CITY OF DES MOINES
Transportation Gateway Project
Design Report

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December 2009

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Supplemental Documents

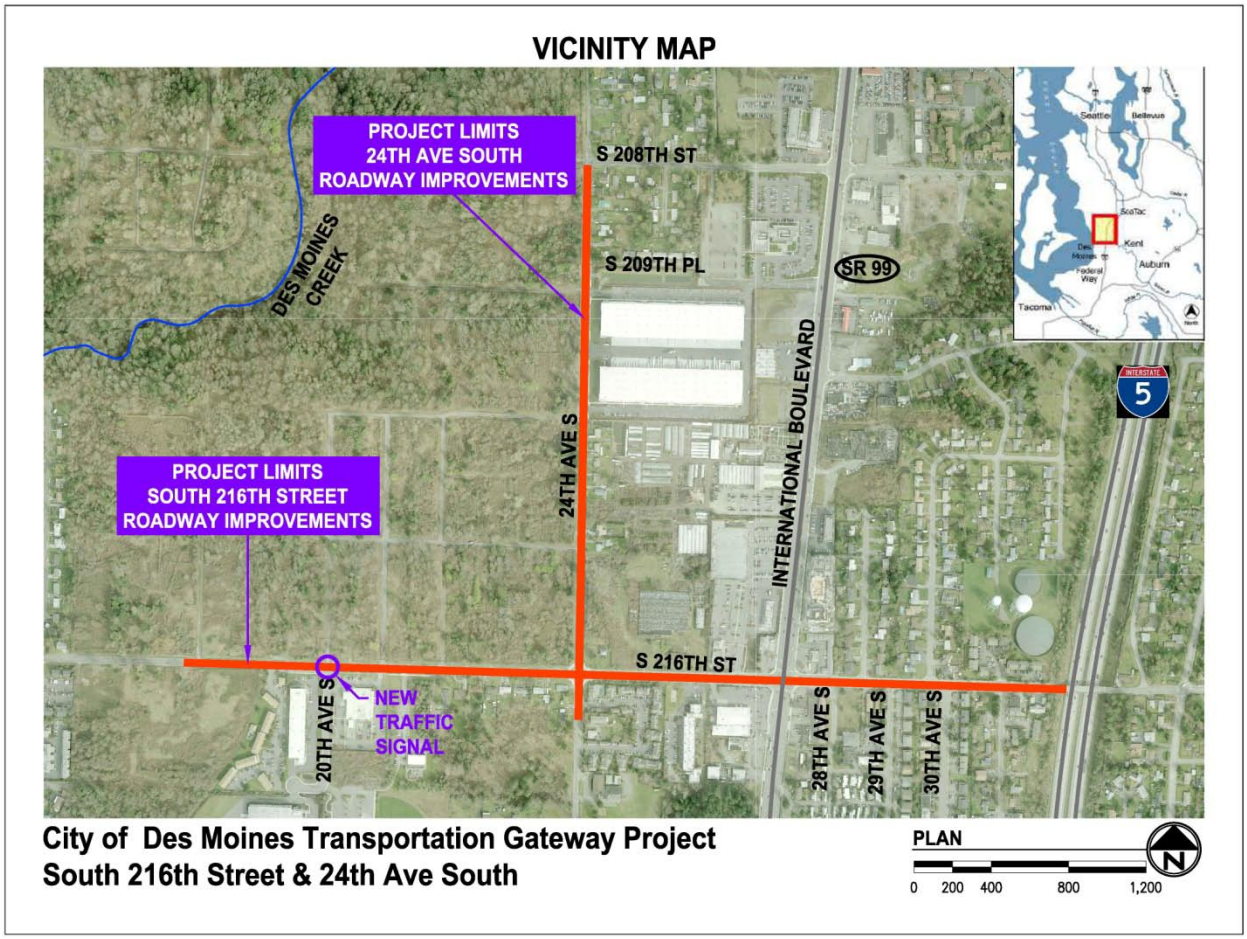
Corridor-Wide Study Screening Level ESA – Landau Associates, December 9, 2009

Cultural Resources Assessment – Landau Associates, November 6, 2009

Draft Geotechnical Report – Landau Associates, October 16, 2009

I. Project Overview

This design report has been prepared for the City of Des Moines and consists of three documents: this report, 30% Design Plans, and Conceptual Urban Design Treatments. The Transportation Gateway Project is located within the City of Des Moines and abuts the City of SeaTac. Two City arterial streets will be upgraded to serve transportation network needs for planned commercial and residential development: South 216th Street between I-5 and 19th Avenue South, and 24th Avenue South north of South 216th Street. Improvements include additional travel and turn lanes, intersection signalization, curbs, gutters, ADA sidewalks, landscaping, bicycle lanes, and ADA transit stops where appropriate. Additionally, storm water detention and treatment facilities will be provided to protect water quality. The location for each street is illustrated on the Vicinity Map below.



The widening of South 216th Street and 24th Avenue South will accommodate the growth planned for the North Central and Pacific Ridge Neighborhoods. Within this area, three major developments are planned: Des Moines Creek Business Park, Waterview Crossing and a potential big box retail development. Within the adjacent City of SeaTac, warehouse development will also increase the City of Des Moines road network demand. Need for these capacity improvements have been documented in

the update to the City of Des Moines Comprehensive Transportation Plan. See Appendix 01 for proposed and existing land use map.

Future investment in the regional transportation system will provide more efficient access to the City of Des Moines and the Port of Seattle, particularly within in the Gateway Project area. Near-term projects include the current Sound Transit Light Rail connection to the Seattle Tacoma International Airport and the King County Rapid Ride on SR99 in 2010. Voter approved long-term projects include an extension of the light rail from the airport thru the City of Des Moines with planned facilities in the Gateway project area. Efforts between Washington State Department of Transportation (WSDOT), the City of Des Moines, and the City of SeaTac are expected to provide a continuous roadway within the 24th/28th Street corridor between South 216th Street and South 200th Street with a link to a proposed extension of SR 509 to I-5, ultimately providing the transportation network for the planned business and residential growth. See Appendix 02 for proposed regional transportation system improvement map.

The City of Des Moines Capital Improvement Program defines the Transportation Gateway Project as three distinct projects; South 216th Street Improvement – Segment 1 (24th Avenue South to Interstate 5), South 216th Street Improvement – Segment 2 (19th Avenue South to 24th Avenue South), and 24th Avenue South Improvement – Segment 2 (South 208th Street to South 216th Street). Each project will be discussed within section 2.2 illustrating the project's construction sequencing.

The primary goal of this design report and associated 30% design plans is to define the corridor improvements and right of way requirements for South 216th Street and 24th Avenue South. Context sensitive street design including business access, low maintenance landscaping, and a visual signature for the Gateway will also be examined in the Conceptual Urban Design treatments document.

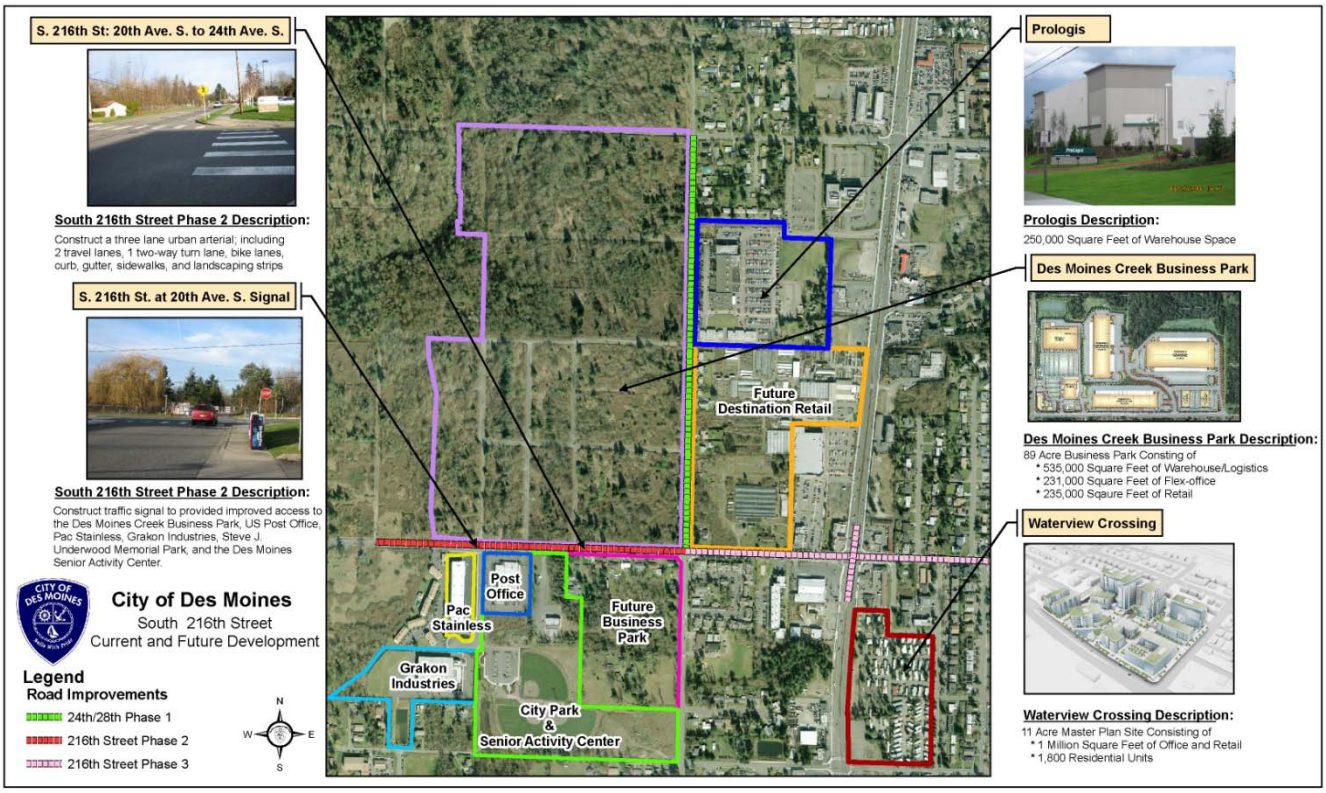
II. Project Description

2.1 Project Type and Termini

The Transportation Gateway Project involves complete reconstruction of South 216th Street and 24th Avenue South. The total length of improvements on South 216th Street is approximately 0.9 miles from 80 feet west of 18th Avenue South to I-5. The total length of improvements on 24th Avenue South is approximately 0.5 miles from South 216th Street to South 208th Street. The new roadways will have four travel lanes, a two-way left turn lane, raised landscaped medians on 24th Avenue South, landscaped planter strips, bike lanes, and sidewalks. The typical roadway sections are shown within section 6.1, proposed roadway improvements.

2.2 Construction Sequencing & Traffic Control

Roadway improvements will be sequenced to allow for concurrent development around the Transportation Gateway Project. Roadway widening to accommodate increased travel demand will be primary to allow for development, while frontage improvements such as sidewalks and planter strips will be secondary, being constructed with adjacent developments. The following three phase sequence is proposed below and is illustrated in the figure below.



The Traffic Control Plan will meet the current *Manual on Uniform Traffic Control Devices* (MUTCD) requirements and be approved prior to the start of work. Traffic control will use both long-term stationary and temporary control devices. These devices may include fixed advanced warning and construction signs as well as movable signing, barricades, drums, and flashing sequential arrows.

General Construction Sequence

- Utility relocate and undergrounding if applicable.
- Storm drainage replacement and modifications.
- Traffic signal and illumination system construction.
- Retaining wall, sidewalk, curb/gutter, and other off-road construction.
- Roadway removal/recycle.
- Roadway final grading, median planter strips, pavement and overlay construction.

24th Avenue South- Including South 216th Street Intersection

The initial stage of construction will involve roadway widening of 24th Avenue South primarily to the west, and some widening to the east near the intersection with South 216th Street. The current roadway will remain open to traffic during the widening process. A new traffic signal will be installed at the intersection of South 216th Street and 24th Avenue South, and appropriate roadway transition

construction will occur south of South 216th Street. It is anticipated that the existing roadway pavement will be recycled for use as fill and base material on site. Driveways and final roadway grading will take place prior to the full depth section of asphalt pavement.

South 216th Street – Segment 2, 19th Avenue South to 24th Avenue South

The second stage of construction will involve roadway widening of the north side of South 216th Street with transitions at 18th Avenue South and east of 24th Avenue South. The existing roadway is anticipated to remain open during construction. Where applicable, existing curb, gutter, and sidewalk on the south side of South 216th Street will remain until future development requires frontage improvements.

South 216th Street – Segment 1A, 24th Avenue South to SR99 – Including SR99 Intersection

The third stage of construction will involve roadway widening on both sides of South 216th Street beginning from Phase 2 termini to a transition east of SR99. Where applicable, existing curb, gutter, and sidewalk on the north side of South 216th Street will remain until future development requires frontage improvements. The existing roadway is anticipated to remain open during construction, with wall construction and roadway widening to occur on the outer edges. Full roadway section construction will occur during this segment to include new curb/gutter, sidewalks, and planter strips.

South 216th Street – Segment 1B, SR99 to Interstate 5

Final roadway widening of South 216th Street, from SR99 to I-5, will take place during development activities and I-5 overpass bridge replacement/widening. Segment 1A transition improvements will be removed to accommodate the ultimate configuration of South 216th Street. The remaining roadway is anticipated to remain open during construction. Full roadway construction of this final segment will include new curb/gutter, sidewalks, and planter strips.

III. Existing Conditions

3.1 Existing Topography and Terrain

The existing terrain generally slopes towards Des Moines Creek to the West. Elevations along South 216th Street vary from 270 feet to 480 feet. Elevations along 24th Avenue South vary from 300 feet to 340 feet. The most significant rate of elevation change occurs on South 216th Street between SR99 and I-5 with roadway grades up to 10%. Both roadway profiles follow the existing terrain; South 216th Street having a continuous up-grade from west to east, and 24th Avenue South having a high point just north of the intersection with South 216th Street.

3.2 Existing Roadway

South 216th Street currently consists of two 11-foot lanes with a continuous 12-foot double left turn lane east of 20th Avenue South. Curb, gutter, and 5-foot sidewalks are located intermittently west of 24th Avenue South and continuously east on both sides of the street. Designated bike lanes are also located

east of 24th Avenue South. Right turn lanes are provided at the intersection with South 216th Street and 20th Avenue South and SR99. Profile grades vary between 2% and 10%.

24th Avenue South currently consists of two 11-foot lanes with 2 to 4-foot shoulders. Designated left turn lanes exist at the intersection with South 216th Street. Curb, gutter, and 5-foot sidewalks are located intermittently along the east side of the street, with drainage swales in-between. The west side of the roadway daylights onto sloping terrain with a drainage swale near the intersection with South 216th Street. Profile grades vary between 0.5% and 7.5%.

Both roadways contain residential and commercial driveway approaches, some with undefined limits. Driveway grades up to 15% do exist. Small retaining walls are used throughout the project to allow for property access as well as roadway side slopes up to 2H:1V.

3.3 Existing Rights-of-Way

South 216th Street consists of the following right-of-way:

- Up to 100-feet -- east of 20th Avenue South.
- 70-feet -- from 20th Avenue South to approximately 300-feet east.
- 60-feet -- from above east limit to approximately 400-feet west of SR99.
- 84-feet -- from above west limit to SR99.
- 72-feet -- from SR99 to 28th Avenue South.
- 60-feet -- from 28th Avenue South to I-5.

24th Avenue South has a continuous 60-foot right-of-way except for a 78-foot right-of-way adjacent to the Prologis commercial property.

3.4 Existing Drainage

There are four primary outfall locations for the existing drainage system associated with this project. The outfall locations will be matched with the proposed improvements. There are two primary outfalls along South 216th Street, one at Pacific Highway South and the other along South 216th Street at the western project boundary. There are also two outfall locations along 24th Avenue South at South 208th Street and South 210th Street. Most of the project is within the Des Moines Creek basin, generally flowing from east to west. A portion of South 216th Street, east of the intersection with Pacific Highway South drains into the Barnes Creek basin. The existing storm system within the project limits is in poor condition and will be replaced with the proposed project. There are no existing detention or water quality facilities associated within the public roadways. Several of the adjacent private properties have conveyance, detention and water quality systems in place. The full drainage report is included in Appendix 03.

Along South 216th Street the existing storm drainage system conveys flows from east to west along the project corridor. The south side of South 216th Street flows in a separate drainage system from 30th Avenue South to the intersection of South 216th Street and Pacific Highway South. At, and along, Pacific Highway South the flows continue towards Barnes Creek. Most of the side street connections along the

south side of South 216th Street, in this same area east of Pacific Highway South, drain south towards Barnes Creek. The existing storm drainage system on South 216th Street, with pipe sizes up to 24-inch, convey the flow to an existing ditch system near the western boundary of the project. The ditch system returns to a storm pipe conveyance system near 14th Avenue S and then heads north paralleling the access road to the Sanitary Sewer Treatment plant with the final outfall to Des Moines Creek west of the bridge crossing into the treatment plant.

From the roadway highpoint on 24th Avenue South, approximately 450 feet north of the intersection with South 216th Street, the existing runoff is conveyed north along 24th Avenue South in roadside ditches on both sides of the road with culvert crossing under driveways crossings. The properties to the east of 24th Avenue South connect to the drainage system along this roadway, but the Port of Seattle property to the west generally drains away from 24th Avenue South. Along 24th Avenue South, the storm drainage system drains east to Des Moines Creek at two locations. The first outfall location is into the roadside drainage ditch that heads west along the abandoned South 210th Street. The northern section of 24th Avenue South outfalls to the roadside drainage ditch along South 208th Street. Per the Des Moines Creek Business Park Draft Environmental Impact Study, the flows along both South 208th Street and South 210th Street connect to existing Wetlands within the ravine to Des Moines Creek. Therefore the drainage connections to the both of these outfalls have been maintained with the proposed improvements.

3.5 Existing Utilities, Signals, and Lighting

3.5.1 Utilities

The following utility providers have been identified as having facilities that exist within the proposed project limits:

- City of Des Moines (Storm Sewer, Traffic Signal Interconnect, Traffic Signal)
- Midway Sewer District (Sanitary Sewer)
- Highline Water District
- Puget Sound Energy (Power, Street Lighting, and Natural Gas)
- Comcast Cable
- Qwest Local Network
- Washington State Department of Transportation (Traffic Signal)
- South King County Fire District

Close coordination with the utility companies will be required to identify potential utility conflicts and to provide relocations prior to construction. In addition, utility companies that currently operate overhead utilities within the project limits will be responsible for coordinating and preparing utility undergrounding plans as part of this project. Existing transmission lines along South 216th Street and 24th Avenue South will be relocated on new poles within the new right-of-way.

3.5.2 Signals

Within the project limits, there are two traffic signal-controlled intersections. These traffic signals are located at the following intersections:

- South 216th Street and 24th Avenue South
- South 216th Street and Pacific Highway South

These signals are interconnected via communication cable that runs underground along South 216th Street between the two traffic signal controllers. Coordination with WSDOT traffic signal maintenance and PSE will be essential as major modifications are expected to both of these traffic signal systems as part of this project.

3.5.3 Illumination

Utility pole-mounted street lighting exists along the South 216th Street corridor and the 24th Avenue South corridor, with signal pole mounted luminaries at both signalized intersections. Puget Sound Energy owns and maintains all street lighting within the City of Des Moines.

3.6 Existing Visual Resources

Background views along the corridor consist of Puget Sound and Vashon Island to the west. Middle-ground views are a mixture of medium- and low- density residential and commercial development interspersed with native and non-native vegetation. Vacant land with vegetation exists west of 24th Avenue South north of South 216th Street. The foreground views are of residences, business, and intermittent roadway shoulders with curb, gutter, sidewalks, small retaining walls, and property landscaping. See Appendix 09 for project site photograph log.

3.7 Existing Transit Operations

King County Metro transit routes are located within the project limits. Route number 166 serves South 216th Street west of SR99, and routs 174 and 191 serve SR99. There are 5 bus stops located along South 216th Street and are located at the following stations as identified in the 30% Design Plans:

TABLE 4.1: South 216th Street - Existing Transit Stops

Type	Station	Location
Sign, Bench, Concrete Pad	42+90 Left	Business Park
Sign	37+20 Right	Emerald Court Apartment Homes
Sign, Concrete Pad	34+25 Left	---
Sign, Bench, Concrete Pad	24+05 Right	US Postal Service Office
Sign, Bench, Concrete Pad	22+85 Left	---

Upgrades to existing pedestrian facilities such as new sidewalks and improved illumination are being proposed to encourage transit use. Bus shelter pads at the above locations are proposed, and will be reviewed by King County Metro.

IV. Design Criteria

The following geometric design criteria were selected based on guidance from the WSDOT Design Manual, AASHTO *A Policy of Geometric Design of Highways and Street,* and the City of Des Moines Street Development Standards.

4.1 Posted Speed/Design Speed

The current posted speed of 35 miles per hour will be maintained along South 216th Street and 24th Avenue South. A design speed of 40 miles per hour will be used for the proposed project improvements.

4.2 Lane Width

All proposed traffic lanes widths will be 12 feet, including all turn lanes. The bike lane width will be 5 feet, not including the roadway gutter/curb. Where raised median landscape strips occur, there will be a 1 foot clear distance to the vertical curb from the edge of the traffic lane.

4.3 Clear Zone

The City will be responsible for establishing clear zone requirements for the proposed improvements. Per WSDOT Design Manual Section 1600, the City is also responsible for establishing the clear zone requirement for managed access state highways, which includes SR99. Therefore, the project will use a clear zone of 2' per *American Association of State Highway and Transportation Officials (AASHTO), Geometric Design of Highways and Streets, 2004, Pg. 399, Horizontal Clearance to Obstructions.*

4.4 Lane & Median Transitions

Based on a design speed of 40 miles per hour, lane and median transitions are to be determined using the equation:

L=VT,

Where:

L=length of transition (ft) V=design speed (mph)

T=tangential offset width (ft)

4.5 Superelevation

Both South 216th Street and 24th Avenue South roadways do not contain any sections with superelevation. The project proposes to maintain normal crown conditions and where horizontal curvature is required, minimum curve radii for normal crown shall be used per WSDOT Design Manual Exhibit 1250-1, *Minimum Radius for Normal Crown Section.*

4.6 Design Stopping Sight Distance

The design stopping sight distance used to evaluate the roadway vertical geometry is 305 feet per WSDOT Design Manual Exhibit 1260-1, *Design Stopping Sight Distance.* Where roadway grades are in excess of 3%, the WSDOT Design Manual Exhibit 1260-3, *Design Stopping Sight Distance on Grades,* was used. Since the proposed design retains various sections of curb/gutter, centerline vertical profiles are consistent with existing conditions that may not meet the above requirements.

4.7 Roadway Cross Slope

Existing roadway cross slope varies between 1% and 4%. New roadway improvements will maintain a normal crown section with a cross slope of 2%.

4.8 Profile Grade

The centerline vertical profile grades will be consistent with existing grades, not to exceed 10%. A steep hill, 10% vertical grade, currently exists on South 216th Street, east of SR99, and will remain due to the scope of this project and cost of associated impacts to reduce the grade to AASHTO and WSDOT standard values. The remaining roadway profiles will maintain grades below 8%, the AASHTO maximum grade for urban arterials.

4.9 Side Slopes

All side slopes will be 3H:1V or flatter, except in areas where necessary to minimize right-of-way acquisition or minimize property impacts. Maximum side slopes in these cases shall be 2H:1V. There will also be a 1 foot shoulder adjacent to the outside edge of the proposed sidewalk before a grade break begins.

4.10 Design Vehicle

The design vehicle for the project is a WB-50 vehicle. Where side streets serve commercial or multifamily zones the SU vehicle is used. A SU vehicle is used as the design vehicle for the two u-turns provided at SR99.

4.11 Channelization Approval

The proposed roadway channelization, as illustrated in the 30% Design Plans, will be approved by the City to allow for continued design.

Channelization plan approval will be required by WSDOT for the intersection of South 216th Street and SR99.

V. Traffic and Accident Data

5.1 Traffic

The City of Des Moines traffic model has been used to forecast year 2030 traffic volumes within the limits of this project. The model is based on proposed and planned land uses along and in the vicinity of

the project, other surrounding traffic improvement projects, the surrounding forecast demographics, and the expected alternative modes of transportation available in the area.

The forecast traffic volumes have been analyzed to identify what capacity will be needed to serve the expected demand of the roadway network. From this analysis, the appropriate corridor and intersection cross-sections and channelization have been identified. Refer to the attached traffic report for a more detailed summary of this analysis, located in Appendix 04.

5.2 Accidents

Accident data for this project has been compiled and documented. The significant finding of this review identified the potential need for access management along South 216th Street, east and west of Pacific Highway South. A more detailed accident summary can be found in the "South 216th Street Corridor Study" by Fehr & Peers, which is attached to the traffic report.

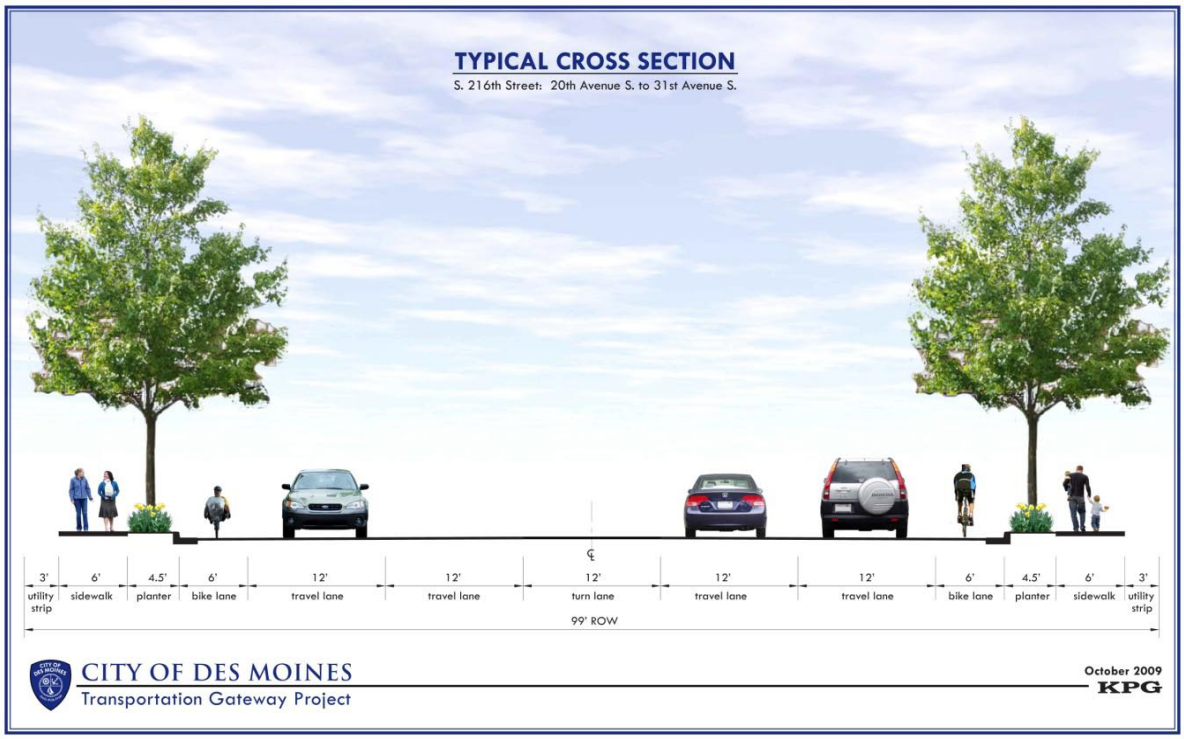
VI. Proposed Improvements

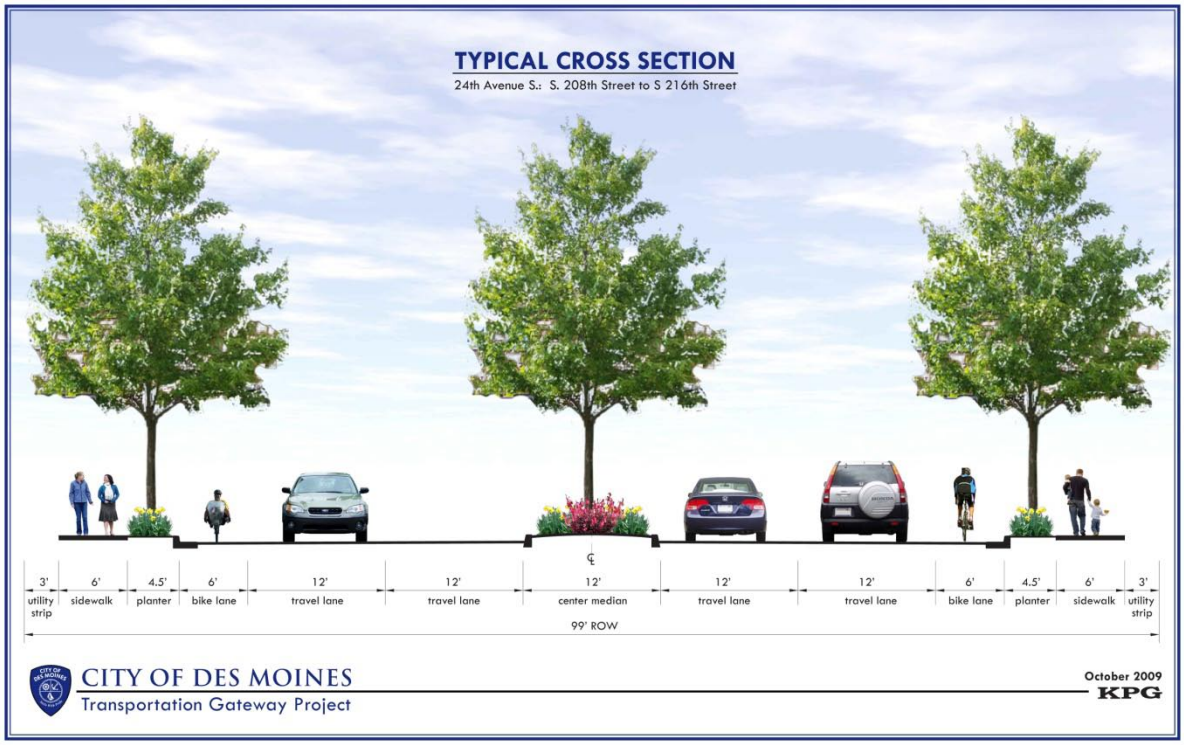
6.1 Roadway

Roadway improvements along South 216th Street and 24th Avenue South will consist of the following cross sectional elements as illustrated in the figures below.

TABLE 6.1: Cross Section Elements

Typical Section	Width
Middle and Outside Traffic Lane	12 feet
Right Turn Lane	12 feet
Dual and Designated Left Turn Lane (middle)	12 feet
Bike Lane	6 feet
Raised Landscaped Median	10 feet
Planter Strip	4 feet
Clear Zone	2 feet
Sidewalks	6 feet
Utility Strip	3 feet





Both South 216th Street and 24th Avenue South share the same cross section characteristics: two thru traffic lanes, one two way left turn lane, bike lanes, curb and gutter, sidewalks and planter strips. Raised median planters are located only on 24th Avenue South due to the numerous driveway approaches for residential and commercial properties on South 216th Street. Where cut and fill earthwork is required on

each side of the roadway, retaining walls will be used to minimize property impacts where appropriate, ranging from two- to nine-feet in height.

Along South 216th Street, approximately 240-feet west and east of the stop bars at the intersection with SR99, precast concrete sloped mountable curb, or c-curb, will be placed. This will provide limited access to and from adjacent commercial driveway approaches and minor residential streets. Left-turn-lane traffic movements will be enhanced and potential vehicular conflict points will be reduced. To mitigate the reduction in access to adjacent parcels and streets, u-turn movements will be provided on South 216th Street at this intersection, both east and westbound.

Driveway approaches for both residential and commercial properties will be provided per Des Moines and WSDOT design standards. The majority of existing approach locations will be retained, and where feasible, consolidation will occur. Driveway grades up to 15% do exist, in which a minimum 15-foot vertical curve will be introduced from the back of approach to limit grade breaks in excess of 6%.

Continuous sidewalks will be provided on both sides of the roadway to encourage pedestrian use and safety. At the location of driveway approaches, the sidewalk will retain running grades and no ramps will be provided. WSDOT Type 3 driveway approaches will be used to ensure design standards are met. Additionally, there will be planter strip separation between the curb and sidewalk. Private property interface with these proposed sidewalks will vary. Pedestrian railings will be necessary in various locations to protect pedestrians at vertical grade separations, such as along retaining walls. All pedestrian crossings and associated curb ramps will be ADA (Americans with Disabilities Act) compliant.

6.2 Rights-of-Way

The new roadway on both South 216th Street and 24th Avenue South will require right-of-way acquisition on both sides of the street in most locations. The new right-of-way width is 99-feet with the following exceptions:

1. 1-foot additional right-of-way at proposed wall locations.
2. 10-foot additional right-of-way proposed along South 216th Street near the intersection with SR99 to accommodate u-turn movements.

6.3 Drainage

Per Existing Drainage Section 3.4, the existing outfall locations within the project corridor will be maintained. Since the existing storm drainage pipes along South 216th Street are in poor repair they will be replaced with the proposed roadway improvements associated with this project. The existing storm drainage system along and crossing International Boulevard/Pacific Highway South will not be replaced.

The drainage design included with the 30% roadway improvement plans is designed for the ultimate configuration of South 216th Street with full roadway width to the right-of-way with Interstate 5. Therefore the conveyance, detention, and water quality systems will be properly sized for the final roadway built-out. The drainage system has been designed in accordance with the 2009 King County Stormwater Management Manual and the 2008 Washington State Department of Transportation Highway Runoff Manual.

The majority of the project is within the Des Moines Creek Basin with a small area of South 216th Street, east of Pacific Highway South, draining south towards Barnes Creek. Per the Des Moines Creek Basin Plan, areas draining to Des Moines Creek are allowed to use Level 1 flow control per historic basin conditions set at 1994. Per aerial photos, existing conditions within the project corridor have remained unchanged since 1994, except for minor improvements at the intersection of South 216th Street and 24th Avenue South. For the roadway improvements within roadway area draining towards Barnes Creek an area equivalent to the new impervious area proposed with this project has been diverted into the South 216th Street drainage system, since this area of the road is too steep for a detention system. The South 216th Street system connects to the proposed detention and water quality treatment systems near 20th Avenue South. There will be no increase in pollution-generating or new impervious area within the Barnes Creek Basin.

There are three detention facilities proposed with this project to match the peak flows from the 2-year and 10-year release rates to the existing conditions. There is one vault proposed along South 216th Street, at the western end of the project. This facility is placed on the south side of the proposed roadway, within the right-of-way formally designated for the SR509 Highway expansion, to avoid existing underground utilities. The South 216th Street detention system will detain flows for the new impervious area created with the proposed widening project and the new impervious area that would have drainage south in to the Barnes Creek Basin. Two detention tanks are proposed along 24th Avenue South prior to the two existing outfalls connections at South 210th Street and South 208th Street.

Water Quality facilities for the project has been designed to meet Enhance Treatment Levels. For each of the proposed detention systems on 24th Avenue South, a water quality vault is proposed directly downstream to provide water quality treatment for the flow of the 2-year release rate. Due to the significant offsite areas connecting to the South 216th Street conveyance system, a single water quality system is not placed downstream of the detention facility. Two water quality systems are proposed for South 216th Street; one near 30th Avenue South and the other near 24th Avenue South. To provide additional water quality protection at the intersection where traffic accidents are statistically more likely to occur, catch basin inserts and outfall pipe protection units are proved to contain oil and other liquids associated with traffic accidents. These inserts are proposed at the intersections of South 216th Street and International Boulevard and 24th Avenue South.

There is also an option of providing detention for the South 216th Street drainage area in a new drainage pond placed within the historic SR 509 right-of-way. A new pond would require drawdown times and features that discourage wildlife per the Washington State Department of Transportation Aviation Stormwater Design Manual, December 2008. A pond option has not been shown with the 30% design plans.

To decrease the size of the proposed detention system and water qualities facilities, an alternative drainage design to infiltration portions of the new sidewalk areas is recommended for this project. This alternative has not been accounted for in the 30% drainage design. There are over 2-acres of new sidewalk area provided with this project. Since the sidewalk area typically drains directly to the roadway, the area of the sidewalk is considered new impervious surface and must be detained and

receive water quality treatment. By infiltrating portions of the sidewalk area through either permeable concrete interlocking pavers or porous concrete, the area of this sidewalk would be excluded from detention or water quality treatment. Options for infiltrating the sidewalk areas are included in the Conceptual Urban Design Elements Report. All of the new sidewalk areas in the project account for approximately 30% of the new impervious area, however only specific areas of the sidewalk are recommended for infiltration. Infiltration of the sidewalk areas can be combined with underground storage systems, such as Silva Cells, which directs the water towards the proposed street trees providing for healthy trees with longer life spans.

6.4 Utilities

Existing underground and overhead utilities within the project limits have been field located and surveyed. The base map will be reviewed by the affected utility providers and will be used to identify conflicts with proposed improvements. As specific conflict locations are identified, further exploration will be conducted by subsurface exploration.

As part of this project, overhead utilities, except for Puget Sound Energy existing transmission lines, will be undergrounded into a joint utility trench. The existing transmission utilities are located on the north side of South 216th Street and the east side of 24th Avenue South. Each utility company will provide a schematic design of their proposed undergrounding facilities, including vaults, number and size of conduits, temporary pole relocations, and terminal pole locations.

Specific utility relocations or modifications have been identified at this time and are illustrated in Table 6.2 below.

TABLE 6.2: Utility Coordination Summary

Utility Provider	Utility Relocation or Upgrade
Highline Water District	Replacement of fire hydrants and services.
Midway Sewer District	New crossing in the vicinity of South 216th Street and 18th Avenue South.
Puget Sound Energy (Power & Illumination)	Joint utility trench will work within sidewalk and 3'-foot utility strip behind sidewalk.
Puget Sound Energy (Natural Gas)	Note: 16-inch high pressure main on west side of 24th Avenue NE. Service upgrades.
South King County Fire District	Development of hydrant spacing and use of City development projections for facility upgrades.
King County Metro	Incorporation of structure shelter footings. Coordination with Rapid Ride Development on SR99.

6.5 Intersections, Signals, and Lighting

20th Avenue South will become a new signalized intersection to provide future access to the Des Moines Creek Business Park. Modifications to existing will occur at the intersections of South 216th Street & 24th Avenue South and SR99. At signalized intersections, all-way crosswalks will be provided. At non-signalized intersections, two-way crosswalks will be provided parallel to the main roadways.

At the signalized intersection of S 216th Street and Pacific Highway S (2030 Without 509 Scenario), the east/west approach channelization at this intersection will consist of the following:

- Left-turn lane
- Through lane
- Through plus right-turn lane
- Bike lane
- U-turn pocket

Single left-turn lanes along S 216th Street at Pacific Highway South are expected to be sufficient, with storage lengths accommodating turning movement queues with the planned available left-turn lane plus two-way left-turn lane configuration at both approaches. Access will be managed with additional c-curb east and west of the intersection. The provided u-turn pockets will assist in the access management of the adjacent driveways. The channelization north and south at this intersection will remain as it exists today.

At the signalized intersection of S 216th Street and 24th Avenue S, the approaches will consist of the following channelization:

- The east/west approaches will have a left-turn lane, a through lane, a through plus right lane, and a bicycle lane.
- The southbound approach will have a left-turn lane, a through lane, a bicycle lane, and a right-turn lane.
- The northbound lane will have a narrowed approach for traffic calming purposes, with a single lane for shared left, through, and right-turn movements.

This channelization provides for better alignment of the intersection, reduced right-of-way impacts on south side of S 216th Street while discouraging through traffic along the south leg of the intersection and a better overall intersection LOS.

At the intersection of S 216th Street and 20th Avenue South it has been determined that signalized control is necessary. The intersection approaches will consist of the following channelization:

- The eastbound approach will have a left-turn lane, a through lane, a through plus right-turn lane, and a bicycle lane.
- The westbound approach will have a left-turn lane, a through lane, a bicycle lane, and a right-turn only lane.
- The northbound approach will have a left-turn lane, and a through plus right-turn lane.
- The southbound approach will have a left-turn lane, and a through plus right-turn lane.

This channelization will provide the capacity needed for the future traffic volumes at this intersection while at the same time allowing for optimal signal timing. This will in turn reduce the overall delay experienced at this intersection as well as along the S 216th Street corridor.

Street lighting will be provided along both South 216th Street and 24th Avenue South. Appropriate wattage, mounting height and spacing will ensure the City's lighting standards are met or exceeded.

6.6 Earthwork Considerations

The proposed South 216th Street roadway profile was based on two main constraints. First, due to the proposed phasing of this project, and retaining traffic movements during construction, existing curb and gutter will be retained where appropriate. As future development occurs, existing curb, gutter, and sidewalk will be replaced to allow for full roadway build-out. Between 20th Avenue South and SR99, the south curb and gutter will be retained, and east of SR99, the north side will be retained. The second constraint, retain existing vertical profile, was used to ensure that the roadway could be constructed in phases.

The proposed 24th Avenue South roadway profile was based on a few considerations, such as commercial driveway approach reconstruction, but is generally more flexible than South 216th Street. First, the existing roadway profile will be retained south of South 216th Street. North of this intersection, the profile will retain the northbound profile except for a rise adjacent to the business park at Station 129+00 RT to reduce extents of driveway reconstruction. Second, isolated low points within the profile have been removed to assist in storm water conveyance.

Approximate earthwork quantities are illustrated in Table 6.3 below. The majority of South 216th Street export quantity originates from roadway widening into existing cut slopes. Retaining walls will be utilized in locations where 3H:1V cut and fill slopes adversely impact adjacent properties.

TABLE 6.3: Approximate Earthwork Quantities

Construction Phase	Cut (CY)	Fill (CY)
24th Avenue South Inc. S 216th St Intersection	6,000	5,650
South 216th St – Segment 2 19th Ave S to 24th Ave S	8,850	2,220
South 216th St – Segment 1A 24th Ave S to SR99	5,700	600
Total Import/Export	20,550	8,470

VII. Conceptual Gateway Treatments

The Transportation Gateway Project has unique opportunities for urban design treatments. South 216th Street at SR99 currently has the City gateway sign and nautical theme expressed along SR99. South 216th Street is a main roadway leading west into downtown Des Moines. The existing theme can be expanded along South 216th Street to support City identity, promote access to downtown, and provide a vibrant frontage to new development.

The intensity of urban design treatments should be centered between SR99 and 24th Avenue South, but still be expressed along the entire length of the proposed improvements. 24th Avenue South, north of South 216th Street, is a corridor that will provide access to new retail and airport related businesses. Urban design treatments do not need to be express City identity; however they should visually support the new developments.

24th Avenue South, south of South 216th Street, is a corridor that will provide access to existing and redeveloped residential neighborhoods. This section should dissuade industrial truck traffic from traveling through this area. Urban design treatments should visually alert drivers that it is a residential neighborhood and provide traffic calming for those who enter, to create a non-principal arterial atmosphere.

For the complete description and set of conceptual urban design treatments, please see the Conceptual Urban Design Treatments document.

VIII. Alternative Analysis and Public Involvement

8.1 Alternative Analysis

Two alignment alternatives, symmetrical and offset, for South 216th Street and 24th Avenue South were evaluated based on the following criteria and presented to Des Moines City Council for consideration and direction; see Appendix 06 for alternative alignment drawings.

- The City of Des Moines Comprehensive Transportation Plan: Ability to meet planned and future growth including multi modal requirements.
- Disruptions and relocations for businesses and residences.
- Thru traffic impacts on local neighborhoods.
- Utility and development coordination.
- Environmental impacts during and after construction.
- Context sensitive design: business accesses, landscaping maintenance, & visual signature for Gateway development.
- Right of way and utility costs.
- Storm water facilities quality & quantity analysis.
- Walls, including impact analysis of overhead/underground utilities.
- Construction costs, phasing, traffic control, and schedule.
- Ongoing operation and maintenance costs.

The City of Des Moines Council, after consideration of public input and engineering recommendations, approved the offset alignment as the preferred option to advance through preliminary design on July 23, 2009. Community involvement and alignment alternative briefings during previous council meetings addressed comments directing the alignment selection.

8.1.1 Offset Alignment Alternative (Preferred)

The offset alignment alternative is based on shifting the centerline alignments for both South 216th Street and 24th Avenue South, North and West from existing. Generally, this alignment will allow for proposed roadway widening primarily onto vacant lands owned by the Port of Seattle, west of 24th Avenue South. South 216th Street, east of 24th Avenue South, the alignment shifts south to maintain existing intersection geometry between South 216th Street and SR99. East of SR99, the alignment shifts south to reduce property impacts and allow for future bridge widening across I-5. Advantages to this alignment include:

- Allow for retention of existing curb, gutter, and sidewalk as noted in Phase 2 and 3 construction sequencing.
- Maintains existing development and access routes to new roadway location, minimizing driveway reconstruction.
- Reduced construction and traffic impact costs due to working primarily on unimproved property.
- Reduced construction and traffic costs due to utility relocation and upgrades occurring adjacent to the existing roadways.
- Reduced impacts to existing commercial and residential uses. Right of way area and anticipated relocations are lessened.
- Fewer right-of-way parcel negotiations and time necessary for acquisition. This will provide the ability to move forward quickly with competitive grant funding.

8.1.2 Symmetrical Alignment Alternative

The symmetrical alignment is based on applying the roadway section along the centerline of the existing right-of-way. It will allow for roadway widening on both sides of the existing roadway on both South 216th Street and 24th Avenue South. The advantages to this alignment include:

- Minimizes right-of-way acquisition of property owned by the Port of Seattle.
- Eliminates roadway horizontal curvature.

The disadvantages to the symmetrical alignment include:

- Complete construction of each side of the roadways for widening, requiring the removal of existing curb, gutter, and sidewalks in those locations indicated for retention in each phase of construction sequencing. This will not allow for concurrent development and roadway activity.
- Will require major driveway reconstruction of multiple driveways such as the accesses for Prologis on 24th Avenue South.

- Increased construction and traffic costs due to major traffic control requirements to shift traffic around construction activity on the existing roadway.
- Increased construction costs due to removal and replacement and addition to utilities within current locations.
- Increased impacts and potential relocations of residential and commercial properties within the City of Des Moines and the City of SeaTac, resulting in increased acquisition time.

8.2 Public Participation

Active public involvement aided with the development of the offset and symmetrical alignments. Two open house events were conducted as well as the distribution of newsletters to obtain comments and concerns from area residences and business owners. See Appendix 10 for detailed open house meeting summaries.

The initial open house focus was to inform the public about the Transportation Gateway Project, project need, and associated improvements. Current and future land use activity including transportation studies were presented to provide project foundation. Exhibits were then presented to illustrate preliminary roadway design concepts for both South 216th Street and 24th Avenue South. Major comments received include:

- Residential property impacts relating to frontage improvements from proposed roadway widening. Roadway improvements impacting the Port of Seattle property north and west of South 216th Street and 24th Avenue South was preferred.
- Provide sanitary sewer utility connections to adjacent properties.
- Maintain commercial driveway accesses.
- Provide signal controlled intersection at the intersection of South 216th Street and 20th Avenue South.

The second open house provided a summary of the project and topics discussed within the first open house as well as presentation of the two roadway alignment alternatives, offset and symmetrical. Streetscape concepts, illumination, patterned concrete and roadside furniture were reviewed to provide visual suggestion of the proposed roadways. Major comments received included overlap with the comments during the first open house as well as:

- Retain recently constructed existing curb, gutter, sidewalk, and landscaping on the south side of South 216th Street where appropriate to reduce project costs.
- Include two-way left turn lane on South 216th Street and 24th Avenue South as well as provide medians where they would not impact property access.
- Wide support for the offset roadway alignment alternative for both South 216th Street and 24th Avenue South.

In Addition to the open house meetings, technical coordination with project stakeholders was performed. Involved groups included the Port of Seattle, Washington State Department of Transportation, Highline Water District, Midway Sewer District, Puget Sound Energy, Qwest, Comcast,

South King County Fire District, King County Metro, Sound Transit, and the City of SeaTac. Comments from these meeting can be found within Appendix 10.

IX. Opinion of Probable Cost & Project Funding Considerations

An engineer's opinion of probable cost has been developed for the 30% design plans. The cost estimate illustrates corridor improvements associated with future right-of-way requirements for South 216th Street and 24th Avenue South. The below table illustrates the key elements of the estimate, and a complete summary is located within Appendix 08.

TABLE 9.1: 30% Design – Preliminary Opinion of Probable Cost *

Construction Phase	Construction Cost	Right of Way Cost	Total Cost
24th Avenue South Inc. S 216th St Intersection	$ 6,217,542	$ 1,879,000	$ 8,096,542
South 216th St – Segment 2 19th Ave S to 24th Ave S	$ 4,460,794	$ 976,000	$ 5,436,794
South 216th St – Segment 1A 24th Ave S to SR99	$ 2,942,659	$ 1,730,000	$ 4,672,659
Total Cost	$ 13,620,995	$ 4,585,000	$ 18,205,995

*Excludes administration, engineering, construction inspection, and project contingency.