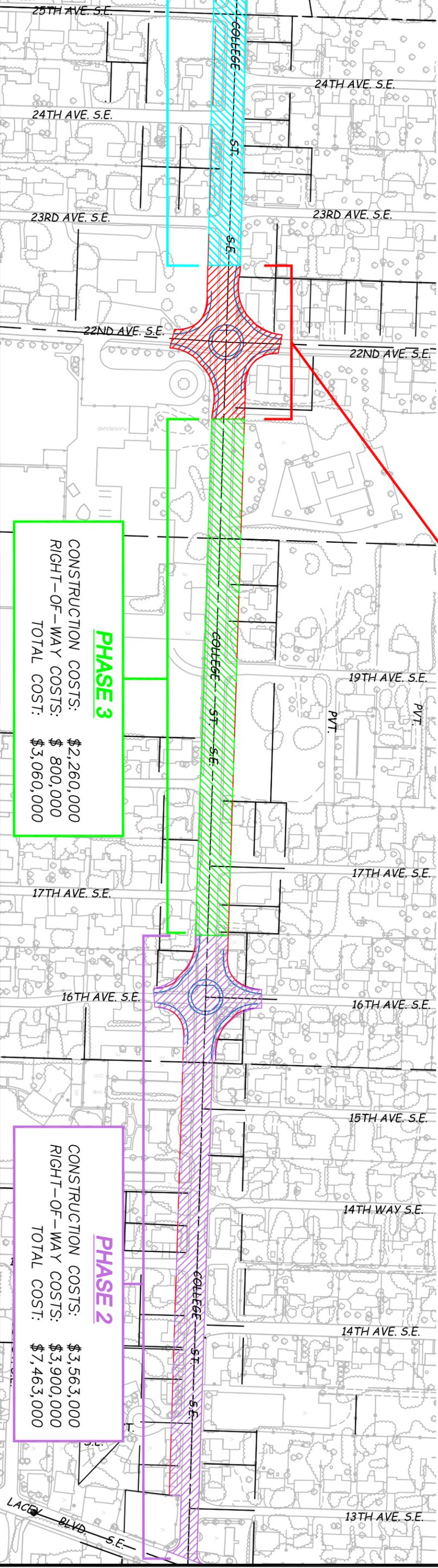
## **Attachments**

**Attachment A – Improvements Phasing Plan, Construction and Right-of-Way Costs – Option 1 and Option 2**

**Attachment B – Planning-Level Cost Estimate Back-up Data**



MATCHLINE



**PHASE 5**

CONSTRUCTION COSTS: \$4,004,000  
 RIGHT-OF-WAY COSTS: \$750,000  
 TOTAL COST: \$4,754,000

**PHASE 1**

CONSTRUCTION COSTS: \$2,400,000  
 RIGHT-OF-WAY COSTS: \$2,590,000  
 TOTAL COST: \$4,990,000

**PHASE 3**

CONSTRUCTION COSTS: \$2,260,000  
 RIGHT-OF-WAY COSTS: \$800,000  
 TOTAL COST: \$3,060,000

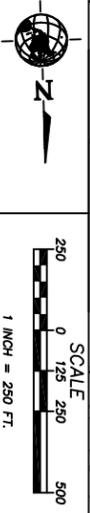
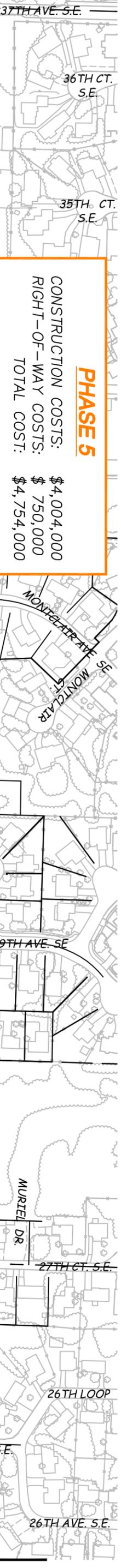
**PHASE 2**

CONSTRUCTION COSTS: \$3,563,000  
 RIGHT-OF-WAY COSTS: \$3,900,000  
 TOTAL COST: \$7,463,000

**PHASE 4**

CONSTRUCTION COSTS: \$4,166,000  
 RIGHT-OF-WAY COSTS: \$1,570,000  
 TOTAL COST: \$5,736,000

MATCHLINE



# Bid Tabulation

Lacey Contract Number: \_\_\_\_\_ Contractor: Engineer  
 Federal Aid Project Number: \_\_\_\_\_ DO-NOT-MODIFY  
 WSDOT Contract Number: \_\_\_\_\_ DO-NOT-MODIFY  
 TIB Contract Number: \_\_\_\_\_ DO-NOT-MODIFY  
 Prepared By: JMB/EJM  
 Checked By: MJJ  
 Prepared Date: October 7, 2008

## PHASE 4 - COLLEGE STREET IMPROVEMENTS

Quantity	Unit	Item ID	Item Description	Unit Price	Extended Price	Provision	COMMENT
1	LS	109-010	Mobilization	\$288,565.00	\$288,565.00	WSDOT 1-09	7% => 0.07 x \$4,122,356.00 = \$288,565.00
1	LS	107-010	SPCC Plan	\$5,000.00	\$5,000.00	WSDOT 1-07	
1	LS	801-010	Temporary Water Pollution/Erosion Control	\$30,000.00	\$30,000.00	WSDOT 8-01	0%
1700	LF	801-090	Silt Fence	\$5.00	\$10,200.00	CITY 8-01	
60	DAYS		ESC Lead	\$100.00	\$6,000.00		
700	LF	830-010	Clearing Limit Fence	\$4.00	\$2,800.00	CITY 2-01	
1	LS	110-010	Project Temporary Traffic Control	\$100,000.00	\$100,000.00	WSDOT 1-10	
3000	HR	110-030	Flags and Spotters	\$38.00	\$114,000.00	WSDOT 1-10	
800	SF	110-100	Construction Signs Class A	\$20.00	\$16,000.00	WSDOT 1-10	
1	LS	201-040	Clearing and Grubbing	\$7,200.00	\$7,200.00	CITY 2-01	
1	LS	202-030	Removal of Structures and Obstructions	\$75,000.00	\$75,000.00	CITY 2-02	
800	SY		Sidewalk and Driveway Removal	\$10.00	\$8,000.00		
1200	LF		Curb and Gutter Removal	\$5.00	\$6,000.00		
1700	SY		Approach Removal	\$15.00	\$25,500.00		
1827	CY	203-030	Roadway Excavation Incl. Mud	\$20.00	\$36,500.00	CITY 2-03	
982	CY	203-080	Embankment Compaction	\$5.00	\$4,900.00	CITY 2-03	
1843	TN	404-020	Crushed Surfacing	\$25.00	\$46,100.00	WSDOT 4-04	
2119	TN	504-030	HMA Cl. 1/2" P.G. 64-22	\$90.00	\$190,800.00	CITY 5-04	
45	TN		Commercial HMA	\$140.00	\$6,300.00	WSDOT 5-04	
222	SY		8 Inch Cement Conc. Driveway Entrance	\$40.00	\$8,900.00	WHP 8-05	
1384	LF	213-010	Joint Trench	\$30.00	\$40,900.00	CITY 2-13	
61	CY	213-020	Vault Excavation	\$25.00	\$1,500.00	CITY 2-13	
14	EA		Electrical Service Conversion	\$4,000.00	\$56,000.00	CITY 2-14	
1	LS	205-030	Trench Safety System	\$10,000.00	\$10,000.00	CITY 2-05	
50	HR		Utility Potholing	\$100.00	\$5,000.00	CITY 7-08	
5	EA	705-100	Catch Basin Type 1	\$1,300.00	\$8,500.00	CITY 7-05	Storm
6	EA	705-110	Catch Basin Type 1L	\$1,750.00	\$10,500.00	CITY 7-05	Storm
5	EA	705-200	Catch Basin Type 2 - 48 In. Diam.	\$3,000.00	\$15,000.00	CITY 7-05	Storm
1	EA		Oil/Water Separator	\$30,000.00	\$30,000.00	CITY 7-05	Storm
547	LF	704-050	12 Inch Diameter Storm Sewer Pipe	\$70.00	\$38,300.00	CITY 7-04	Storm- add \$10/ft to pipe costs to cover bedding and backfill
645	LF	704-057	18 Inch Diameter Storm Sewer Pipe	\$65.00	\$41,900.00	CITY 7-04	Storm- add \$10/ft to pipe costs to cover bedding and backfill
1790	LF	804-030	Cement Conc. Traffic Curb	\$15.00	\$26,900.00	WSDOT 8-04	
2400	LF	804-040	Cement Conc. Traffic Curb and Gutter	\$15.00	\$36,000.00	WSDOT 8-04	
150	LF		Double Faced Cement Concrete Traffic Curb	\$40.00	\$6,000.00	WHP 8-04	
2483	SY	814-070	Cement Concrete Sidewalk	\$30.00	\$74,500.00	CITY 8-14	
16	EA	814-080	Cement Concrete Sidewalk Ramp	\$1,250.00	\$20,000.00	CITY 8-14	
1	LS	806-030	Lawn and Landscape Restoration	\$25,000.00	\$25,000.00	GSP 8-05	
878	CY	802-200	Topsoil Type A	\$35.00	\$30,700.00	GSP 8-02	
88	CY	802-121	Bark Mulch	\$35.00	\$3,100.00	GSP 8-02	
0.21	AC	801-040	Seeding, Fertilizing, and Mulching	\$8,000.00	\$1,600.00	WSDOT 8-01	
94	EA	802-???	Street Trees	\$400.00	\$37,700.00	GSP 8-02	
68	EA	802-???	Tree Grates	\$800.00	\$54,900.00	GSP 8-02	
1	LS	802-???	Shrubs and Plants	\$10,740.00	\$10,700.00	GSP 8-02	
1	LS	803-030	Irrigation System	\$41,900.00	\$41,900.00	GSP 8-03	
4	EA	803-100	Irrigation System Modification and Adjustment	\$1,000.00	\$4,000.00	CITY 8-03	approx. (1) for every 5 homes along College St
1	LS	820-042	Luminaire System	\$103,100.00	\$103,100.00	CITY 8-20	
5.3	HUND	809-030	Raised Pavement Marker Type 1	\$250.00	\$1,300.00	WSDOT 8-09	
3.5	HUND	809-040	Raised Pavement Marker Type 2	\$350.00	\$1,200.00	WSDOT 8-09	
2180	LF	822-092	Plastic Wide Line	\$1.00	\$2,200.00	WSDOT 8-22	
4	EA	822-200	Plastic Traffic Letter	\$60.00	\$240.00	WSDOT 8-22	
4	EA	822-180	Plastic Traffic Arrow	\$75.00	\$300.00	WSDOT 8-22	
14	EA	822-065	Plastic Bicycle Lane Symbol	\$125.00	\$1,800.00	WSDOT 8-22	
70	LF	822-040	Plastic Stop Line	\$5.00	\$350.00	CITY 8-22	
2400	LF	823-010	Temporary Pavement Marking	\$0.25	\$600.00	WSDOT 8-23	
2400	LF	823-015	Removing Temporary Pavement Marking	\$0.10	\$240.00	WSDOT 8-23	same value as Temporary Pavement Marking = 2400ft
6	EA	813-040	Manumant Case and Cover	\$400.00	\$2,400.00	CITY 8-13	locate at each intersection
1	MIC	104-100	Minor Change	\$20,000.00	\$20,000.00		
1	LS	104-100	Miscellaneous Items	\$14,400.00	\$14,400.00	WSDOT 1-04	

Schedule A Subtotal:	\$1,764,495.00
20% Contingency:	\$352,899.00
12% Cons. Engineer:	\$211,700.00
PSE Conversion:	\$33,900.00
Right-of-way:	\$2,000,000.00
<b>Schedule Total:</b>	<b>\$4,362,994.00</b>

### Project Summary

Schedule Contract Subtotal:	\$2,362,994.00
Schedule Right-of-way:	\$2,000,000.00
<b>Total:</b>	<b>\$4,362,994.00</b>

I hereby certify this to be a true and correct tabulation of bids received and opened on \_\_\_\_\_

Signature \_\_\_\_\_

COLLEGE STREET IMPROVEMENT #034709 COST ESTIMATE						
PHASE 4			B2 Section = 700			
STA 179+00 to 191+00 = 1200 LF			E Section = 500			
HMA (assume Section E and B2)						
	Volume (c.y.) = (area (sf) x length (l.f.) /27)	CY to T Factor	Tons = Volume/ (CYxT Factor)	Unit Price (tons)	Cost	Volume Calculation (refer to E and B2 typical cross section)
HMA WEARING COURSE (2" DEPTH)	385	2.05	790	\$90.00	\$71,067	$((26+26) * (2/12) * 1200) / 27$
HMA LEVELING COURSE (4" DEPTH)	281	2.05	577	\$90.00	\$51,933	$(19 * (4/12) * 1200) / 27$
HMA LEVELING COURSE (DEPTH VARIES)	367	2.05	753	\$90.00	\$67,753	$((6.68+0.92) * 700) + ((3.94+5.25) * 500) / 367$
<b>TOTAL (tons) =</b>			<b>2119</b>		<b>\$190,753</b>	
CRUSHED ROCK (assume Section E and B2)						
	Volume (c.y.) = (area (sf) x length (l.f.) /27)	CY to T Factor	Tons = Volume/ (CYxT Factor)	Unit Price (tons)	Cost	Volume Calculation (refer to E and B2 typical cross section)
CRUSHED ROCK (12" DEPTH) for Roadway	911	1.85	1686	\$25.00	\$42,139	$(20.5 * \text{segment length} = 1200) / 27$
CRUSHED ROCK (2" DEPTH) for Driveway	10	1.85	19	\$25.00	\$471	$((2/12) * \text{D/W area} = 1650) / 27$
CRUSHED ROCK (1" DEPTH) for Sidewalk	75	1.85	139	\$25.00	\$3,476	$((3/12) * (\text{sidewalk area} = (2483 * 9) + \text{D/W entrancearea} = 222 * 9)) / 27 = 75$
<b>TOTAL (tons) =</b>			<b>1843</b>		<b>\$46,086</b>	
ROADWAY EXCAVATION						
	X-SECTION AREA (SF)	LENGTH (LF)	Volume (c.y.) = (area (sf) x length (l.f.) /27)	Unit Price (c.y.)	Cost	Volume Calculation (refer to E and B2 typical cross section)
B2 =	45	700	1154	\$20.00	\$23,074	$B2 = (44.5 * 700) / 27$
E =	21	500	389	\$20.00	\$7,778	$E = (21.0 * 500) / 27$
				Sub total =	\$30,852	
MEDIAN	Area (sf) = 8.58		284	\$20.00	\$5,688	$(5.53 + 3.05) * 895 / 27 = 284$
	Length (lf) = 1200 L.F. - 55ft for one median breaks @ 55ft - 250 ft for one left turn lane @ 250ft ea		895			
				Sub total =	\$5,688	
			<b>TOTAL =</b>	<b>TOTAL =</b>	<b>\$36,540</b>	
CURB AND GUTTER REMOVAL						
			Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions
B2 Length (lf) =	700		700	\$5.00	\$3,500	B2=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION
E Length (lf) =	500		500	\$5.00	\$2,500	E=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION
			<b>TOTAL =</b>	<b>TOTAL =</b>	<b>\$6,000</b>	
SIDEWALK AND DRIVEWAY REMOVAL						
		Length (l.f.)	Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions
B2 Length (lf) =	700	700	800	\$10.00	\$8,000	SIDEWALK WIDTH = 6FT B2+S+D IN FILL ON ONE SIDE ONLY PER X-SECTION
E Length (lf) =	500	500				E+S+D IN FILL ON ONE SIDE ONLY PER X-SECTION
		<b>TOTAL (LF) =</b>	<b>TOTAL =</b>	<b>TOTAL =</b>	<b>\$8,000</b>	
APPROACH REMOVAL						
			Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions
D/W REMOVAL (sf) =	13650		1517	\$15.00	\$25,500	see Driveway/RemovalAreas tab for breakdown of areas; AREA = SF/9
D/W REMAIN (sf) =	1650		183			
		<b>TOTAL =</b>	<b>TOTAL =</b>	<b>TOTAL =</b>	<b>\$25,500</b>	

EMBANKMENT COMPACTION								
FILL IN REMOVAL OF APPROACH					Volume (c.y.) = (area (sf) x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions *D/W AND APPROACH DEPTH = 0.5ft *see "Driveway Removal Areas" tab for breakdown of areas
D/W REMOVAL (sf) =	13650				253	\$5.00	\$1,417	
D/W REMAIN (sf) =	1650				31			
SUB-TOTAL =					283		\$1,417	
FILL IN REMOVAL OF CURB AND GUTTER					Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions
B2 Length (lf) =	700				29	\$5.00	\$250	*length from curb/gutter removal
E Length (lf) =	500				21			*gutter width = 1.5ft and depth = 0.75ft
SUB-TOTAL =					50		\$250	
FILL IN REMOVAL OF SIDEWALK					Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions
B2 Length (lf) =	700				29	\$5.00	\$250	*sidewalk width = 6ft and depth = 0.33 ft
E Length (lf) =	500				21			
SUB-TOTAL =					50		\$250	
CURB, GUTTER, AND SIDEWALK					Volume (c.y.) = (area (sf) x length (lf))/27	Unit Price (c.y.)	Cost	Volume Calculation
B2 Length (lf) =	700	11.6			301	\$5.00	\$2,994	*assume 1ft depth
E Length (lf) =	500	16.1			298			
SUB-TOTAL (c.y.) =					599		\$2,994	
TOTAL EMBANKMENT COMPACTION =					982		\$4,911	

GRAVEL BORROW INCL. HAUL								
Embank. Comp. (c.y.) =	982				N/A	\$20.00	N/A	Assumptions *assume all excavated material can be used for embankment compaction ROADWAY EXCAV > EMBANK COMP => NO BORROW
Roadway Excav. (c.y.) =	1827							
TOTAL =					N/A		N/A	

COMMERCIAL HMA								
			Volume (c.y.) = (length x width x depth (ft.) /27)	CY To T Factor	Tons = Volume / (CYxT Factor)	Unit Price (tons)	Cost	Assumptions
Sum of Driveways to Remain widths (ft) =	165		22	2.05	45	\$140.00	\$6,303	*HMA depth = 2in = 0.17ft
Assumed Approach length (ft) =	10							*assume 10ft length for approach
Depth (ft) =	0.17							* See DrivewayRemovalAreas tab for "Sum of Driveways to Remain widths"
Relocate D/W's (sf) =	1908							* Add 1908 sf for RELOCATE D/W's
TOTAL =					45		\$6,303	

6 in CEMENT CONCRETE DRIVEWAY ENTRANCE								
			Area (s.y.)		Unit Price (s.y.)	Cost	Assumptions	
Sum of Driveways to Remain widths (ft) =	165		222		\$40.00	\$8,889	*Entrance width = driveway width + 5ft PER D/W * 7 D/W's (See DrivewayRemovalAreas tab)	
Length (ft) =	10						* Area = (sum of entrance widths x length)/9 *10 length	
TOTAL =					222		\$8,889	

CURB AND GUTTER								
			Length (l.f.)		Unit Price (l.f.)	Cost	Assumptions	
Length (lf) =	2400		2400		\$15.00	\$36,000	1200x 2 = 2400 l.f. = curb/gutter length for removal	
TOTAL =					2400		\$36,000	

TRAFFIC CURB							Assumptions	
						Length (l.f.)	Unit Price (l.f.)	Cost
Length (lf) =	1790					1790	\$15.00	\$26,850
TOTAL =						1790	TOTAL =	\$26,850

\*Traffic curb runs along median  
\*Length = median length x 2 (both sides) = 895 x 2 = 1790 ft

DOUBLE FACED CEMENT CONCRETE TRAFFIC CURB							Assumptions	
						Length (l.f.)	Unit Price (l.f.)	Cost
Length (lf) =	150					150	\$40.00	\$6,000
TOTAL =						150	TOTAL =	\$6,000

\*One left turn lane at median breaks = 150ft (see City of Lacey Detail)

CEMENT CONCRETE SIDEWALK RAMP							Assumptions	
						Unit Price (ea.)	Cost	
# of Ramps	16					16	\$1,250.00	\$20,000
TOTAL =						16	TOTAL =	\$20,000

\*2 ramps at T-intersection NOT at median break; 4 instead of 6 at median break due to break not being at an intersection

SIDEWALK							Assumptions	
		Length (l.f.)	Area (s.f.)	Area (s.y.)	Unit Price (s.y.)	Cost		
Length (lf) =	2400	2235	22350	2483	\$30.00	\$74,500	*Sidewalk width = 10ft	*1200
Sum of remaining D/W WIDTHS =	165						x 2 = 2400 l.f. • REMAINING driveway widths =	SIDEWALK LENGTH
Width (ft) =	10							
TOTAL =						2,483	TOTAL =	\$74,500

STREET TREES							Assumptions	
						# of TREES	Unit Price (ea.)	Cost
Median Length (ft) =	895					26	\$400.00	\$10,229
Roadway Edge Length (ft) =	2400					69	\$400.00	\$27,429
TOTAL =						94	TOTAL =	\$37,657

\*tree spacing = 35ft O.C.  
\*trees on both sides of roadway and in median

TREE GRATES							Assumptions	
						# of TREES	Unit Price (ea.)	Cost
						69	\$800.00	\$54,857
TOTAL =						69	TOTAL =	\$54,857

\*one grate for each tree along roadway edge

SHRUBS AND PLANTS							Assumptions	
						Area (s.f.)	Unit Price (s.f.)	Cost
Median Length (ft) =	895					7160	\$1.50	\$10,740
Median Width (ft) =	8							
TOTAL =						7160	TOTAL =	\$10,740

\*shrubs and plants in median only = 9ft - 1ft for curb = 8ft width

IRRIGATION							Assumptions	
						Area (s.f.)	Unit Price (s.f.)	Cost
Median Area (s.f.) =	7160					16760	\$2.50	\$41,900
Roadway Edge Area (s.f.) =	9600							
TOTAL =						16760	TOTAL =	\$41,900

\*median width = 9ft - 1ft for curb = 8ft  
\*140 s.f. per tree along roadway = 140 x 69 = 9600s.f.

TOPSOIL							Assumptions
				Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	
Median Area (s.f.) =	7160			398	\$35.00	\$13,922	* 18 in = 1.5ft depth for entire median and roadway edge trees (4ftx4ft tree well) -> 16 sf x 69trees = 1104sf. * 6 In = 0.5ft depth for embankment/excavation limits * Roadway Edge Tree Area = 16sf x 69 trees= 1104 sf * Embank/Excav Area = 4.5ft (width) x 2235ft (length) - 1104sf (Roadway Edge Tree Area) = 9471sf
Median Depth (ft.) =	1.5						
Roadway Edge Tree Area (s.f.) =	1104			61	\$35.00	\$2,147	
Roadway Edge Depth (ft) =	1.5						
Embank/Excav Area (s.f.) =	8954			166	\$35.00	\$5,803	
Embank/Excav Depth (ft) =	0.5						
D/W Removal (s.f.) =	13650			253	\$35.00	\$8,847	
D/W Removal Depth (ft) =	0.5						
TOTAL (c.y.) =				878	TOTAL =	\$30,719	

SEEDING/MULCHING/FERTILIZER							Assumptions
				Area (acre)	Unit Price (acre)	Cost	
Embank/Excav Area (s.f.) =	8954			0.21	\$8,000.00	\$1,644	* Seeding/Mulching/Fertilizer area = Embank/Excav Area
TOTAL =				0.21	TOTAL =	\$1,644	

BARK MULCH							Assumptions
				Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	
Median Area (s.f.) =	7160			88	\$35.00	\$3,063	* median only
Median Depth (ft.) =	0.33						* depth = 4in = 0.33ft
TOTAL =				88	TOTAL =	\$3,063	

JOINT TRENCH							Assumptions
				# of Crossings	Length (l.f.)	Unit Price (l.f.)	
Length (ft) =	1200			2	1364	\$30.00	\$40,920
Trench Spacing (ft) =	800						
R/W width (ft) =	82						
TOTAL =				1364	TOTAL =	\$40,920	* only on one side of roadway * crossing every 800ft proposed R/W = 82ft width

ELECTRICAL CONVERSION							Assumptions
					Unit Price (ea.)	Cost	
# of Conversions =	14				\$4,000.00	\$56,000	* Counted addresses on "College St. Driveway Tabulation" street that fall within limits of Phase 4 - FULL TAKES to obtain number of conversions * Added \$1000.00 to conversion unit price to cover cost of service trench
TOTAL =				14	TOTAL =	\$56,000	

VAULT EXCAVATION							Assumptions
				# of Crossings	Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	
Length (ft) =	1200			2	50	\$25.00	\$1,522
Vault Spacing (ft) =	800				11		
Depth (ft) =	4						
TOTAL =				61	TOTAL =	\$1,522	* only on one side of roadway * excavate area = 15ft x 15ft every 800ft * excavate area = 7ft x 7ft at every crossing * excavation depth = 4ft Volume = (# crossings x depth x excavate area)/27

PSE CONVERSION COSTS						
					Unit Price (l.f.)	Cost
Length (ft) =	1200				\$28.25	\$33,900
TOTAL =				1200	TOTAL =	\$33,900

STREET LIGHTS							Assumptions
				# of Lights	Unit Price (ea.)	Cost	
Length (ft) =	2400			20	\$5,500.00	\$110,000	* full length, both sides of roadway = 1050x2 = 2100ft
Light Spacing (ft) =	240						* 240ft spacing * add 10 lights to cover costs of intersection adjustments
TOTAL =				20	TOTAL =	\$110,000	

PLASTIC WIDE LINE							Assumptions
					Unit Price (l.f.)	Cost	
Length (ft) =	2180				\$1.00	\$2,180	* length = (1200x2) - cross street widths cross street width total = approx 220ft
TOTAL =				2180	TOTAL =	\$2,180	

PLASTIC TRAFFIC LETTER								Assumptions
# Letters =	4					Unit Price (ea.)	Cost	
						\$60.00	\$240	* "ONLY" per left turn lane x (1) left turn lanes = 1;
								1 x 4 = 4 letters
				<b>TOTAL =</b>	<b>4</b>		<b>\$240</b>	

PLASTIC TRAFFIC ARROW								Assumptions
# Arrows =	4					Unit Price (ea.)	Cost	
						\$75.00	\$300	* (2) arrows per left turn lane x (1) left turn lanes = 2;
								also assume 2 additional at Lacey Blvd intersection
				<b>TOTAL =</b>	<b>4</b>		<b>\$300</b>	

PLASTIC BICYCLE LANE SYMBOL								Assumptions
# Symbols =	14					Unit Price (ea.)	Cost	
						\$125.00	\$1,750	* (1) at after each break in bike lane at intersections
				<b>TOTAL =</b>	<b>14</b>		<b>\$1,750</b>	= 14

PLASTIC STOP LINE								Assumptions
# Stop Lines =	7				Length (l.f.)	Unit Price (l.f.)	Cost	
					70	\$5.00	\$350	* (1) at each intersection = 7
Lane width (ft) =	10							assume lane width = 10 ft
				<b>TOTAL =</b>	<b>70</b>		<b>\$350</b>	

TEMPORARY STRIPING								Assumptions
Length (ft) =	2400				Length (l.f.)	Unit Price (l.f.)	Cost	
					2400	\$0.25	\$600	* only lane striping = 1200 x 2 = 2400
				<b>TOTAL =</b>	<b>2400</b>		<b>\$600</b>	

RETAINING WALL								Assumptions
Length of wall (ft) =	0				Area (s.f.)	Unit Price (s.f.)	Cost	
					0	\$110.00	N/A	
Avg. Height (ft) =	0							
				<b>TOTAL =</b>	<b>0</b>		<b>N/A</b>	

STORM DRAINAGE  
see calc's by J. Brantlin

CLEAR AND GRUB								Assumptions
Length (ft) =	1707				Area (acre)	Unit Price (acre)	Cost	
					1.4	\$5,000.00	\$7,250	* Prop. Total width = 92ft
Width (ft) =	37							* Improvement width = 55ft
				<b>TOTAL =</b>	<b>1.4</b>		<b>\$7,250</b>	* length = both sides of roadway for full length of segment - cross streets and existing D/W's = 2400 - (165 + 312) - 216 = 1707

SILT FENCE								Assumptions
B2 Length (lf) =	700	ONE SIDE			Length (l.f.)	Unit Price (l.f.)	Cost	
					700			* fill along ONE SIDE FOR B2 = 700 ft; fill along TWO SIDES FOR E = 1000 ft;
E Length (lf) =	500	TWO SIDES			1000	\$6.00	\$6,000	* Length = 700 + 300
				<b>TOTAL =</b>	<b>1700</b>		<b>\$6,000</b>	

RAISED PAVEMENT MARKERS								Assumptions
Length for Line Striping (ft) =	2400	# TYPE 1 along median	# TYPE 1 for lane stripe	# TYPE 2 along median	# TYPE 2 for lane stripe	Unit Price (HUND)	Cost	
		383	150	128	225	\$250.00	\$1,331	* Along Median: (3) TYPE 1 per 16ft length; (1) TYPE 2 per 16ft length
Length Along Median (ft) =	2040					\$350.00	\$1,234	Lane Stripe: (2) TYPE 1 per stripe; (3) TYPE 2 per stripe; Stripe spacing = 20ft
		<b>TYPE 1 TOTAL =</b>	<b>533</b>	<b>TYPE 2 TOTAL =</b>	<b>353</b>		<b>\$2,565</b>	* Length for striping = 1200 x 2 = 2400ft * Length along median = (895 x 2) + 250 for two left turn lanes at 250ft ea. = 2040

CLEARING LIMIT FENCE								Assumptions
B2 Length (lf) =	700	ONE SIDE			Length (l.f.)	Unit Price (l.f.)	Cost	
					700	\$4.00	\$2,800	* Applies where there is no silt fence in place
E Length (lf) =	0							
				<b>TOTAL =</b>	<b>700</b>		<b>\$2,800</b>	

# Bid Tabulation

Lacey Contract Number: Contractor: Engineer  
 Federal Aid Project Number: DO-NOT-MODIFY  
 WSDOT Contract Number: DO-NOT-MODIFY  
 TIG Contract Number: DO-NOT-MODIFY  
 Prepared By: JMB/EJM  
 Checked By: MJJ  
 Prepared Date: October 8, 2008

## PHASE 5-COLLEGE STREET IMPROVEMENTS

Quantity	Unit	Item ID	Item Description	Unit Price	Extended Price	Provision	COMMENT
1	LS	109-010	Mobilization	\$213,333.00	\$213,333.00	WSDOT 1-09	7% => 0.07 x 3,047,613.00 = \$213,333.00
1	LS	107-010	SPCC Plan	\$5,000.00	\$5,000.00	WSDOT 1-07	
1	LS	801-010	Temporary Water Pollution/Erosion Control	\$30,000.00	\$30,000.00	WSDOT 8-01	0%
2600	LF	801-090	Silt Fence	\$6.00	\$15,600.00	CITY 8-01	
60	DAYS		ESC Lead	\$100.00	\$6,000.00		
0	LF	830-010	Clearing Limit Fence	\$4.00	\$0.00	CITY 2-01	
1	LS	110-010	Project Temporary Traffic Control	\$100,000.00	\$100,000.00	WSDOT 1-10	
3000	HR	110-030	Flaggers and Spotters	\$38.00	\$114,000.00	WSDOT 1-10	
800	SF	110-100	Construction Signs Class A	\$20.00	\$16,000.00	WSDOT 1-10	
1	LS	201-040	Clearing and Grubbing	\$9,400.00	\$9,400.00	CITY 2-01	
1	LS	202-030	Removal of Structures and Obstructions	\$75,000.00	\$75,000.00	CITY 2-02	
867	SY		Sidewalk and Driveway Removal	\$10.00	\$8,700.00		
1300	LF		Curb and Gutter Removal	\$5.00	\$6,500.00		
530	SY		Approach Removal	\$15.00	\$7,950.00		
1015	CY	203-030	Roadway Excavation Incl. Haul	\$20.00	\$20,300.00	CITY 2-03	
859	CY	203-060	Embankment Compaction	\$5.00	\$4,300.00	CITY 2-03	
2000	TN	404-020	Crushed Surfacing	\$25.00	\$50,000.00	WSDOT 4-04	
2450	TN	604-030	HMA Cl. 1/2" PG. 64-22	\$90.00	\$220,500.00	CITY 5-04	
25	TN		Commercial HMA	\$140.00	\$3,600.00	WSDOT 5-04	
268	SY		6 Inch Cement Conc. Driveway Entrance	\$40.00	\$10,700.00	WHP 8-06	
1433	LF	213-010	Joint Trench	\$30.00	\$43,000.00	CITY 2-13	
66	CY	213-020	Vault Excavation	\$25.00	\$1,650.00	CITY 2-13	
11	EA		Electrical Service Conversion	\$4,000.00	\$44,000.00	CITY 2-14	
1	LS	205-030	Trench Safety System	\$10,000.00	\$10,000.00	CITY 2-05	
50	HR		Utility Potholing	\$100.00	\$5,000.00	CITY 7-08	
7	EA	705-100	Catch Basin Type 1	\$1,300.00	\$9,100.00	CITY 7-05	Storm
3	EA	705-110	Catch Basin Type 1L	\$1,750.00	\$5,300.00	CITY 7-05	Storm
5	EA	705-200	Catch Basin Type 2 - 48 In. Diam.	\$3,000.00	\$15,000.00	CITY 7-05	Storm
1478	LF	704-057	18 Inch Diameter Storm Sewer Pipe	\$50.00	\$73,900.00	CITY 7-04	Storm- added \$10/ft to pipe costs to cover bedding and backfill
1990	LF	804-030	Cement Conc. Traffic Curb	\$15.00	\$29,900.00	WSDOT 8-04	
2600	LF	804-040	Cement Conc. Traffic Curb and Gutter	\$15.00	\$39,000.00	WSDOT 8-04	
150	LF		Double Faced Cement Concrete Traffic Curb	\$40.00	\$6,000.00	WHP 8-04	
2666	SY	814-070	Cement Concrete Sidewalk	\$30.00	\$80,000.00	CITY 8-14	
12	EA	814-080	Cement Concrete Sidewalk Ramp	\$1,250.00	\$15,000.00	CITY 8-14	
1	LS	808-030	Lawn and Landscape Restoration	\$25,000.00	\$25,000.00	GSP 8-05	
737	CY	802-200	Topsoil Type A	\$35.00	\$25,800.00	GSP 8-02	
97	CY	802-121	Bark Mulch	\$35.00	\$3,400.00	GSP 8-02	
0.22	AC	801-040	Seeding, Fertilizing, and Mulching	\$8,000.00	\$1,800.00	WSDOT 8-01	
103	EA	802-???	Street Trees	\$400.00	\$41,100.00	GSP 8-02	
74	EA	802-???	Tree Grates	\$800.00	\$59,400.00	GSP 8-02	
1	LS	802-???	Shrubs and Plants	\$11,940.00	\$11,900.00	GSP 8-02	
1	LS	803-030	Irrigation System	\$45,800.00	\$45,800.00	GSP 8-03	
2	EA	803-100	Irrigation System Modification and Adjustment	\$1,000.00	\$2,000.00	CITY 8-03	approx. (1) for every 5 homes along College St
1	LS	820-042	Luminaire System	\$130,600.00	\$130,600.00	CITY 8-20	
5.8	HUND	809-030	Raised Pavement Marker Type 1	\$250.00	\$1,500.00	WSDOT 8-09	
3.8	HUND	809-040	Raised Pavement Marker Type 2	\$350.00	\$1,300.00	WSDOT 8-09	
2486	LF	822-082	Plastic Wide Line	\$1.00	\$2,500.00	WSDOT 8-22	
4	EA	822-200	Plastic Traffic Letter	\$60.00	\$240.00	WSDOT 8-22	
2	EA	822-180	Plastic Traffic Arrow	\$75.00	\$200.00	WSDOT 8-22	
8	EA	822-085	Plastic Bicycle Lane Symbol	\$125.00	\$1,000.00	WSDOT 8-22	
40	LF	822-040	Plastic Stop Line	\$5.00	\$200.00	CITY 8-22	
2600	LF	823-010	Temporary Pavement Marking	\$0.25	\$700.00	WSDOT 8-23	
2600	LF	823-015	Removing Temporary Pavement Marking	\$0.10	\$260.00	WSDOT 8-23	same value as Temporary Pavement Marking = 2600ft
4	EA	813-040	Monument Case and Cover	\$400.00	\$1,600.00	CITY 8-13	
1	MC	104-100	Minor Change	\$20,000.00	\$20,000.00		
1	LS	104-100	Miscellaneous Items	\$14,200.00	\$14,200.00	WSDOT 1-04	
				Schedule A Subtotal:	\$1,684,200.00		
				20% Contingency:	\$338,800.00		
				12% Cons. Engineer:	\$202,104.00		
				PSE Conversion:	\$36,725.00		
				Right-of-way	\$800,000.00		
				Schedule Total	\$3,059,829.00		

### Project Summary

Schedule Contract Subtotal: \$2,259,829.00  
 Schedule Right-of-way: \$800,000.00  
**\$3,059,829.00**

I hereby certify this to be a true and correct tabulation of bids received and opened on \_\_\_\_\_

Signature \_\_\_\_\_

COLLEGE STREET IMPROVEMENT #034709  
COST ESTIMATE

PHASE 5  
STA 163+00 to 176+00 = 1300 LF  
F Section = 250 + 750 = 1000  
C2 Section = 300

HMA (assume Section F and C2):							Volume Calculation (refer to F and C2 typical cross section)
	Volume (c.y.) = (area (sf) x length (l.f.))/27	CY to T Factor	Tons = Volume/ (CYxT Factor)	Unit Price (tons)	Cost		
HMA WEARING COURSE (2" DEPTH)	417	2.05	855	\$90.00	\$76,989		$((26+26)*(2/12)*1300)/27 = 417$
HMA LEVELING COURSE (4" DEPTH)	305	2.05	625	\$90.00	\$56,261		$(19*(4/12)*1300)/27 = 305$
HMA LEVELING COURSE (DEPTH VARIES)	473	2.05	970	\$90.00	\$87,269		$((5.17+3.62)*1000)+(8.21+5.06)*300)/27 = 473$
<b>TOTAL (tons) =</b>			<b>2450</b>	<b>TOTAL =</b>	<b>\$220,519</b>		

CRUSHED ROCK (assume Section F and C2):							Volume Calculation (refer to F and C2 typical cross section)
	Volume (c.y.) = (area (sf) x length (l.f.))/27	CY to T Factor	Tons = Volume/ (CYxT Factor)	Unit Price (tons)	Cost		
CRUSHED ROCK (12" DEPTH) for Roadway	987	1.85	1826	\$25.00	\$45,650		$(20.5*segment\ length = 1300)/27 = 987$
CRUSHED ROCK (2" DEPTH) for Driveway	12	1.85	23	\$25.00	\$574		$((2/12)*D/W\ area = 2010)/27 = 12$
CRUSHED ROCK (1" DEPTH) for Sidewalk	81	1.85	151	\$25.00	\$3,769		$((1/12)*sidewalk\ area + 2666*9)/D/W\ entrance = 268*9)/27 = 81$
<b>TOTAL (tons) =</b>			<b>2000</b>	<b>TOTAL =</b>	<b>\$49,993</b>		

ROADWAY EXCAVATION							Volume Calculation (refer to F and C2 typical cross section)
	X-SECTION AREA (SF)	LENGTH (LF)	Volume (c.y.) = (area (sf) x length (l.f.))/27	Unit Price (c.y.)	Cost		
F =	21	1000	781	\$20.00	\$15,630		$F = (21*1000)/27$
C2 =	10.9	300	121	\$20.00	\$2,420		$C2 = (10.9*300)/27$
				Sub total =	\$18,050		

MEDIAN							Volume Calculation (refer to F and C2 typical cross section)
	Area (sf) =	Length (lf) =	Volume (c.y.) = (area (sf) x length (l.f.))/27	Unit Price (c.y.)	Cost		
Area (sf) =	3.06		113	\$20.00	\$2,255		$((0.1+2.96)*1300)/27 = 113$
Length (lf) =	1300 L.F. - 55ft for one median breaks @ ~55ft/break - 250 ft for two left turn lane @ 250ft ea		995				
				Sub total =	\$2,255		
<b>TOTAL =</b>			<b>1015</b>	<b>TOTAL =</b>	<b>\$20,305</b>		

CURB AND GUTTER REMOVAL							Assumptions
	F Length (lf) =	C2 Length (lf) =	Length (l.f.)	Unit Price (l.f.)	Cost		
F Length (lf) =	1000		1000	\$5.00	\$5,000		F=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION
C2 Length (lf) =	300		300	\$5.00	\$1,500		C2=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION
<b>TOTAL =</b>			<b>1300</b>	<b>TOTAL =</b>	<b>\$6,500</b>		

SIDEWALK AND DRIVEWAY REMOVAL							Assumptions
	F Length (lf) =	C2 Length (lf) =	Length (l.f.)	Area (s.y.)	Unit Price (s.y.)	Cost	
F Length (lf) =	1000		1000	867	\$10.00	\$8,667	SIDEWALK WIDTH = 6FT
C2 Length (lf) =	300		300				F=S+D IN FILL ON ONE SIDE ONLY PER X-SECTION
<b>TOTAL =</b>			<b>1300</b>	<b>TOTAL =</b>	<b>867</b>	<b>\$8,667</b>	C2=S+D IN FILL ON ONE SIDE ONLY PER X-SECTION

APPROACH REMOVAL							Assumptions
	D/W REMOVAL (sf) =	D/W REMAIN (sf) =	Area (s.y.)	Unit Price (s.y.)	Cost		
D/W REMOVAL (sf) =	2758		306	\$15.00	\$7,947		see Driveway/Removal Areas tab for breakdown of areas; AREA = SF/9
D/W REMAIN (sf) =	2010		223				
<b>TOTAL =</b>			<b>530</b>	<b>TOTAL =</b>	<b>\$7,947</b>		

EMBANKMENT COMPACTION							Assumptions
FILL IN REMOVAL OF D/W AND APPROACH							
	D/W REMOVAL (sf) =	D/W REMAIN (sf) =	Volume (c.y.) = (area (sf) x depth (l.f.))/27	Unit Price (c.y.)	Cost		
D/W REMOVAL (sf) =	2758		51	\$5.00	\$441		*D/W AND APPROACH DEPTH = 0.5R
D/W REMAIN (sf) =	2010		37				*see "Driveway Removal Areas" tab for breakdown of areas
<b>SUB-TOTAL =</b>			<b>88</b>	<b>Sub total =</b>	<b>\$441</b>		

FILL IN REMOVAL OF CURB AND GUTTER							Assumptions
	F Length (lf) =	C2 Length (lf) =	Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost		
F Length (lf) =	1000		42	\$5.00	\$271		*length from curb/gutter removal
C2 Length (lf) =	300		13				*gutter width = 1.5ft and depth = 0.75ft
<b>SUB-TOTAL =</b>			<b>54</b>	<b>Sub total =</b>	<b>\$271</b>		

FILL IN REMOVAL OF SIDEWALK							Assumptions
	F Length (lf) =	C2 Length (lf) =	Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost		
F Length (lf) =	1000		42	\$5.00	\$208		*length= east sidewalk - east D/W and street crossings
C2 Length (lf) =	300		13				*sidewalk width = 6ft and depth = 0.33 ft
<b>SUB-TOTAL =</b>			<b>54</b>	<b>Sub total =</b>	<b>\$208</b>		

CURB, GUTTER, AND SIDEWALK									
					Volume (c.y.) = (area (sf) x length (l.f.) / 27)	Unit Price (c.y.)	Cost	Volume Calculation	
F Length (lf) =	1000	14.8			548	\$5.00	\$3,314	*assume 1ft depth	
C2 Length (lf) =	300	10.31			115				
SUB-TOTAL (c.y.) =					663	Sub total =	\$3,314		
TOTAL EMBANKMENT COMPACTION =					859	TOTAL =	\$4,234		

GRAVEL BORROW INCL. HAUL									
					Volume (c.y.)	Unit Price (c.y.)	Cost	Assumptions	
Embank. Comp. (c.y.) =	859				N/A	\$20.00	N/A	*assume all excavated material can be used for embankment compaction ROADWAY EXCAV > EMBANK COMP => NO BORROW	
Roadway Excav. (c.y.) =	1015								
TOTAL =					N/A				

COMMERCIAL HMA										
					Volume (c.y.) = (length x width x depth (ft.) / 27)	CY To T Factor	Tons = Volume / (CYXT Factor)	Unit Price (tons)	Cost	Assumptions
Sum of Driveways to Remain widths (ft) =	201				12	2.05	25	\$140.00	\$3,561	*HMA depth = 2in = 0.17ft
Assumed Approach length (ft) =	10									*assume 10ft length for approach
Depth (ft) =	0.17									* See DrivewayRemovalAreas tab for "Sum of Driveways to Remain widths"
TOTAL =					25			TOTAL =	\$3,561	

6 in CEMENT CONCRETE DRIVEWAY ENTRANCE									
					Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions	
Sum of Driveways to Remain widths (ft) =	201				268	\$40.00	\$10,711	*Entrance width = driveway width + 5ft PER D/W * 8 D/W's (See DrivewayRemovalAreas tab) * Area = (sum of entrance widths x length) / 9 * 10 length	
Length (ft) =	10								
TOTAL =					268	TOTAL =	\$10,711		

CURB AND GUTTER									
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions	
Length (lf) =	2600				2600	\$15.00	\$39,000	1300x 2 = 2600 l.f. = curb/gutter length for removal	
TOTAL =					2600	TOTAL =	\$39,000		

TRAFFIC CURB									
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions	
Length (lf) =	1990				1990	\$15.00	\$29,850	*Traffic curb runs along median *Length = median length x 2 (both sides) = 995 x 2 = 1990 ft	
TOTAL =					1990	TOTAL =	\$29,850		

DOUBLE FACED CEMENT CONCRETE TRAFFIC CURB									
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions	
Length (lf) =	150				150	\$40.00	\$6,000	*ONE left turn lanes at median breaks = 150ft x 1 = 350ft (see City of Lacey Detail)	
TOTAL =					150	TOTAL =	\$6,000		

CEMENT CONCRETE SIDEWALK RAMP										
					Unit Price (ea.)	Cost	Assumptions			
# of Ramps	12				12	\$1,250.00	\$15,000	*2 ramps at T-intersection NOT at median break; 6 at T-intersection at median break		
TOTAL =					12	TOTAL =	\$15,000			

SIDEWALK							Assumptions	
Length (lf) =	2600	Length (lf.)	2399	Area (s.y.)	2666	Unit Price (s.y.)		Cost
Sum of remaining D/W WIDTHS =	201							* Sidewalk width = 10ft 2 = 2600 lf. - driveway widths = sidewalk length for removal
Width (ft) =	10							*1300x
<b>TOTAL =</b>				<b>2666</b>	<b>TOTAL =</b>	<b>\$79,967</b>		

STREET TREES							Assumptions	
Median Length (ft) =	995	Roadway Edge Length (ft) =	2600	# of TREES	28	Unit Price (ea.)		Cost
					74	\$400.00	\$29,714	*tree spacing = 35ft O.C. *trees on both sides of roadway and in median
<b>TOTAL =</b>				<b>103</b>	<b>TOTAL =</b>	<b>\$41,086</b>		

TREE GRATES							Assumptions	
				# of TREES	74	Unit Price (ea.)		Cost
<b>TOTAL =</b>				<b>74</b>	<b>TOTAL =</b>	<b>\$59,429</b>		*one grate for each tree along roadway edge

SHRUBS AND PLANTS							Assumptions	
Median Length (ft) =	995	Median Width (ft) =	8	Area (s.f.)	7960	Unit Price (s.f.)		Cost
<b>TOTAL =</b>				<b>7960</b>	<b>TOTAL =</b>	<b>\$11,940</b>		*shrubs and plants in median only = 9ft - 1ft for curb = 8ft width

IRRIGATION							Assumptions	
Median Area (s.f.) =	7960	Roadway Edge Area (s.f.) =	10400	Area (s.f.)	18360	Unit Price (s.f.)		Cost
<b>TOTAL =</b>				<b>18360</b>	<b>TOTAL =</b>	<b>\$45,900</b>		* median width = 9ft - 1ft for curb = 8ft s.f. per tree along roadway = 140 x 74 = 10360s.f.

TOPSOIL							Assumptions	
Median Area (s.f.) =	7960	Median Depth (ft.) =	1.5	Roadway Edge Tree Area (s.f.) =	1189	Roadway Edge Depth (ft) =		1.5
Embank/Excav Area (s.f.) =	9607	Embank/Excav Depth (ft) =	0.5	D/W Removal (s.f.) =	2758	D/W Removal Depth (ft) =	0.5	
<b>TOTAL =</b>				<b>737</b>	<b>TOTAL =</b>	<b>\$25,803</b>		* 18 in = 1.5ft depth for entire median and roadway edge trees (4ftx4ft tree well) → 16 sf x 74 trees = 1184 s.f. * 6 in = 0.5ft depth for embankment/excavation limits *Roadway Edge Tree Area = 16sf x 74 trees = 1184 sf *Embank/Excav Area = 4.5ft (width) x 2399ft (length) - 1504sf (Roadway Edge Tree Area) = 9607

SEEDING/MULCHING/FERTILIZER							Assumptions	
Embank/Excav Area (s.f.) =	9607	Area (acre)	0.22	Unit Price (acre)	\$8,000.00	Cost		\$1,764
<b>TOTAL =</b>				<b>0.22</b>	<b>TOTAL =</b>	<b>\$1,764</b>		*Seeding/Mulching/Fertilizer area = Embank/Excav Area

BARK MULCH							Assumptions	
Median Area (s.f.) =	7960	Median Depth (ft.) =	0.33	Volume (c.y.) = (length x width x depth (ft))/27	97	Unit Price (c.y.)		Cost
<b>TOTAL =</b>				<b>97</b>	<b>TOTAL =</b>	<b>\$3,405</b>		* median only * depth = 4in = 0.33ft

JOINT TRENCH							Assumptions		
Length (ft) =	1300	# of Crossings	2	Length (l.f.)	1433	Unit Price (l.f.)		\$30.00	Cost
Trench Spacing (ft) =	800								
R/W width (ft) =	82								
<b>TOTAL =</b>				<b>1433</b>	<b>TOTAL =</b>	<b>\$42,998</b>			

\*only on one side of roadway  
\* crossing every 800ft  
proposed R/W = 82ft width

ELECTRICAL CONVERSION							Assumptions		
# of Conversions =	11	Unit Price (ea.)	\$4,000.00	Cost	\$44,000				
<b>TOTAL =</b>				<b>11</b>	<b>TOTAL =</b>	<b>\$44,000</b>			

\*Counted addresses on "College St. Driveway  
Fabrication" sheet that fall within limits of Phase 4 -  
FULL TAKES to obtain number of conversions  
\* Added \$1000.00 to conversion unit price to cover  
cost of service trench

VAULT EXCAVATION							Assumptions		
Length (ft) =	1300	# of Crossings	2	Volume (c.y.) = (length x width x depth (ft))/27	54	Unit Price (c.y.)		\$25.00	Cost
Vault Spacing (ft) =	800				12				
Depth (ft) =	4								
<b>TOTAL =</b>				<b>66</b>	<b>TOTAL =</b>	<b>\$1,649</b>			

\*only on one side of roadway  
area = 15ft x 15ft every 800ft  
\*excavate  
\*excavate area = 7ft x 7ft at every crossing  
\*excavation depth = 4ft  
Volume = (# crossings x depth x excavate area)/27

PSE CONVERSION COSTS						
Length (ft) =	1300	Unit Price (l.f.)	\$28.25	Cost	\$36,725	
<b>TOTAL =</b>				<b>1300</b>	<b>TOTAL =</b>	<b>\$36,725</b>

STREET LIGHTS							Assumptions	
Length (ft) =	2600	# of Lights	21	Unit Price (ea.)	\$5,500.00	Cost		\$114,583
Light Spacing (ft) =	240							
<b>TOTAL =</b>				<b>21</b>	<b>TOTAL =</b>	<b>\$114,583</b>		

\* full length, both sides of roadway = 1300 x 2 =  
2600ft  
\* 240ft spacing  
add 10 lights to cover costs of intersection  
adjustments

PLASTIC WIDE LINE							Assumptions	
Length (ft) =	2466	Unit Price (l.f.)	\$1.00	Cost	\$2,466			
<b>TOTAL =</b>				<b>2466</b>	<b>TOTAL =</b>	<b>\$2,466</b>		

\* length = (1300x2) - cross street widths  
\* cross street width total = approx 134ft

PLASTIC TRAFFIC LETTER							Assumptions	
# letters =	4	Unit Price (ea.)	\$60.00	Cost	\$240			
<b>TOTAL =</b>				<b>4</b>	<b>TOTAL =</b>	<b>\$240</b>		

\* "ONLY" per left turn lane x (1) left turn lanes = 1;  
1 x 4 = 4 letters

PLASTIC TRAFFIC ARROW							Assumptions	
# Arrows =	2	Unit Price (ea.)	\$75.00	Cost	\$150			
<b>TOTAL =</b>				<b>2</b>	<b>TOTAL =</b>	<b>\$150</b>		

\* (2) arrows per left turn lane x (1) left turn lanes =  
2

PLASTIC BICYCLE LANE SYMBOL							Assumptions	
# Symbols =	8	Unit Price (ea.)	\$125.00	Cost	\$1,000			
<b>TOTAL =</b>				<b>8</b>	<b>TOTAL =</b>	<b>\$1,000</b>		

\* (1) at after each break in bike lane at intersections  
= 22

PLASTIC STOP LINE							Assumptions	
# Stop Lines =	4	Length (l.f.)	40	Unit Price (l.f.)	\$5.00	Cost		\$200
Lane width (ft) =	10							
<b>TOTAL =</b>				<b>40</b>	<b>TOTAL =</b>	<b>\$200</b>		

\* (1) at each intersection = 5  
assume lane width = 10 ft

TEMPORARY STRIPING										
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
Length (ft) =	2600				2600	\$0.25	\$650	* only lane striping = 1300x 2 =2600		
TOTAL =					2600	TOTAL =	Cost			

RETAINING WALL										
					Area (s.f.)	Unit Price (s.f.)	Cost	Assumptions		
Length of wall (ft) =	0				0	\$110.00	N/A			
Avg. Height (ft) =	0									
TOTAL =					0	TOTAL =	N/A			

STORM DRAINAGE									
see calc's by J. Brannin									

CLEAR AND GRUB										
					Area (acre)	Unit Price (acre)	Cost	Assumptions		
Length (ft) =	2224				1.9	\$5,000.00	\$9,445	* Prop. Total width = 92ft		
Width (ft) =	37							* Improvement width = 55ft		
TOTAL =					1.9	TOTAL =	\$9,445	* length = both sides of roadway for full length of segment + cross streets and existing D/W's = 2600 - (200 + 41) = 2159		

SILT FENCE										
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
F Length (lf) =	1000	TWO SIDES			2000			* fill along TWO SIDES FOR F = 2000 ft; fill along TWO SIDES FOR C2 = 600ft;		
C2 Length (lf) =	300	TWO SIDES			600	\$6.00	\$15,600	* length = 2000+600		
TOTAL =					2600	TOTAL =	\$15,600			

RAISED PAVEMENT MARKERS										
		# TYPE 1 along median	# TYPE 1 for lane stripe	# TYPE 2 along median	# TYPE 2 for lane stripe	Unit Price (HUND)	Cost	Assumptions		
Length for Line Striping (ft) =	2600	420	163	140	244	\$250.00	\$1,456	* Along Median: (3) TYPE 1 per 16ft length; (4) TYPE 2 per 16ft length		
Length Along Median (ft) =	2240					\$350.00	\$1,343	* Lane Stripe: (2) TYPE 1 per stripe; (3) TYPE 2 per stripe; Stripe spacing = 20ft		
		TYPE 1 TOTAL =	583	TYPE 2 TOTAL =	384	TOTAL =	\$2,799	* Length for striping = 1300 x 2 =2600ft		
								* Length along median = (995x2) + 250 for two left turn lanes at 250ft ea. = 2240		

CLEARING LIMIT FENCE										
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
F Length (lf) =	0				0			* opposite side of roadway of silt fence		
C2 Length (lf) =	0				0	\$4.00	\$0			
TOTAL =					0	TOTAL =	\$0			

# Bid Tabulation

Levey Contract Number: \_\_\_\_\_ Contractor: Engineer  
 Federal Aid Project Number: \_\_\_\_\_ DO-NOT-MODIFY  
 WSDOT Contract Number: \_\_\_\_\_ DO-NOT-MODIFY  
 TIB Contract Number: \_\_\_\_\_ DO-NOT-MODIFY  
 Prepared By: JMB/EJM  
 Checked By: MMJ  
 Prepared Date: October 8, 2008

## PHASE 6 - COLLEGE STREET IMPROVEMENTS

Quantity	Unit	Item ID	Item Description	Unit Price	Extended Price	Provision	COMMENT
1	LS	109-010	Mobilization	\$367,554.00	\$367,554.00	WSDOT 1-09	7% => 0.07 x 5,250,770 = \$367,554.00
1	LS	107-010	SPCC Plan	\$5,000.00	\$5,000.00	WSDOT 1-07	
1	LS	801-010	Temporary Water Pollution/Erosion Control	\$30,000.00	\$30,000.00	WSDOT 8-01	0%
2850	LF	801-090	Silt Fence	\$5.00	\$17,100.00	CITY 8-01	
60	DAYS		EGC Lead	\$100.00	\$6,000.00		
700	LF	830-010	Clearing Limit Fence	\$4.00	\$2,800.00	CITY 2-01	
1	LS	110-010	Project Temporary Traffic Control	\$100,000.00	\$100,000.00	WSDOT 1-10	
3000	HR	110-030	Flaggers and Spotters	\$38.00	\$114,000.00	WSDOT 1-10	
800	SF	110-100	Construction Signs Class A	\$20.00	\$16,000.00	WSDOT 1-10	
1	LS	201-040	Clearing and Grubbing	\$14,249	\$14,249	CITY 2-01	
1	LS	202-030	Removal of Structures and Obstructions	\$75,000.00	\$75,000.00	CITY 2-02	
233	SY		Sidewalk and Driveway Removal	\$10.00	\$2,300.00		
2160	LF		Curb and Gutter Removal	\$5.00	\$10,500.00		
1081	SY		Approach Removal	\$15.00	\$16,200.00		
3379	CY	203-030	Roadway Excavation Incl. Haul	\$20.00	\$67,600.00	CITY 2-03	
4482	CY		Pond Excavation Incl. Haul	\$20.00	\$89,600.00	CITY 2-03	
1382	CY	203-060	Embankment Compaction	\$5.00	\$6,900.00	CITY 2-03	
3248	TN	404-020	Crushed Surfacing	\$25.00	\$81,200.00	WSDOT 4-04	
3894	TN	504-030	HMA CI 1/2" PG. 64-22	\$90.00	\$332,500.00	CITY 5-04	
58	TN		Commercial HMA	\$140.00	\$8,100.00	WSDOT 5-04	
627	SY		6 Inch Cement Conc. Driveway Entrance	\$40.00	\$25,100.00	WHP 8-08	
2318	LF	213-010	Joint Trench	\$30.00	\$69,500.00	CITY 2-13	
107	CY	213-020	Vault Excavation	\$25.00	\$2,700.00	CITY 2-13	
35	EA		Electrical Service Conversion	\$4,000.00	\$140,000.00	CITY 2-14	
1	LS	205-030	Trench Safety System	\$10,000.00	\$10,000.00	CITY 2-05	
50	HR		Utility Potholing	\$100.00	\$5,000.00	CITY 7-08	
8	EA	705-100	Catch Basin Type 1	\$1,300.00	\$10,400.00	CITY 7-05	Storm
15	EA	705-110	Catch Basin Type 1L	\$1,750.00	\$26,300.00	CITY 7-05	Storm
10	EA	705-200	Catch Basin Type 2 - 48 In. Diam.	\$3,000.00	\$30,000.00	CITY 7-05	Storm
1590	LF	704-057	18 Inch Diameter Storm Sewer Pipe	\$50.00	\$79,500.00	CITY 7-04	Storm- add \$10/R to pipe costs to cover bedding and backfill
850	LF	704-060	30 Inch Diameter Storm Sewer Pipe	\$78.00	\$66,300.00	CITY 7-04	Storm- add \$10/R to pipe costs to cover bedding and backfill
3390	LF	804-030	Cement Conc. Traffic Curb	\$15.00	\$50,850.00	WSDOT 8-04	
4200	LF	804-040	Cement Conc. Traffic Curb and Gutter	\$15.00	\$63,000.00	WSDOT 8-04	
150	LF		Double Faced Cement Concrete Traffic Curb	\$40.00	\$6,000.00	WHP 8-04	
4157	SY	814-070	Cement Concrete Sidewalk	\$30.00	\$124,700.00	CITY 8-14	
24	EA	814-080	Cement Concrete Sidewalk Ramp	\$1,280.00	\$30,700.00	CITY 8-14	
1	LS	806-030	Lawn and Landscape Restoration	\$25,000.00	\$25,000.00	GSP 8-05	
1276	CY	802-200	Topsoil Type A	\$35.00	\$44,700.00	GSP 8-02	
176	CY	802-121	Bark Mulch	\$35.00	\$6,100.00	GSP 8-02	
0.34	AC	801-040	Seeding, Fertilizing, and Mulching	\$8,000.00	\$2,700.00	WSDOT 8-01	
28	EA	802-???	Street Trees	\$400.00	\$11,000.00	GSP 8-02	
120	EA	802-???	Tree Grates	\$80.00	\$9,600.00	GSP 8-02	
1	LS	802-???	Shrubs and Plants	\$21,540.00	\$21,500.00	GSP 8-02	
1	LS	803-030	Irrigation System	\$77,900.00	\$77,900.00	GSP 8-03	
5	EA	803-100	Irrigation System Modification and Adjustment	\$1,000.00	\$5,000.00	CITY 8-03	approx. (1) for every 5 homes along College St
1	LS	820-042	Luminaire System	\$151,300.00	\$151,300.00	CITY 8-20	
8.8	HUND	809-030	Raised Pavement Marker Type 1	\$250.00	\$2,200.00	WSDOT 8-09	
6.3	HUND	809-040	Raised Pavement Marker Type 2	\$350.00	\$2,200.00	WSDOT 8-09	
4820	SF		Conc. Retaining Wall w/ Architectural Surface	\$110.00	\$497,200.00	WSDOT 8-02	
3955	LF	822-092	Plastic Wide Line	\$1.00	\$4,000.00	WSDOT 8-22	
4	EA	822-200	Plastic Traffic Letter	\$60.00	\$240.00	WSDOT 8-22	
2	EA	822-180	Plastic Traffic Arrow	\$75.00	\$200.00	WSDOT 8-22	
18	EA	822-085	Plastic Bicycle Lane Symbol	\$125.00	\$2,300.00	WSDOT 8-22	
30	LF	822-040	Plastic Stop Line	\$5.00	\$450.00	CITY 8-22	
4200	LF	823-010	Temporary Pavement Marking	\$0.25	\$1,100.00	WSDOT 8-23	
4200	LF	823-015	Removing Temporary Pavement Marking	\$0.10	\$420.00	WSDOT 8-23	same value as Temporary Pavement Marking = 4200ft
9	EA	813-040	Monument Case and Cover	\$400.00	\$3,600.00	CITY 8-13	locate at each intersection
1	MC	104-100	Minor Change	\$20,000.00	\$20,000.00		
1	LS	104-100	Miscellaneous Items	\$32,400.00	\$32,400.00	WSDOT 1-04	
				Schedule A Subtotal:	\$3,111,112.74		
				20% Contingency:	\$622,222.55		
				12% Cons. Engineer:	\$373,300.00		
				PSE Conversion:	\$59,300.00		
				Right-of-way:	\$1,570,000.00		
				Schedule Total:	\$5,735,935.28		

### Project Summary

Schedule Contract Subtotal: \$4,165,935.28  
 Schedule Right-of-way: \$1,570,000.00  
 \$5,735,935.28

I hereby certify this to be a true and correct tabulation  
 of bids received and opened on \_\_\_\_\_

Signature

COLLEGE STREET IMPROVEMENT #034709  
COST ESTIMATE

PHASE 6	B Section = 950 + 400 = 1350
STA 138+00 to 159+00 = 2100 LF	E Section = 250 + 500 = 750

HMA (assume Sections E and B):						
	Volume (c.y.) = (area (sf) x length (l.f.) / 27)	CY to T Factor	Tons = Volume / (CYxT Factor)	Unit Price (tons)	Cost	Volume Calculation (refer to E and B typical cross section)
HMA WEARING COURSE (2" DEPTH)	674	2.05	1382	\$90.00	\$124,367	$((26+26) * (2/12) * 2350) / 27 = 754$
HMA LEVELING COURSE (4" DEPTH)	493	2.05	1010	\$90.00	\$90,883	$(19 * (4/12) * 2350) / 27 = 551$
HMA LEVELING COURSE (DEPTH VARIES)	635	2.05	1802	\$90.00	\$117,209	$[(6.68+0.92) * 1350] + [(3.94+5.25) * (250+500)] = 635$
<b>TOTAL (tons) =</b>			<b>3694</b>	<b>TOTAL =</b>	<b>\$332,459</b>	

CRUSHED ROCK (assume Sections E and B):						
	Volume (c.y.) = (area (sf) x length (l.f.) / 27)	CY To T Factor	Tons = Volume / (CYxT Factor)	Unit Price (tons)	Cost	Volume Calculation (refer to E and B typical cross section)
CRUSHED ROCK (12" DEPTH) for Roadway	1594	1.85	2950	\$25.00	\$73,743	$(20.5 * \text{segment length} = 2100) / 27 = 1594$
CRUSHED ROCK (2" DEPTH) for Driveway	28	1.85	52	\$25.00	\$1,310	$((2/12) * D/W \text{ area} = 4590) / 27 = 28$
CRUSHED ROCK (1" DEPTH) for Sidewalk	133	1.85	246	\$25.00	\$6,145	$[(1/12) * (\text{sidewalk area} - 4157 * 9) + 0] / W \text{ entrances} = (627 * 9) / 27 = 133$
<b>TOTAL (tons) =</b>			<b>3248</b>	<b>TOTAL =</b>	<b>\$81,199</b>	

ROADWAY EXCAVATION						
	X-SECTION AREA (SF)	LENGTH (LF)	Volume (c.y.) = (area (sf) x length (l.f.) / 27)	Unit Price (c.y.)	Cost	Volume Calculation (refer to E and B typical cross section)
B =	45	1350	2225	\$20.00	\$44,500	$B2 = (44.5 * 1350) / 27$
E =	21	750	583	\$20.00	\$11,667	$E = (21.0 * 750) / 27$
				Sub total =	\$56,167	
<b>MEDIAN</b>						
Area (sf) =	8.58		570	\$20.00	\$11,408	$(5.53+3.05) * 1795 / 27 = 570$
Length (lf) = 2100 L.F. - 55ft for one median breaks - 250ft for one left turn lane @ 250ft ea			1795			
				Sub total =	\$11,408	
<b>TOTAL =</b>			<b>3379</b>	<b>TOTAL =</b>	<b>\$67,575</b>	

CURB AND GUTTER REMOVAL						
	Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
B Length (lf) =	1350	\$5.00	\$6,750	B=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION		
E Length (lf) =	750	\$5.00	\$3,750	E=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION		
<b>TOTAL =</b>	<b>2100</b>	<b>TOTAL =</b>	<b>\$10,500</b>			

SIDEWALK AND DRIVEWAY REMOVAL						
	Length (l.f.)	Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions	
B Length (lf) =	1350	233	\$10.00	\$2,333	SIDEWALK WIDTH = 6FT	
E Length (lf) =	750				B=S+D IN FILL ON ONE SIDE ONLY PER X-SECTION	
<b>TOTAL (LF) =</b>	<b>2100</b>	<b>TOTAL =</b>	<b>233</b>	<b>TOTAL =</b>	<b>\$2,333</b>	
					E=S+D IN FILL ON ONE SIDE ONLY PER X-SECTION	

APPROACH REMOVAL						
	Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions		
D/W REMOVAL (sf) =	5142	571	\$15.00	\$16,220	see DrivewayRemovalAreas tab for breakdown of areas; AREA = SF/9	
D/W REMAIN (sf) =	4590	510				
<b>TOTAL =</b>	<b>1081</b>	<b>TOTAL =</b>	<b>16,220</b>			

EMBANKMENT COMPACTION							Assumptions					
FILL IN REMOVAL OF D/W AND APPROACH							Volume (c.y.) = (area (sf) x depth (l.f.))/27	Unit Price (c.y.)	Cost	*D/W AND APPROACH DEPTH = 0.5ft *see "Driveway Removal Areas" tab for breakdown of areas		
D/W REMOVAL (sf) =	5142					95	\$5.00	\$901				
D/W REMAIN (sf) =	4590					85						
SUB-TOTAL =						180	Sub total =	\$901				
FILL IN REMOVAL OF CURB AND GUTTER							Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions		
B Length (lf) =	1350					56	\$5.00	\$438	*length from curb/gutter removal			
E Length (lf) =	750					31			*gutter width = 1.5ft and depth = 0.75ft			
SUB-TOTAL =						88	Sub total =	\$438				
FILL IN REMOVAL OF SIDEWALK							Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions		
B2 Length (lf) =	1350					56	\$5.00	\$438	*sidewalk width = 6ft and depth = 0.33 ft			
E Length (lf) =	750					31						
SUB-TOTAL =						88	Sub total =	\$438				
CURB, GUTTER, AND SIDEWALK							Volume (c.y.) = (area (sf) x length (l.f.))/27	Unit Price (c.y.)	Cost	Volume Calculation		
B Length (lf) =	1350	11.6				580	\$5.00	\$5,136	*assume 1ft depth			
E Length (lf) =	750	16.1				447						
SUB-TOTAL (c.y.) =						1027	Sub total =	\$5,136				
TOTAL EMBANKMENT COMPACTION =						1382	TOTAL =	\$6,912				
GRAVEL BORROW INCL. HAUL							Volume (c.y.)	Unit Price (c.y.)	Cost	Assumptions		
Embank. Comp. (c.y.) =	1382					N/A	\$20.00	N/A	*assume all excavated material can be used for embankment compaction			
Roadway Excav. (c.y.) =	3379								ROADWAY EXCAV > EMBANK COMP => NO BORROW			
TOTAL =						N/A						
COMMERCIAL HMA							Volume (c.y.) = (length x width x depth (ft.))/27	CY To T Factor	Tons = Volume / (CYxT Factor)	Unit Price (tons)	Cost	Assumptions
Sum of Driveways to Remain widths (ft) =	459			28	2.05	58	\$140.00	\$8,132	*HMA depth = 2in = 0.17ft			
Assumed Approach length (ft) =	10								*assume 10ft length for approach			
Depth (ft) =	0.17								* See DrivewayRemovalAreas tab for "Sum of Driveways to Remain widths"			
TOTAL =						58	TOTAL =	\$8,132				
6 in CEMENT CONCRETE DRIVEWAY ENTRANCE							Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions		
Sum of Driveways to Remain widths (ft) =	459					627	\$40.00	\$25,067	*Entrance width = driveway width + 5R PER D/W			
Length (ft) =	10								* 21 D/W's (See DrivewayRemovalAreas tab)			
TOTAL =						627	TOTAL =	\$25,067	*Area = (sum of entrance widths x length)/9			
TOTAL =						627	TOTAL =	\$25,067	*10 length			
CURB AND GUTTER							Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
Length (lf) =	4200					4200	\$15.00	\$63,000	2100x 2 = 4200 l.f. = curb/gutter length for removal			
TOTAL =						4200	TOTAL =	\$63,000				

TRAFFIC CURB					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions
Length (lf) =	3590				3590	\$15.00	\$53,850	*Traffic curb runs along median *Length = median length x 2 (both sides) = 1795 x 2 = 3590ft
TOTAL =					3590	TOTAL =	\$53,850	

DOUBLE FACED CEMENT CONCRETE TRAFFIC CURB					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions
Length (lf) =	150				150	\$40.00	\$6,000	*One left turn lane at median breaks = 150ft = 150ft (see City of Lacey Detail)
TOTAL =					150	TOTAL =	\$6,000	

CEMENT CONCRETE SIDEWALK RAMP					Unit Price (ea.)	Cost	Assumptions	
# of Ramps	24				24	\$1,250.00	\$30,000	*2 ramps at T-intersection NOT at median break; 6 at T-intersection at median break
TOTAL =					24	TOTAL =	\$30,000	

SIDEWALK					Length (l.f.)	Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions
Length (lf) =	4200				3741	4157	\$30.00	\$124,700	*Sidewalk width = 10ft *2100 x 2 = 4200 Lf. - REMAINING driveway widths = SIDEWALK LENGTH
Sum of remaining D/W WIDTHS =	459								
Width (ft) =	10								
TOTAL =					4157	TOTAL =	\$124,700		

STREET TREES					# of TREES	Unit Price (ea.)	Cost	Assumptions
Median Length (ft) =	1795				51	\$400.00	\$20,514	*tree spacing = 35ft O.C. *trees on both sides of roadway and in median
Roadway Edge Length (ft) =	4200				120	\$400.00	\$48,000	
TOTAL =					171	TOTAL =	\$68,514	

TREE GRATES					# of TREES	Unit Price (ea.)	Cost	Assumptions
					120	\$800.00	\$96,000	*one grate for each tree along roadway edge
TOTAL =					120	TOTAL =	\$96,000	

SHRUBS AND PLANTS					Area (s.f.)	Unit Price (s.f.)	Cost	Assumptions
Median Length (ft) =	1795				14360	\$1.50	\$21,540	*shrubs and plants in median only = 9ft - 1ft for curb = 8ft width
Median Width (ft) =	8							
TOTAL =					0	TOTAL =	\$21,540	

IRRIGATION					Area (s.f.)	Unit Price (s.f.)	Cost	Assumptions
Median Area (s.f.) =	14360				31160	\$2.50	\$77,900	*median width = 9ft - 1ft for curb = 8ft *140 s.f. per tree along roadway = 140 x 120 = 16800s.f.
Roadway Edge Area (s.f.) =	16800							
TOTAL =					31160	TOTAL =	\$77,900	

TOPSOIL							Assumptions
				Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	
Median Area (s.f.) =	14360			798	\$35.00	\$27,922	* 18 in = 1.5ft depth for entire median and roadway edge trees (4ftx4ft tree well) -> 16 sf x 120 trees = 1920 s.f. * 6 in = 0.5ft depth for embankment/excavation limits * Roadway Edge Tree Area = 16sf x 120 trees = 1920 sf * Embank/Excav Area = 4.5ft (width) x 4157ft (length) - 1920sf (Roadway Edge Tree Area) = 14915
Median Depth (ft.) =	1.5						
Roadway Edge Tree Area (s.f.) =	1920			107	\$35.00	\$3,733	
Roadway Edge Depth (ft) =	1.5						
Embank/Excav Area (s.f.) =	14915			276	\$35.00	\$9,667	
Embank/Excav Depth (ft) =	0.5						
D/W Removal (s.f.) =	5142			95	\$35.00	\$3,333	
D/W Removal Depth (ft) =	0.5						
<b>TOTAL (c.y.) =</b>				<b>1276</b>	<b>TOTAL =</b>	<b>\$44,655</b>	

SEEDING/MULCHING/FERTILIZER							Assumptions
				Area (acre)	Unit Price (acre)	Cost	
Embank/Excav Area (s.f.) =	14915			0.34	\$8,000.00	\$2,739	* Seeding/Mulching/Fertilizer area = Embank/Excav Area
<b>TOTAL =</b>				<b>0.34</b>	<b>TOTAL =</b>	<b>\$2,739</b>	

BARK MULCH							Assumptions
				Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	
Median Area (s.f.) =	14360			176	\$35.00	\$6,143	* median only
Median Depth (ft.) =	0.33						* depth = 4in = 0.33ft
<b>TOTAL =</b>				<b>176</b>	<b>TOTAL =</b>	<b>\$6,143</b>	

JOINT TRENCH							Assumptions
				# of Crossings	Length (l.f.)	Unit Price (l.f.)	Cost
Length (ft) =	2100			3	2315	\$30.00	\$69,458
Trench Spacing (ft) =	800						
R/W width (ft) =	82						
<b>TOTAL =</b>				<b>3</b>	<b>2315</b>	<b>TOTAL =</b>	<b>\$69,458</b>

ELECTRICAL CONVERSION							Assumptions
					Unit Price (ea.)	Cost	
# of Conversions =	35				\$4,000.00	\$140,000	* Counted addresses on "College St. Driveway Tabulation" sheet that fall within limits of Phase 4 FULL TAKES to obtain number of conversions * Added \$1000.00 to conversion unit price to cover cost of service trench
<b>TOTAL =</b>				<b>35</b>	<b>TOTAL =</b>	<b>\$140,000</b>	

VAULT EXCAVATION							Assumptions
				# of Crossings	Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost
Length (ft) =	2100			3	88	\$25.00	\$2,664
Vault Spacing (ft) =	800				19		
Depth (ft.) =	4						
<b>TOTAL =</b>				<b>3</b>	<b>107</b>	<b>TOTAL =</b>	<b>\$2,664</b>

PSE CONVERSION COSTS						
					Unit Price (l.f.)	Cost
Length (ft) =	2100				\$28.25	\$59,325
<b>TOTAL =</b>					<b>2100</b>	<b>\$59,325</b>

STREET LIGHTS								
					# of Lights	Unit Price (ea.)	Cost	Assumptions
Length (ft) =	4200				28	\$5,500.00	\$151,250	* full length, both sides of roadway = 2100 x 2 = 4200ft 240ft spacing add 10 lights to cover cost for intersection adjustments
Light Spacing (ft) =	240							
<b>TOTAL =</b>					<b>28</b>	<b>\$151,250</b>		

PLASTIC WIDE LINE								
					Unit Price (l.f.)	Cost	Assumptions	
Length (ft) =	3955				\$1.00	\$3,955	* length = (2100x2) - cross street widths * cross street width total = approx 245ft	
<b>TOTAL =</b>					<b>3955</b>	<b>\$3,955</b>		

PLASTIC TRAFFIC LETTER								
					Unit Price (ea.)	Cost	Assumptions	
# letters =	4				\$60.00	\$240	* "ONLY" per left turn lane x (1) left turn lanes = 1; 1 x 4 = 4 letters	
<b>TOTAL =</b>					<b>4</b>	<b>\$240</b>		

PLASTIC TRAFFIC ARROW								
					Unit Price (ea.)	Cost	Assumptions	
# Arrows =	2				\$75.00	\$150	* (2) arrows per left turn lane x (1) left turn lanes = 2	
<b>TOTAL =</b>					<b>2</b>	<b>\$150</b>		

PLASTIC BICYCLE LANE SYMBOL								
					Unit Price (ea.)	Cost	Assumptions	
# Symbols =	18				\$125.00	\$2,250	* (1) at after each break in bike lane at intersections = 18	
<b>TOTAL =</b>					<b>18</b>	<b>\$2,250</b>		

PLASTIC STOP LINE								
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions
# Stop Lines =	9				90	\$5.00	\$450	* (1) at each intersection = 9 assume lane width = 10 ft
Lane width (ft) =	10							
<b>TOTAL =</b>					<b>90</b>	<b>\$450</b>		

TEMPORARY STRIPING								
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions
Length (ft) =	4200				4200	\$0.25	\$1,050	* only lane striping = 2100 x 2 = 4200
<b>TOTAL =</b>					<b>4200</b>	<b>\$1,050</b>		

RETAINING WALL								
					Area (s.f.)	Unit Price (s.f.)	Cost	Assumptions
Length of wall (ft) =	1130				4520	\$110.00	\$497,200	* assume wall starts at 149+20 and runs to roundabout at 160+50 = 1130 ft height = 4ft for surface area
Avg. Height (ft) =	4							
<b>TOTAL =</b>					<b>4520</b>	<b>\$497,200</b>		

<b>STORM DRAINAGE</b>	
see calc's by J. Brannin	

CLEAR AND GRUB									Assumptions
					Area (acre)	Unit Price (acre)	Cost		
Length (ft) =	3355				2.8	\$5,000.00	\$14,249	* Prop. Total width = 92ft * improvement width = 55ft * length = both sides of roadway for full length of segment - cross streets and existing D/W's = 4200 - (459 + 141) - 245 = 3355	
Width (ft) =	37								
<b>TOTAL =</b>					<b>2.8</b>	<b>TOTAL =</b>	<b>\$14,249</b>		

SILT FENCE									Assumptions
					Length (l.f.)	Unit Price (l.f.)	Cost		
B Length (lf) =	1350	ONE SIDE			1350	\$6.00	\$17,100	* fill along ONE SIDE FOR B = 1350ft; fill along TWO SIDES FOR E = 1500 ft; Length = 1350+1500	
E Length (lf) =	750	TWO SIDES			1500				
<b>TOTAL =</b>					<b>2850</b>	<b>TOTAL =</b>	<b>\$17,100</b>		

RAISED PAVEMENT MARKERS										Assumptions
		# TYPE 1 along median	# TYPE 1 for lane stripe	# TYPE 2 along median	# TYPE 2 for lane stripe	Unit Price (HUND)	Cost			
Length for Line Striping (ft) =	4200	720	263	240	394	\$250.00	\$2,456	* Along Median: (3) TYPE 1 per 16ft length; (1) TYPE 2 per 16ft length Lane Stripe: (2) TYPE 1 per stripe; (3) TYPE 2 per stripe; Stripe spacing = 20ft * Length for striping = 2100 x 2 = 4200ft * Length along median = (1795x2) + 250 for two left turn lanes at 250ft ea. = 3840		
Length Along Median (ft) =	3840					\$350.00	\$2,218			
		<b>TYPE 1 TOTAL =</b>	<b>983</b>	<b>TYPE 2 TOTAL =</b>	<b>634</b>	<b>TOTAL =</b>	<b>\$4,674</b>			

CLEARING LIMIT FENCE									Assumptions
					Length (l.f.)	Unit Price (l.f.)	Cost		
B Length (lf) =	700	ONE SIDE			700	\$4.00	\$2,800	* opposite side of roadway of silt fence	
E Length (lf) =	0								
<b>TOTAL =</b>					<b>700</b>	<b>TOTAL =</b>	<b>\$2,800</b>		

# Bid Tabulation

Lacey Contract Number: \_\_\_\_\_ Contractor: Engineer  
 Federal Aid Project Number: \_\_\_\_\_ DO-NOT-MODIFY  
 WSDOT Contract Number: \_\_\_\_\_ DO-NOT-MODIFY  
 TIB Contract Number: \_\_\_\_\_ DO-NOT-MODIFY  
 Prepared By: JMB/EJM  
 Checked By: MMJ  
 Prepared Date: October 9, 2008

## PHASE 7-COLLEGE STREET IMPROVEMENTS

Quantity	Unit	Item ID	Item Description	Unit Price	Extended Price	Provision	COMMENT
1	LS	109-010	Mobilization	\$304,652.00	\$304,652.00	WSDOT 1-09	7% => 0.07 x 4,352,164 = \$304,652.00
1	LS	107-010	SPCC Plan	\$5,000.00	\$5,000.00	WSDOT 1-07	
1	LS	801-010	Temporary Water Pollution/Erosion Control	\$30,000.00	\$30,000.00	WSDOT 8-01	0%
1850	LF	801-090	Silt Fence	\$6.00	\$11,700.00	CITY 8-01	
60	DAYS		ESC Lead	\$100.00	\$6,000.00		
1950	LF	830-010	Clearing Limit Fence	\$4.00	\$7,800.00	CITY 2-01	
1	LS	110-010	Project Temporary Traffic Control	\$100,000.00	\$100,000.00	WSDOT 1-10	
3000	HR	110-030	Flaggers and Spotters	\$38.00	\$114,000.00	WSDOT 1-10	
800	SF	110-100	Construction Signs Class A	\$20.00	\$16,000.00	WSDOT 1-10	
1	LS	201-040	Clearing and Grubbing	\$13,500.00	\$13,500.00	CITY 2-01	
1	LS	202-030	Removal of Structures and Obstructions	\$75,000.00	\$75,000.00	CITY 2-02	
1300	SY		Sidewalk and Driveway Removal	\$10.00	\$13,000.00		
1850	LF		Curb and Gutter Removal	\$5.00	\$9,250.00		
862	SY		Approach Removal	\$15.00	\$12,900.00		
766	CY	203-030	Roadway Excavation Incl. Haul	\$20.00	\$15,300.00	CITY 2-03	
285	CY	203-070	Gravel Borrow Incl. Haul	\$20.00	\$5,700.00	WSDOT 9-03	
1051	CY	203-060	Embankment Compaction	\$5.00	\$5,300.00	CITY 2-03	
3010	TN	404-020	Crushed Surfacing	\$25.00	\$75,200.00	WSDOT 4-04	
4186	TN	504-030	HMA Cl. 1/2" PG. 64-22	\$90.00	\$376,700.00	CITY 5-04	
60	TN		Commercial HMA	\$140.00	\$8,400.00	WSDOT 5-04	
512	SY		8 inch Cement Conc. Driveway Entrance	\$40.00	\$20,500.00	WHP 8-06	
2160	LF	213-010	Joint Trench	\$30.00	\$64,500.00	CITY 2-13	
99	CY	213-020	Vault Excavation	\$25.00	\$2,500.00	CITY 2-13	
23	EA		Electrical Service Conversion	\$4,000.00	\$92,000.00	CITY 2-14	
1	LS	205-030	Trench Safety System	\$10,000.00	\$10,000.00	CITY 2-05	
50	HR		Utility Potholing	\$100.00	\$5,000.00	CITY 7-08	
15	EA	705-100	Catch Basin Type 1	\$1,300.00	\$19,500.00	CITY 7-05	Storm
8	EA	705-110	Catch Basin Type 1L	\$1,750.00	\$14,000.00	CITY 7-05	Storm
4	EA	705-200	Catch Basin Type 2 - 48 In. Diam.	\$3,000.00	\$12,000.00	CITY 7-05	Storm
2092	LF	704-057	18 Inch Diameter Storm Sewer Pipe	\$55.00	\$115,100.00	CITY 7-04	Storm- add \$10/ft to pipe costs to cover bedding and backfill
2660	LF	804-030	Cement Conc. Traffic Curb	\$15.00	\$40,200.00	WSDOT 8-04	
3800	LF	804-040	Cement Conc. Traffic Curb and Gutter	\$15.00	\$57,000.00	WSDOT 8-04	
300	LF		Double Faced Cement Concrete Traffic Curb	\$40.00	\$12,000.00	WHP 8-04	
3910	SY	814-070	Cement Concrete Sidewalk	\$30.00	\$117,300.00	CITY 8-14	
16	EA	814-080	Cement Concrete Sidewalk Ramp	\$1,250.00	\$20,000.00	CITY 8-14	
1	LS	808-030	Lawn and Landscape Restoration	\$25,000.00	\$25,000.00	GSP 8-05	
1028	CY	802-200	Topsoil Type A	\$35.00	\$36,000.00	GSP 8-02	
3538	CY	802-121	Bark Mulch	\$35.00	\$123,800.00	GSP 8-02	
0.32	AC	801-040	Seeding, Fertilizing, and Mulching	\$8,000.00	\$2,600.00	WSDOT 8-01	
150	EA	802-777	Street Trees	\$400.00	\$59,900.00	GSP 8-02	
111	EA	802-777	Tree Grates	\$800.00	\$89,100.00	GSP 8-02	
1	LS	802-777	Shrubs and Plants	\$16,080.00	\$16,100.00	GSP 8-02	
1	LS	803-030	Irrigation System	\$65,800.00	\$65,800.00	GSP 8-03	
5	EA	803-100	Irrigation System Modification and Adjustment	\$1,000.00	\$5,000.00	CITY 8-03	approx. (1) for every 5 homes along College St
1	LS	820-042	Luminaire System	\$144,400.00	\$144,400.00	CITY 8-20	
7.2	HUND	809-030	Raised Pavement Marker Type 1	\$250.00	\$1,800.00	WSDOT 8-09	
3.8	HUND	809-040	Raised Pavement Marker Type 2	\$350.00	\$1,300.00	WSDOT 8-09	
5000	SF		Conc. Retaining Wall w Architectural Surface	\$110.00	\$550,000.00	WSDOT 8-02	
3627	LF	822-092	Plastic Wide Line	\$1.00	\$3,600.00	WSDOT 8-22	
8	EA	822-200	Plastic Traffic Letter	\$60.00	\$480.00	WSDOT 8-22	
4	EA	822-180	Plastic Traffic Arrow	\$75.00	\$300.00	WSDOT 8-22	
12	EA	822-065	Plastic Bicycle Lane Symbol	\$125.00	\$1,500.00	WSDOT 8-22	
50	LF	822-040	Plastic Stop Line	\$5.00	\$250.00	CITY 8-22	
3900	LF	823-010	Temporary Pavement Marking	\$0.25	\$1,000.00	WSDOT 8-23	same value as Temporary Pavement Marking = 3900ft
3900	LF	823-015	Removing Temporary Pavement Marking	\$0.10	\$390.00	WSDOT 8-23	locate at each intersection
3	EA	813-040	Monument Case and Cover	\$400.00	\$1,200.00	CITY 8-13	
1	MC	104-100	Minor Change	\$20,000.00	\$20,000.00		
1	LS	104-100	Miscellaneous Items	\$33,300.00	\$33,300.00	WSDOT 1-04	
				Schedule A Subtotal:	\$2,991,822.00		
				20% Contingency:	\$598,364.40		
				12% Cons. Engineer:	\$358,018.64		
				PSE Conversion:	\$55,100.00		
				Right-of-way	\$750,000.00		
				Schedule Total:	\$4,754,305.04		

### Project Summary

Schedule Contract Subtotal: \$4,004,305.04  
 Schedule Right-of-way: \$750,000.00  
**\$4,754,305.04**

I hereby certify this to be a true and correct tabulation  
 of bids received and opened on \_\_\_\_\_

Signature \_\_\_\_\_

COLLEGE STREET IMPROVEMENT #034709		COST	
ESTIMATE			
PHASE 7			
STA 115+50 to 135+00	=	1950	LF
C1 Section =		1950	
HMA (assume Section C1):			
	Volume (c.y.) = (area (sf) x length (l.f.) / 27)	CY To T Factor	Tons = Volume / (CYxT Factor)
			Unit Price (tons)
			Cost
			Volume Calculation (refer to C1 typical cross section)
HMA WEARING COURSE (2" DEPTH)	626	2.05	1283
			\$90.00
			\$115,483
			$((26+26) * (2/12) * 1950) / 27 = 626$
HMA LEVELING COURSE (4" DEPTH)	457	2.05	938
			\$90.00
			\$84,392
			$(19 * (4/12) * 1950) / 27 = 457$
HMA LEVELING COURSE (DEPTH VARIES)	958	2.05	1965
			\$90.00
			\$176,823
			$((8.21+5.06) * 1950) / 27 = 958$
	<b>TOTAL (tons) =</b>		<b>4186</b>
			<b>TOTAL =</b>
			<b>\$376,698</b>
CRUSHED ROCK (assume Section C1):			
	Volume (c.y.) = (area (sf) x length (l.f.) / 27)	CY To T Factor	Tons = Volume / (CYxT Factor)
			Unit Price (tons)
			Cost
			Volume Calculation (refer to C1 typical cross section)
CRUSHED ROCK (12" DEPTH) for Roadway	1481	1.85	2739
			\$25.00
			\$68,476
			$(20.5 * \text{segment length} = 1950) / 27 = 1481$
CRUSHED ROCK (2" DEPTH) for Driveway	24	1.85	44
			\$25.00
			\$1,088
			$((2/12) * \text{D/W area} = 3810) / 27 = 24$
CRUSHED ROCK (1" DEPTH) for Sidewalk	123	1.85	227
			\$25.00
			\$5,681
			$((11/12) * (\text{sidewalk area} = 8910) + \text{D/W entrance} = 512) / 27 = 123$
	<b>TOTAL (tons) =</b>		<b>3010</b>
			<b>TOTAL =</b>
			<b>\$75,245</b>
ROADWAY EXCAVATION			
	X-SECTION AREA (SF)	LENGTH (LF)	Volume (c.y.) = (area (sf) x length (l.f.) / 27)
			Unit Price (c.y.)
			Cost
			Volume Calculation (refer to C1 typical cross section)
C1 =	10.54	1950	761
			\$20.00
			\$15,224
			$(10.54 * 1950) / 27 = 761$
			Sub total =
			\$15,224
MEDIAN			
Area (sf) =	0.1		5
			\$20.00
			\$99
			$(0.1 * 1340) / 27 = 5$
Length (lf) = 1950 L.F. - 110ft for two median breaks @ ~55ft/break - 500ft for two left turn lanes @ 250ft ea			1340
			Sub total =
			\$99
			<b>TOTAL (c.y.) =</b>
			<b>766</b>
			<b>TOTAL =</b>
			<b>\$15,324</b>
CURB AND GUTTER REMOVAL			
		Length (l.f.)	Unit Price (l.f.)
			Cost
			Assumptions
C1 Length (lf) =	1950	1950	\$5.00
			\$9,750
			C1=C+G IN FILL ON ONE SIDE ONLY PER X-SECTION
		<b>TOTAL =</b>	<b>1950</b>
			<b>TOTAL =</b>
			<b>\$9,750</b>
SIDEWALK AND DRIVEWAY REMOVAL			
		Length (l.f.)	Area (s.y.)
			Unit Price (s.y.)
			Cost
			Assumptions
Length (lf) =	1950	1950	1300
			\$10.00
			\$13,000
			SIDEWALK WIDTH = 6FT C1=S+D IN FILL ON ONE SIDE ONLY PER X-SECTION
		<b>TOTAL =</b>	<b>1300</b>
			<b>TOTAL =</b>
			<b>\$13,000</b>
APPROACH REMOVAL			
		Length (l.f.)	Area (s.y.)
			Unit Price (s.y.)
			Cost
			Assumptions
D/W REMOVAL (sf) =	3946	3946	862
			\$15.00
			\$12,927
			see Driveway Removal Areas tab for breakdown of areas; AREA = SF/9
D/W REMAIN (sf) =	3810	3810	
		<b>TOTAL =</b>	<b>7756</b>
			<b>TOTAL =</b>
			<b>862</b>
			<b>TOTAL =</b>
			<b>\$12,927</b>

EMBANKMENT COMPACTION										
FILL IN REMOVAL OF D/W AND APPROACH										
						Volume (c.y.) = (area (sf) x depth (ft.)/27)	Unit Price (c.y.)	Cost	Assumptions	
D/W REMOVAL (sf) = 3946						73	\$5.00	\$718	*D/W AND APPROACH DEPTH = 0.5ft	
D/W REMAIN (sf) = 3810						71			*see "Driveway Removal Areas" tab for breakdown of areas	
SUB-TOTAL =						144		Sub total = \$718		
FILL IN REMOVAL OF CURB AND GUTTER										
						Volume (c.y.) = (length x width x depth (ft.)/27)	Unit Price (c.y.)	Cost	Assumptions	
C1 Length (lf) = 1950						81	\$5.00	\$406	*length from curb/gutter removal	
SUB-TOTAL =						81		Sub total = \$406	*gutter width = 1.5ft and depth = 0.75ft	
FILL IN REMOVAL OF SIDEWALK										
						Volume (c.y.) = (length x width x depth (ft.)/27)	Unit Price (c.y.)	Cost	Assumptions	
C1 Length (lf) = 1950						81	\$5.00	\$406	*sidewalk width = 6ft and depth = 0.33 ft	
SUB-TOTAL =						81		Sub total = \$406		
CURB, GUTTER, AND SIDEWALK										
						Volume (c.y.) = (area (sf) x length (ft.)/27)	Unit Price (c.y.)	Cost	Volume Calculation	
C1 Length (lf) = 1950 10.31						745	\$5.00	\$3,723	*assume 1ft depth	
SUB-TOTAL (c.y.) =						745		Sub total = \$3,723		
<b>TOTAL EMBANKMENT COMPACTION =</b>						<b>1051</b>		<b>TOTAL = \$5,254</b>		
GRAVEL BORROW INCL. HAUL										
						Volume (c.y.)	Unit Price (c.y.)	Cost	Assumptions	
Embank. Comp. (c.y.) = 1051						285	\$20.00	\$5,691	*assume all excavated material can be used for embankment compaction	
Roadway Excav. (c.y.) = 766									* Borrow = Embankment compaction	
TOTAL =						285		TOTAL = \$5,691	RoadwayExcavation	
COMMERCIAL HMA										
				Volume (c.y.) = (length x width x depth (ft.)/27)	CY To T Factor	Tons = Volume / (CYxT Factor)	Unit Price (tons)	Cost	Assumptions	
Sum of Driveways to Remain widths (ft) = 381				29	2.05	60	\$140.00	\$8,380	*HMA depth = 2in = 0.17ft	
Assumed Approach length (ft) = 10									*assume 10ft length for approach	
Depth (ft) = 0.17									* See DrivewayRemovalAreas tab for "Sum of Driveways to Remain widths"	
Relocate D/W's (sf) = 920									* Add 920sf for RELOCATE D/W's	
TOTAL =						60		TOTAL = \$8,380		
6 in CEMENT CONCRETE DRIVEWAY ENTRANCE										
						Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions	
Sum of Driveways to Remain widths (ft) = 381						512	\$40.00	\$20,489	*Entrance width = driveway width + 5ft PER D/W	
Length (ft) = 10									* 16 D/W's (See DrivewayRemovalAreas tab)	
TOTAL =						512		TOTAL = \$20,489	* Area = (sum of entrance widths x length)/9 *10 length	

CURB AND GUTTER										
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
Length (lf) =	3900				3900	\$15.00	\$58,500	1950x 2 = 3900 l.f. = curb/gutter length for removal		
TOTAL =					3900		\$58,500			
TRAFFIC CURB										
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
Length (lf) =	2680				2680	\$15.00	\$40,200	*Traffic curb runs along median *Length = median length x 2 (both sides) = 1340 x 2 = 2680ft		
TOTAL =					2680		\$40,200			
DOUBLE FACED CEMENT CONCRETE TRAFFIC CURB										
					Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions		
Length (lf) =	300				300	\$40.00	\$12,000	*Two left turn lanes at median breaks = 150ft x 2 = 300ft. (see City of Legacy Detail)		
TOTAL =					300		\$12,000			
CEMENT CONCRETE SIDEWALK RAMP										
						Unit Price (ea.)	Cost	Assumptions		
# of Ramps	16				16	\$1,250.00	\$20,000	*2 ramps at T-intersection NOT at median break; 6 at T-junction at median break		
TOTAL =					16		\$20,000			
SIDEWALK										
				Length (l.f.)	Area (s.y.)	Unit Price (s.y.)	Cost	Assumptions		
Length (lf) =	3900			3519	3910	\$30.00	\$117,300	* Sidewalk width = 10ft *1950 x 2 = 3900 l.f. - REMAINING driveway widths = SIDEWALK LENGTH		
Sum of remaining D/W WIDTHS =	381									
Width (ft) =	10									
TOTAL =				3910			\$117,300			
STREET TREES										
					# of TREES	Unit Price (ea.)	Cost	Assumptions		
Median Length (ft) =	1340				38	\$400.00	\$15,314	*tree spacing = 35ft O.C. *trees on both sides of roadway and in median		
Roadway Edge Length (ft) =	3900				111	\$400.00	\$44,571			
TOTAL =					150		\$59,886			
TREE GRATES										
					# of TREES	Unit Price (ea.)	Cost	Assumptions		
					111	\$800.00	\$89,143	*one grate for each tree along roadway edge		
TOTAL =					111		\$89,143			

SHRUBS AND PLANTS					Area (s.f.)	Unit Price (s.f.)	Cost	Assumptions
Median Length (ft) =	1340			10720	\$1.50	\$16,080	*shrubs and plants in median only = 9ft - 1ft for curb = 8ft width	
Median Width (ft) =	8							
TOTAL =				10720	TOTAL =	\$16,080		

IRRIGATION					Area (s.f.)	Unit Price (s.f.)	Cost	Assumptions
Median Area (s.f.) =	10720			26320	\$2.50	\$65,800	* median width = 9ft - 1ft for curb = 8ft *140 s.f. per tree along roadway = 140 x 111 = 15540 s.f.	
Roadway Edge Area (s.f.) =	15600							
TOTAL =				26320	TOTAL =	\$65,800		

TOPSOIL					Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions
Median Area (s.f.) =	10720			596	\$35.00	\$20,844	* 18 in = 1.5ft depth for entire median and roadway edge trees (4ftx4ft tree well) -> 16 sf x 111 trees = 1776 s.f. * 6 in = 0.5ft depth for embankment/excavation limits *Roadway Edge Tree Area = 16sf x 111 trees = 1776 sf *Embank/Excav Area = 4.5ft (width) x 3910ft (length) - 1776sf (Roadway Edge Tree Area) = 14053	
Median Depth (ft.) =	1.5							
Roadway Edge Tree Area (s.f.) =	1783			99	\$35.00	\$3,467		
Roadway Edge Depth (ft) =	1.5							
Embank/Excav Area (s.f.) =	14053			260	\$35.00	\$9,108		
Embank/Excav Depth (ft) =	0.5							
D/W Removal (s.f.) =	3946			73	\$35.00	\$2,558		
D/W Removal Depth (ft) =	0.5							
TOTAL (c.y.) =				1028	TOTAL =	\$35,977		

SEEDING/MULCHING/FERTILIZER					Area (acre)	Unit Price (acre)	Cost	Assumptions
Embank/Excav Area (s.f.) =	14053			0.32	\$8,000.00	\$2,581	*Seeding/Mulching/Fertilizer area = Embank/Excav Area	
TOTAL =				0.32	TOTAL =	\$2,581		

BARK MULCH					Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions
Median Area (s.f.) =	10720			3538	\$35.00	\$123,816	*median only	
Median Depth (ft.) =	0.33						* depth = 4in = 0.33ft	
TOTAL =				3538	TOTAL =	\$123,816		

JOINT TRENCH					# of Crossings	Length (l.f.)	Unit Price (l.f.)	Cost	Assumptions
Length (ft) =	1950			2	2150	\$30.00	\$64,496	*only on one side of roadway * crossed every 800ft * proposed R/W = 82ft width *Length = (2 x 82) + 1950 = 2150ft	
Trench Spacing (ft) =	800								
R/W width (ft) =	82								
TOTAL =				2150	TOTAL =	\$64,496			

ELECTRICAL CONVERSION					Unit Price (ea.)	Cost	Assumptions
# of Conversions =	23				\$4,000.00	\$92,000	* Counted addresses on "College St. Driveway Tabulation" sheet that fall within limits of Phase 7 - FULL TAKES to obtain number of conversions * Added \$1000.00 to conversion unit price to cover cost of service trench
TOTAL =				23	TOTAL =	\$92,000	

VAULT EXCAVATION										
					# of Crossings	Volume (c.y.) = (length x width x depth (ft))/27	Unit Price (c.y.)	Cost	Assumptions	
Length (ft) =	1950				2	81	\$25.00	\$2,474	*only on one side of roadway area = 15ft x 15ft every 800ft *excavate *excavate area = 7ft x 7ft at every crossing *excavation depth = 4ft Volume = (# crossings x depth x excavate area)/27	
Vault Spacing (ft) =	800					18				
Depth (ft) =	4									
					<b>TOTAL (c.y.) =</b>	<b>99</b>	<b>TOTAL =</b>	<b>\$2,474</b>		

PSE CONVERSION COSTS											
					Unit Price (l.f.)	Cost					
Length (ft) =	1950					\$28.25	\$55,088				
					<b>TOTAL =</b>	<b>1950</b>	<b>TOTAL =</b>	<b>\$55,088</b>			

STREET LIGHTS											
					# of Lights	Unit Price (ea.)	Cost	Assumptions			
Length (ft) =	3900				26	\$5,500.00	\$144,375	* full length, both sides of roadway = 1950 x 2 = 3900ft * 240ft spacing * add 10 lights to cover costs for intersection adjustments			
Light Spacing (ft) =	240										
					<b>TOTAL =</b>	<b>26</b>	<b>TOTAL =</b>				<b>\$144,375</b>

PLASTIC WIDE LINE										
					Unit Price (l.f.)	Cost	Assumptions			
Length (ft) =	3627					\$1.00	\$3,627	* length = (1950x2) - cross street widths * cross street width total = approx 273ft		
					<b>TOTAL =</b>	<b>3627</b>	<b>TOTAL =</b>			

PLASTIC TRAFFIC LETTER										
					Unit Price (ea.)	Cost	Assumptions			
# letters =	8					\$60.00	\$480	* "ONLY" per left turn lane x (2) left turn lanes = 2; 2 x 4 = 8 letters		
					<b>TOTAL =</b>	<b>8</b>	<b>TOTAL =</b>			

PLASTIC TRAFFIC ARROW										
					Unit Price (ea.)	Cost	Assumptions			
# Arrows =	4					\$75.00	\$300	* (2) arrows per left turn lane x (2) left turn lanes = 4		
					<b>TOTAL =</b>	<b>4</b>	<b>TOTAL =</b>			

PLASTIC BICYCLE LANE SYMBOL										
					Unit Price (ea.)	Cost	Assumptions			
# Symbols =	12					\$125.00	\$1,500	* (1) at after each break in bike lane at intersections = 12		
					<b>TOTAL =</b>	<b>12</b>	<b>TOTAL =</b>			

PLASTIC STOP LINE								Assumptions
					Length (l.f.)	Unit Price (l.f.)	Cost	
# Stop Lines =	5				50	\$5.00	\$250	* (1) at each Intersection = 5
Lane width (ft) =	10							assume lane width = 10 ft
TOTAL =					50		\$250	

TEMPORARY STRIPING								Assumptions
					Length (l.f.)	Unit Price (l.f.)	Cost	
Length (ft) =	3900				3900	\$0.25	\$975	* only lane striping = 1950 x 2 = 3900
TOTAL =					3900		\$975	

RETAINING WALL								Assumptions
					Area (s.f.)	Unit Price (s.f.)	Cost	
length of wall (ft) =	1000				5000	\$110.00	\$550,000	* assume wall starts at 126+50 and runs to roundabout at 136+50 = 1000 ft
Avg. Height (ft) =	5							* Avg height = 5ft for surface area
TOTAL =					5000		\$550,000	

STORM DRAINAGE							
see calc's by J. Brannin							

CLEAR AND GRUB								Assumptions
					Area (acre)	Unit Price (acre)	Cost	
Length (ft) =	3172				3	\$5,000.00	\$13,472	* Prop. Total width = 92ft
Width (ft) =	37							* Improvement width = 55ft
TOTAL =							\$13,472	* length = both sides of roadway for full length of segment - cross streets and existing D/W's = 3900 - (381+74) - 273 = 3355

SILT FENCE								Assumptions
					Length (l.f.)	Unit Price (l.f.)	Cost	
C1 Length (lf) =	1950	ONE SIDE			1950	\$6.00	\$11,700	* fill along ONE SIDE FOR C1 = 1950
TOTAL =					1950		\$11,700	* Length = 1950

RAISED PAVEMENT MARKERS								Assumptions
		# TYPE 1 along median	# TYPE 1 for lane stripe	# TYPE 2 along median	# TYPE 2 for lane stripe	Unit Price (HUND)	Cost	
Length for Line Striping (ft) =	1950	596	122	199	183	\$250.00	\$1,795	* Along Median: (3) TYPE 1 per 16ft length; (1) TYPE 2 per 16ft length
Length Along Median (ft) =	3180					\$350.00	\$1,335	* Lane Stripe: (2) TYPE 1 per stripe; (3) TYPE 2 per stripe; Stripe spacing = 20ft
		TYPE 1 TOTAL =	718	TYPE 2 TOTAL =	382		\$3,131	* Length for striping = 1950 x 2 = 3900ft
								* Length along median = (1340x2) + 250 for two left turn lanes at 250ft ea. = 3180

CLEARING LIMIT FENCE								Assumptions
					Length (l.f.)	Unit Price (l.f.)	Cost	
Length (ft) =	1950				1950	\$4.00	\$7,800	* opposite side of roadway of silt fence
TOTAL =					1950		\$7,800	

SEGMENT #1 (Phase 7) STA 118+00 TO 185+00

PORTION TO REMOVE FROM DRIVEWAYS TO REMAIN					FULL REMOVAL				
Address	Width (ft)	Length (ft) <small>assume L = 10ft</small>	Area (sf)	Area (sy)	Address	Width (ft)	Length (ft) <small>approx. length measured in CAD</small>	Area (sf)	Area (sy)
3033 College St SE	32	10	320	36	3038 College St SE	23	24	554	65
3001 to 3007 College St SE	35	30	250	28	3001 College St SE	40	26	3040	338
3015 to 3015 College St SE	34	10	240	27	3005 College St SE	17	26	512	58
3000 IIII NW	35	10	350	40					
3007 TO 3008 College St SE	30	10	300	33					
3480 TO 3448 College St SE	32	30	220	25					
3370 TO 3430 College St SE	26	10	260	29					
3026 & 3028 College St SE	28	10	270	30					
City of WCTV AND RESIDENTS	28	10	280	32					
3106 College St SE	16	10	160	18					
3091 College St SE	17	10	170	19					
3001 College St SE	23	10	230	25					
2915 College St SE	18	10	180	20					
3032 College St SE	10	10	100	11					
3020 College St SE	17	10	170	19					
3015 & 3028 College St SE	15	10	150	17					
College Ln H.D.A.	20	10	200	22					
<b>SUB TOTAL =</b>	<b>381</b>	<b>TOTAL =</b>	<b>3810</b>	<b>428</b>	<b>SUB TOTAL =</b>	<b>21</b>	<b>TOTAL =</b>	<b>3045</b>	<b>438</b>

SEGMENT #2 (Phase 6) STA 130+00 TO 151+00

PORTION TO REMOVE FROM DRIVEWAYS TO REMAIN					FULL REMOVAL				
Address	Width (ft)	Length (ft) <small>assume L = 10ft</small>	Area (sf)	Area (sy)	Address	Width (ft)	Length (ft) <small>approx. length measured in CAD</small>	Area (sf)	Area (sy)
2723 Cochran College St SE	28	10	280	31	2706 College St SE	15	33	490	103
2818 College St SE	13	10	130	14	2607 College St SE	12	31	372	43
2710 College St SE	23	10	230	25	2505 College St SE	18	28	488	54
2717 College St SE	24	10	240	27	2545 College St SE	12	35	300	33
2713 College St SE	19	10	190	21	2506 College St SE	7	51	357	40
2708 College St SE	16	10	160	17	2506 College St SE	10	27	270	30
2700 College St SE	20	10	200	22	2502 College St SE	17	27	504	66
2702 College St SE	28	10	280	31	2602 College St SE	20	30	600	66
2702 College St SE	14	10	140	15	2603 College St SE	21	47	987	110
2701 College St SE	19	10	190	21					
2617 College St SE	36	10	360	40					
2700 College St SE	12	10	120	13					
2626 College St SE	18	10	180	20					
2613 College St SE	26	10	260	28					
2609 College St SE	22	10	220	24					
2606 College St SE	20	10	200	22					
2607 College St SE	15	10	150	17					
2505 & 2509 College St SE	18	10	180	20					
2601 & 2606 College St SE	34	10	340	38					
2405 College St SE	16	10	160	17					
2209 College St SE	21	10	210	23					
2213 College St SE	20	10	200	22					
<b>SUB TOTAL =</b>	<b>459</b>	<b>TOTAL =</b>	<b>4598</b>	<b>510</b>	<b>SUB TOTAL =</b>	<b>141</b>	<b>TOTAL =</b>	<b>5142</b>	<b>571</b>

SEGMENT #3 (Phase 5) STA 163+00 TO 175+00

PORTION TO REMOVE FROM DRIVEWAYS TO REMAIN					FULL REMOVAL				
Address	Width (ft)	Length (ft) <small>assume L = 10ft</small>	Area (sf)	Area (sy)	Address	Width (ft)	Length (ft) <small>approx. length measured in CAD</small>	Area (sf)	Area (sy)
1706 College St SE	25	10	250	28	1721 College St SE	23	135	2810	257
1500 College St SE	28	10	280	31	1600 18th Ave SE	10	25	250	28
1500 College St SE	40	10	400	44	1705 College St SE	9	22	198	22
1615 A&B College St SE	15	10	150	17					
1501 College St SE	30	10	300	33					
1605 18th Ave SE	17	10	170	18					
1613 College St SE	32	10	320	35					
1605 College St SE	14	10	140	15					
<b>SUB TOTAL =</b>	<b>201</b>	<b>TOTAL =</b>	<b>2010</b>	<b>223</b>	<b>SUB TOTAL =</b>	<b>41</b>	<b>TOTAL =</b>	<b>2758</b>	<b>306</b>

SEGMENT #4 (Phase 4) STA 179+00 TO 191+00

PORTION TO REMOVE FROM DRIVEWAYS TO REMAIN					FULL REMOVAL				
Address	Width (ft)	Length (ft) <small>assume L = 10ft</small>	Area (sf)	Area (sy)	Address	Width (ft)	Length (ft) <small>approx. length measured in CAD</small>	Area (sf)	Area (sy)
1507 College St SE	28	10	280	30	1810 College St SE	28	10	280	31
1510 College St SE	25	10	250	27	1721 College St SE	27	10	270	29
1510 College St SE	31	10	310	34	1413 College St SE	18	10	180	20
1510 College St SE	24	10	240	27	1601 College St SE	23	40	920	102
1411 W&B Ave College St SE	29	10	290	32	1602 College St SE	28	41	1064	119
Building at STA 1871 95.00	15	10	150	16	1720 College St SE	28	15	300	33
1307 College St SE	23	10	230	24	1326 College St SE	10	28	280	31
					1304 College St SE	10	18	180	20
					1310 College St SE	40	16	2880	320
					1308 College St SE	28	13	580	64
					1307 College St SE	18	23	390	44
					1303 College St SE	34	34	1088	121
<b>SUB TOTAL =</b>	<b>150</b>	<b>TOTAL =</b>	<b>1500</b>	<b>163</b>	<b>SUB TOTAL =</b>	<b>312</b>	<b>TOTAL =</b>	<b>13630</b>	<b>1517</b>

# Appendix E

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# COLLEGE CORRIDOR STUDY -- PUBLIC INPUT

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1. How did you learn about tonight's Open House?

- Direct Mailing                       Friend / Neighbor  
 Newspaper                               Other: \_\_\_\_\_

2. What situation describes you best:

- I live/work adjacent to College Street  
 I live/work in the general vicinity of College Street  
 I commute along the College Street Corridor  
 Other: \_\_\_\_\_

3. How would you rate the current congestion/safety of College Street?

<i>Mode</i>	<i>Poor</i>	<i>Below Average</i>	<i>Average</i>	<i>Above Average</i>	<i>Excellent</i>
<i>Motor Vehicle</i>	<input type="checkbox"/>				
<i>Bicycle</i>	<input type="checkbox"/>				
<i>Pedestrian</i>	<input type="checkbox"/>				

4. Do you agree with the proposed plan? What changes would you make?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. What phase would you like to see constructed first?

1<sup>st</sup> \_\_\_\_\_  
2<sup>nd</sup> \_\_\_\_\_  
3<sup>rd</sup> \_\_\_\_\_

6. When would you like to see these improvements constructed?

- 5-10 years                                            15-20 years   
10-15 years                                            20 +

7. Comments / Suggestions?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# COLLEGE CORRIDOR STUDY

## Public Feedback Summary – Combined from Oct. 9 and Nov. 5

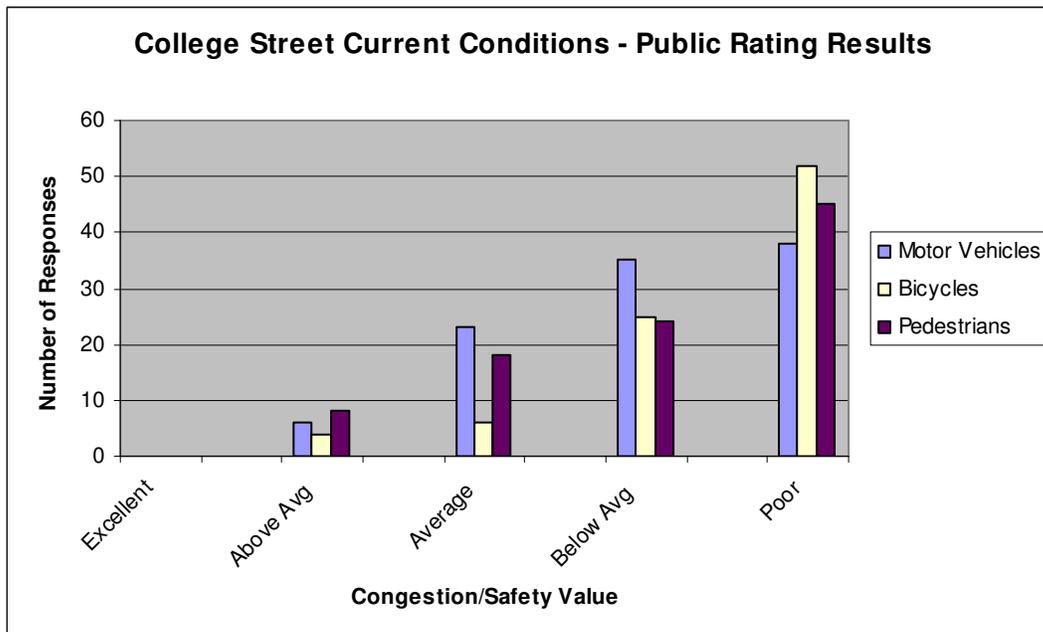
### 1. How did you learn about tonight’s Open House?

- Direct Mailing (73)
- Newspaper (33)
- Friend/Neighbor (7)
- Other: (8)
  1. School Flyer (4)
  2. Online (2)
  3. Radio (1)
  4. City Staff (1)

### 2. What situation describes you best?

- I live/work adjacent to College St (61)
- I live/work in the general vicinity of College St (39)
- I commute along the College Street Corridor (29)
- Other: (8)
  1. Own property on 22<sup>nd</sup> Ave
  2. Walk and Bicycle
  3. Have regional focus on alternative transportation
  4. Elderly mother lives adjacent to College
  5. Sister lives on College
  6. Daughter goes to Mt View Elementary
  7. Lives on other side of Ruddell
  8. unspecified

### 3. How would you rate the current congestion/safety of College Street?



**4. Do you agree with the proposed plan? What changes would you make?**

- Agree (58)**
- Disagree (14)**

**Suggested changes include:**

- **Increase Bike Lane width (7)**
- **Signalized intersections instead of Roundabouts (3)**
- **No Landscaping (3)**
- **Roundabouts are good solution (3)**
- **More and/or lighted crosswalks (2)**
- **Signal at 22<sup>nd</sup> instead of Roundabout (2)**
- **Turn Lane instead of Median (2)**
- **Position Roundabouts where most traffic turns (2)**
- **Use shrubs instead of trees in median (2)**
- **Make College a one-way street (2)**
- **More Bus Shelters and Benches (2)**
- **Move 16<sup>th</sup> Roundabout to 14<sup>th</sup> (1)**
- **4-Way Stop at 22<sup>nd</sup> (1)**
- **Install Roundabout at 37<sup>th</sup> (1)**
- **Turn Lane instead of median between 19<sup>th</sup> and 22<sup>nd</sup> (1)**
- **Crosswalks near Bus Stops (1)**
- **Consider pedestrian overpasses at Mt View and 16<sup>th</sup> (1)**
- **Install Roundabout at 22<sup>nd</sup> as soon as possible (1)**
- **Green line – connector roads should be priority (1)**
- **These improvements would be great asset for growth of the community (1)**
- **Concern about financing given current state of economy (1)**

**5. What phase would you like to see constructed first if funding becomes available?**

**The following construction phases are ranked in order of popularity**

- Phase 1 - 22<sup>nd</sup> and College Roundabout**
- Phase 3 - 16<sup>th</sup> and College Roundabout**
- Phase 2 - 29<sup>th</sup> and College Roundabout**
- Phase 4 - Corridor section between Lacey Blvd and 16<sup>th</sup> Ave**
- Phase 5 - Corridor section between 16<sup>th</sup> and 22<sup>nd</sup>**
- Phase 7 - Corridor section between 29<sup>th</sup> and 37<sup>th</sup>**
- Phase 6 – Corridor section between 22<sup>nd</sup> and 29<sup>th</sup>**

**6. Comments/ Suggestions?**

**Some comments and suggestions include:**

- **Widen Bike Lanes (4)**
- **Install Signals instead of Roundabouts (4)**
- **Drivers do not yield right of way in Roundabouts (4)**
- **Concern about tax increases (3)**
- **Make College safer for Pedestrians (3)**

cont'd

- **Turn Lane instead of Medians (2)**
- **Install flashing crosswalks (2)**
- **Reconsider Landscaping due to cost and long term maintenance (2)**
- **Use shrubs instead of trees in median (2)**
- **Well conceived plan (2)**
- **Build as soon as possible (2)**
- **Interest in environmental impact (2)**
- **Lower Speed Limit (2)**
- **Elderly and young drivers not familiar with Roundabouts (1)**
- **Install flashers in Pedestrian crossings at Roundabouts (1)**
- **Make Bus Stops and Public Transportation more attractive (1)**
- **Concern about emergency vehicles once improvements completed (1)**
- **How will traffic be affected during construction? (1)**
- **Open up dead ends on side streets (1)**
- **How is property value affected? (1)**
- **Concern about increased traffic noise (1)**
- **Address need for Pedestrian education (1)**
- **Much needed project to alleviate congestion and increase safety (1)**
- **Roundabouts are a waste of tax dollars (1)**
- **Existing street adequate except for cross traffic turns (1)**
- **Street tree additions, especially in median, look good (1)**
- **Encourage more use of Ruddell, Carpenter, and Boulevard (1)**
- **Incorporate Pedestrian overpasses (1)**
- **Extend school zones (1)**
- **What is the progress of the Mullen Rd extension?**
- **Thanks for being so prepared, and having so many available to answer questions. (1)**
- **I trust a red light more than a yield sign to stop traffic for children (1)**
- **Thanks for the opportunity to see what's going on (1)**
- **Make the left hand turnouts long enough for at least 4 cars (1)**
- **Provide right turn only lane from Lacey Blvd to College southbound (2)**
- **Provide as many as possible left turns (1)**
- **How many million will it cost and who will pay for it? (1)**
- **I agree with the plan 100%, it is very much needed (1)**
- **I would like to see fewer roundabouts in Lacey, not more (1)**
- **School Bus movements should be considered (1)**
- **Leave the midblock crosswalk at the School (1)**
- **As is, College St is dangerous and poorly lit (1)**

# Appendix F

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**TECHNICAL MEMORANDUM**

<b>Date:</b> <u>December 10, 2008 Rev 4/17/09</u>	<b>RE:</b> <u>Bike Lane Technical Memorandum</u>
<b>To:</b> <u>Martin Hoppe, P.E., PTOE</u>	<b>From:</b> <u>Scott Sawyer, P.E.</u>
<b>Company:</b> <u>City of Lacey</u>	<b>Title:</b> <u>Sr. Project Manager</u>
<b>Phone:</b> <u>360.438.2681</u>	<b>Phone:</b> <u>360.918.5305</u>
<b>Fax:</b> <u>360.456.7799</u>	<b>Fax:</b> <u>360.754.1195</u>
<b>Address:</b> <u>420 College Street SE</u>	
<u>Lacey, WA 98509-3400</u>	<b>Project #:</b> <u>34709</u>
	<b>Project Name:</b> <u>College Street Improvement Report</u>

**Purpose**

The purpose of this technical memorandum is (1) to address the public opinions concerning the space provided for bicycles, and (2) to present the costs associated with widening the roadway four feet to provide space for a Class II, five-foot wide bike lane.

**Summary**

The City of Lacey held public open houses on October 9 and November 5, 2008 to present the preferred design for College Street and to give opportunity for the public to voice comments and concerns. The City received some public concerns about the width provided for bicycles.

Because of these public concerns, the City asked WHPacific to prepare cost estimates for increasing the curb to curb width to provide space for a Class II bike lane. We estimate the total additional costs at \$1.7M to provide Class II bike lanes. Also, the five-foot bike lanes require full parcel acquisition of three additional homes sites.

**Background**

**Previous Work**

Previous study work resulted in a report, “College Street, Evaluation of Options”, August 2005. This report documented a comprehensive alternatives analysis that scored and ranked ten options (nine build and one no-build) for improvements to College Street that addressed the corridor needs. The report recommended Option 9 as the preferred option, because it best provides a blend of corridor capacity, cost, neighborhood connectivity, non-motorized uses, and corridor aesthetics. The cross-section included a planted center median to control access and provide space for left-turn lanes at key intersections; wide sidewalks with tree wells to

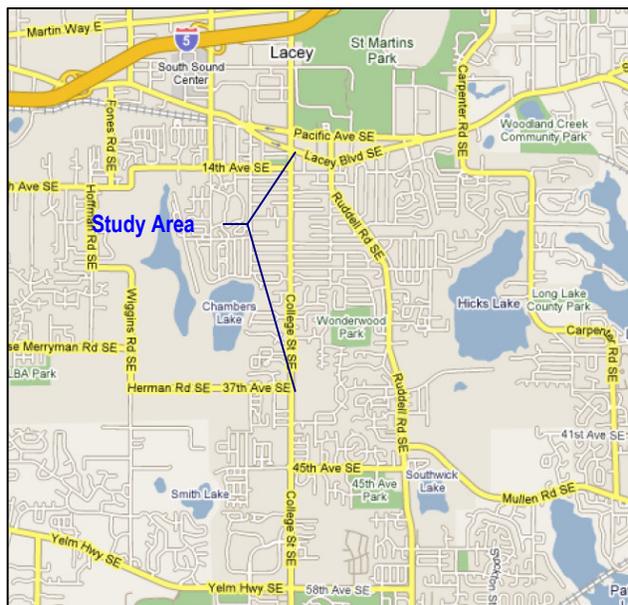


Figure 1 - Vicinity Map



## Cost Evaluation

### Approach

We evaluated the additional costs for widening the curb to curb dimension to provide space for Class II bike lanes. We used the same approach for determining the least impactful horizontal alignment as documented in the *Horizontal Alignment and Right-of-Way Limits* technical memorandum. We widened the overall right-of-way width from 82 to 86 feet to provide additional space for the bike lanes.

### Findings

The least impactful horizontal alignment is not affected by the additional right-of-way width. The alignment by segment remains as stated above.

The five-foot bike lanes require full parcel acquisition of 3 more home sites. The bike lanes also add construction costs (additional roadway and minor retaining walls behind the sidewalks), and right-of-way costs.

The three additional full parcel acquisitions are shown in Tables 1 and 2. The estimated construction costs are approximately \$500,000. The estimated right-of-way costs at roughly \$1.20 M are shown in Table 3.

We recommend \$1.7M as a reasonable planning level estimate to provide five-foot bike lanes. This equates to approximately \$210 per linear foot using a project length of 8,100 feet.

**Table 1**  
**Full Parcel Acquisitions for Structures and/or Driveways Impacted (Including Roundabouts)**

Segment	Current Full Takes	Additional Full Takes	Evaluated Full Takes
1	3	1	4
2	8	2	10
3	5	0	5
4	7 <sup>1</sup>	0	7 <sup>1</sup>
<b>Total</b>	<b>23</b>	<b>3</b>	<b>26</b>

1. Assumes a full parcel acquisition is not required for the apartment buildings at 1510 College Street SE, assuming three building can be remodeled to remove six end units.

**Table 2**  
**Additional Full Parcel Acquisitions Due to Bike Lane Widening<sup>1</sup>**

Parcel Number	Site Address	Existing Parcel (SQFT)
58090006700	4513 29 <sup>th</sup> Court SE	10,693
84850000100	2602 College Street SE	21,162
11828220205	4805 27 <sup>th</sup> Lane SE	5,283

1. Each parcel is impacted by encroachment on an existing structure.

**Table 3**  
**Estimated Right-of-Way Acquisition Costs (Including Roundabout Impacts)**

Segment	Current Cost	Additional Cost	Evaluated Cost
1	\$1,501,194	\$374,701	\$1,875,895
2	\$3,042,376	\$747,998	\$3,790,374
3	\$1,912,530	\$61,164	\$1,973,694
4	\$3,141,860	\$20,703	\$3,162,563
<b>Total</b>	<b>\$9,597,960</b>	<b>\$1,204,566</b>	<b>\$10,802,526</b>