Washington State Department of Transportation

Supplemental Agreement Number 02	Organization and Address HDJ Design Group, PLLC 314 W 15th Street Vancouver, WA 98660-2927 Phone: (360) 695-3488	
Original Agreement Number S-584		
Project Number S-584	Execution Date 7/6/2015	Completion Date 3/31/2016
Project Title NW 6th Avenue and Norwood Intersection	New Maximum Amount Payable $ 278,107.76	
Description of Work Intersection Improvements including the design of a roundabout.		

The Local Agency of City of Camas desires to supplement the agreement entered into with HDJ Design Group, PLLC and executed on 7/8/2014 and identified as Agreement No. S-584

All provisions in the basic agreement remain in effect except as expressly modified by this supplement.

The changes to the agreement are described as follows:

I

Section 1, SCOPE OF WORK, is hereby changed to read:

See attached scope of work

II

Section IV, TIME FOR BEGINNING AND COMPLETION, is amended to change the number of calendar days for completion of the work to read: completion date 3/31/2016

III

Section V, PAYMENT, shall be amended as follows:

See attached exhibit B-2 -- Original $50,075, Supplement #1 $24,564.17, Supplement #2 $203,468.59 New Total $278,107.76

as set forth in the attached Exhibit A, and by this reference made a part of this supplement.

If you concur with this supplement and agree to the changes as stated above, please sign in the appropriate spaces below and return to this office for final action.

By: Thomas W Dennis

THOMAS W DENNIS, MEMBER
Consultant Signature

By: Scott Higgins, Mayor

Approving Authority Signature

July 6, 2015
Date

DOT Form 140-063 EF
Revised 9/2005

Exhibit A
Scope of Work
Supplemental Agreement #2
Engineering Design Services

NW 6th Avenue and Norwood Intersection
City of Camas Agreement Number S-584

June 8, 2015

The Professional Services Contract is amended and supplemented to include the following provisions regard the Scope of Services.

PROJECT DESCRIPTION AND BACKGROUND

HDJ Design Group and their consultant team were previously selected by the City of Camas to design a traffic signal at the intersection of NW 6th Avenue and Norwood Street On March 16, 2015, it was determined that a roundabout should be designed to 30% conceptual level, and the traffic signal design be put "on hold". The roundabout option was intended to address safety and congestion issues in the project area.

The conceptual design of the roundabout was presented to the community at an Open House conducted on May 28, 2015. The roundabout option was very well received by the community.

On June 1, 2015 City council decided to proceed with the roundabout option for the intersection of NW 6th Avenue and Norwood Street. The intersection will be designed for reconstruction as a single lane roundabout and designed in a manner that will accommodate an additional east bound lane through the roundabout in the future.

This project will also include a 3 inch deep HMAC grind and inlay from where the roundabout reconstruction ends on NW 6th Avenue to the east side of the intersection of Logan Street where the City will have already performed a grind and inlay on NW 6th Avenue during the summer 2015 construction. HDJ will also design a curb gutter, sidewalk and associated storm drainage improvements along the north side of NW 6th Avenue between the Norwood and Logan Street intersections. As part of these improvements the Logan Street intersection curb returns will be reconstructed to comply with current ADA standards.

The following scope of work includes the design of the roundabout and preparation of plan, specifications and estimate (PS&E) for construction.

In general, the engineering phase will involve, but not be limited to, the following key components and deliverables:

- Subsurface Geotechnical Explorations and Report
- 60% Design Submittal with Cost Estimate
- 90% Design Submittal with Specification and Estimate
- 100% Design Submittal with Specification and Estimate
- Coordinate, prepare and submit a SEPA Checklist, and a General Stormwater Construction Permit
- Perform an archeological pre-determination.
- Final Design Submittal (Bid Ready) Documents
- Completing final plans, specifications, estimate, (PS&E) and for the project
- Assist in Bidding and Award
- Supplemental if requested – Provide Construction Administration including on-site observation and testing of materials and overall construction administration.

PROJECT ASSUMPTIONS

1. Assume that there are not environmental sensitive areas within the project boundary
2. Assume that the design of retaining walls is not required, except for the short decorative walls at the roundabout
3. Assume the proposed roundabout meets volume to capacity standard for the City of Camas for 2035 volumes and any further capacity analysis will be based on recent memo dated May 8, 2015 (attached)
4. Right of way acquisition will be required for one property. Assume that the City of Camas will coordinate the acquisition effort and perform the acquisition. HDJ will prepare the exhibit and legal description.
5. No updated WSDOT Right-of-Way Plan will be required and no Access Break Permit will be required.
6. The design of the storm water collection, conveyance and treatment systems are to be prepared following WSDOT their Highway Runoff Manual.
7. The City will obtain right-of-access to all properties, and will assist with coordination with WSDOT.
8. Field work will be performed during normal business hours (7am to 6pm).
9. If contaminated soils are encountered, then additional charges will be incurred for equipment decontamination, testing, and soil disposal.
10. Evaluation of the pavement overlay from approximate Station 104+00 to the east, is not included in our scope of work.
11. If needed, the City will issue a street use permit at no cost to the Consultant.
12. Assume that no archaeological site is found and that a "survey" is not required.

DUTIES AND RESPONSIBILITIES OF CONSULTANT

TASK A – PROJECT ADMINISTRATION

HDJ shall oversee project tasks and coordinate with City staff to manage the scope, schedule and budget for the project. This item includes the coordination and meetings necessary to successfully complete all phases of the project. Scope of work is based on a 6 month design process.

Subtask A.1 – Contract Administration, Invoicing, and Progress Reports

1. Prepare and submit monthly invoices. Each invoice will include: date period covered by invoice, number of hours worked during the billing period with billing rates shown; expenses and associated mark-ups; total cost for labor and expenses for the billing period; sub-consultants fees including markups for the billing period; and a total amount summarizing labor, expenses, and sub-consultant fees.
2. Prepare a Contract Summary Report to accompany the monthly invoices. The Contract Summary Report will list each invoice as well as current invoice with an itemized summary of invoice numbers, dates, and amounts billed for labor, expenses, and sub-consultants as well as total amounts for each invoice. The Contract Summary Report will also list the total amount billed to date, total amount remaining under contract, and contract expiration date.
3. Prepare a brief Project Status Report to accompany the monthly invoices. The Project Status Report will include: date period covered by Status Report, brief summary of work performed during the billing period, a notice to City raising any issues or concerns that could require a contract amendment/supplement, a brief summary of completed and/or upcoming project milestones, and action items needed from City for project delivery. HDJ will monitor the status of the budget and take corrective actions to correct undesirable budget trends involving the City if scope is impacted.
4. Prepare and maintain project design schedule. The schedule shall identify HDJ tasks and items provided by City and other consultants. The schedule shall be updated every month or as circumstances require or as requested by the City.
5. Project Management. General coordination with client, sub-consultants, other consultants, and stakeholders and ongoing monitoring of tasks and resources.
6. Maintain all contract-required documentation. Provide copies of project files and records to the City for audits and public information requests. All final documents shall be provided in electronic format as requested.
7. Deliverables:
    a. Monthly invoices, Contract Summary Reports, and Project Status Reports.
    b. Project Design Schedule and updates
    c. Project Documentation

Subtask A.2 –Meetings

This item includes the preparing for and facilitating regular meetings to successfully complete the project.

1. HDJ shall schedule Project team meetings and prepare meeting agendas. This includes monthly progress meetings with City staff, design staff meetings, and coordination meetings.

2. HDJ shall organize and hold Project meetings with key Project team members, as well as representatives from the City of Camas and other agencies, as needed. These meetings shall have specific agendas addressing and resolving Project issues as they are encountered.
3. Meet with City after the 60%, 90% and 100% plan submittals to discuss the review comments. (Assumed 3 meetings, 3 hours each)
4. Deliverables:
    a. Meeting Agenda and meeting summaries delivered within 5 days of the meeting

Subtask A.3 –Management, Coordination and Direction

This item includes the preparing for and facilitating regular meetings to successfully complete the project.

1. HDJ shall provide management, coordination, and direction to the Project team in order to complete the project on time and within budget. The City fosters a partnership approach of all stakeholders in the Project. HDJ shall integrate this strategy into the overall management approach.
2. HDJ shall establish a quality management program and designate responsibility for review of technical work and other deliverable products.
3. HDJ shall prepare and maintain a project design schedule. The schedule shall identify HDJ and sub-consultants tasks, major milestones and deliverables, and items provided by CITY and other consultants. The schedule shall be updated every month or as circumstances require.
4. HDJ shall coordinate HDJ tasks and activities with the City. This shall include using monthly meetings to plan and coordinate upcoming activities.
5. HDJ shall coordinate with private and public utilities, including power, phone, cable, gas and other utilities.
6. HDJ shall coordinate with Washington State Department of Transportation, the Camas Public School District, CTran, and other potential stakeholders.
7. HDJ shall coordinate with property owners adjacent to the Project who will be affected by the roadway design. Prior approval from the City's Project Manager will be required before any contact with neighborhood associations or private property owners occurs.
8. Deliverables:
    a. Project Schedule & Schedule Updates
    b. Summary notes of coordination efforts

TASK B – DATA COLLECTION

Subtask B.1 – Surveying

Additional topographic survey is needed to gather information along the south side of NW 6th Avenue, including curb/gutter, back of walk, and ground shots at and near the sloped area. The crew will also pick up the location of the geotechnical borings and infiltration test pit.

Subtask B.2 – Base Map Update

After completion of the additional survey, HDJ staff will update the base map for the project.

9. HDJ will import the survey information including additional topography and location of geotechnical borings and infiltration testing.

10. Deliverables:
    a. Updated base drawing in AutoCAD format.

Subtask B.3 – Site Visit

HDJ staff will conduct a site visit, to verify survey data represented in project base map.

1. Deliverables:
    a. Project Photos

Subtask B.4 – Right-of-Way Mapping

1. HDJ will prepare a legal description and take exhibit for the one property where right-of-way will be required in the SW quadrant of the NW 6th and Norwood intersection.

2. Deliverables:
    a. Title Report
    b. Take Exhibit
    c. Legal Description

TASK C– GEOTECHNICAL INVESTIGATION

Geotechnical Investigation will be provided by sub-consultant HartCrowser. This item includes all work necessary for HDJ and HartCrowser to perform the necessary geotechnical investigations and analysis and provide the required reports and design recommendations. HDJ will coordinate with sub-consultant by providing necessary project information to facilitate the geotechnical investigation. HDJ will review the report and incorporate report project recommendations, as appropriate, into the project design.
The Geotechnical Investigation will include the following:

Subtask C.1 – Geotechnical Explorations and Reporting

HDJ's sub-consultant, Hart Crowser, will conduct a geotechnical investigation to evaluate pavement, soil, and groundwater conditions in the project work area. They will develop geotechnical design recommendations and construction guidelines for an infiltration system, earthwork, and new pavement. The work will be conducted in general conformance with City of Camas (City) standards and Washington State Department of Transportation's (WSDOT's) Geotechnical, Highway Runoff, and Pavement Policy design manuals.

Specifically, Hart Crowser will provide the following services.

1. Review readily available geologic, groundwater, and soil survey maps that cover the project vicinity.
2. Review geotechnical reports, if any, prepared for nearby developments and provided by the City.
3. Conduct a reconnaissance of the project area.
4. Mark the proposed exploration locations in the field and notify the "One Call" service for public utility locates.
5. Prepare traffic control plans for review by the City and WSDOT. Implement the approved traffic control plans during completion of field explorations.
6. Complete the following exploratory work to characterize as-built pavement and subsurface soil and groundwater conditions. (The approximate proposed locations of the explorations are shown on the attached figure.)
    a. Complete up to 6 pavement cores and conduct dynamic cone penetrometer (DCP) testing at each core location to depths up to 3 feet below grade to evaluate pavement subgrade strength.
    b. Advance up to 3 borings to 4 feet below grade adjacent to select pavement cores to characterize subsurface soils.
    c. Advance up to 2 borings to depths of 6 to 15 feet below grade for evaluation of soil conditions in areas of future earthwork activities.
    d. Advance 1 boring to a depth up to 40 feet below grade for evaluation of soil and groundwater conditions in the vicinity of the proposed infiltration pond. Install a 2-inch diameter groundwater monitoring well (e.g. piezometer) in the borehole.
7. Maintain a log of the soils encountered in the explorations and collect select soil samples for laboratory testing.
8. Patch the pavement at the coring and boring locations with ready-mixed concrete or cold-mix asphalt patches.
9. Conduct a program of laboratory testing on select soil samples. The actual quantity and type of tests run will be based on the materials collected, though for budgeting purposes include up to:
    a. 6 particle-size distribution tests (sieve analyses),
    b. 4 percent fines determinations (percent passing the No. 200 sieve),
    c. 12 moisture content and/or density determinations, and
    d. 1 Atterberg Limits determination.
10. Conduct engineering analyses to evaluate:
    a. Infiltration characteristics per WSDOT Highway Runoff Manual standards,
    b. Pavement design per WSDOT Pavement Policy Design Manual standards,
    c. Retaining wall design parameters, if needed, and
    d. Earthwork considerations.
11. Measure groundwater levels in the piezometer on up to 8 occasions.
12. Prepare a draft geotechnical report summarizing the results of the subsurface exploration and laboratory testing programs, and presenting appropriate recommendations and conclusions.
13. Prepare a final geotechnical report incorporating requested changes/updates from the project team's review of the draft report.
14. Provide project management and support for our work, including coordination of Hart Crowser staff and subcontractors, invoicing, email and telephone communications with the project team,

other incidental administrative services required for the project, and attendance at up to two project meetings.

15. Deliverables
    a. Draft Geotechnical Report (electronic PDF format)
    b. Final Geotechnical Report (electronic PDF copy and up to 5 hard copies)

TASK D – INTERSECTION PLAN AND ROUNDABOUT ANALYSIS REPORT

HDJ will prepare the WSDOT Intersection Plan for Approval and the required WSDOT Roundabout Analysis, address review comments from WSDOT and City.

Subtask D.1 – Intersection Plan

HDJ will provide traffic engineering services for the design of the intersection improvements in accordance with City of Camas and WSDOT standards that will include:

1. Support preparation of an intersection plan for approval
2. Provide for the traffic engineer to meet with WSDOT to discuss any red-lines or comments
3. Deliverables:
    a. Intersection Plan

Subtask D.2 – Roundabout Analysis Report

This sub-task includes work necessary to prepare a roundabout analysis report including the following:

1. Traffic Analysis/Queuing
2. Design Vehicle Maneuvering
3. Illumination Photometric (the photometric plan will be prepared under task G below, a copy will be included in the Roundabout Analysis Report
4. Signing and Striping Plans (the signing and striping plans will be prepared under task G below, a copy will be included in the Roundabout Analysis Report)
5. Fastest path analysis
6. Safety Benefits
7. Pedestrian and bicycle consideration
8. Sight Distance
9. Deliverables:
    a. Roundabout Analysis Report

TASK E – ROUNDABOUT LANDSCAPE CONCEPTS

This item includes all work necessary to complete 3 landscape development concepts:

1. Prepare 3 landscape concept plans to include:
    a. Landscape plan showing location of plant material, hardscape materials and lighting elements.
    b. Three dimensional sketch depicting each landscape plan as shown above.
    c. Landscape legend calling out examples of landscape, hardscape and lighting materials to be used in each concept.

2. Prepare preliminary summary of quantities and cost estimates for hardscape, walls, landscaping, irrigation and lighting.
3. Deliverables
    a. Roundabout Landscape Concepts (3)

TASK F – PERMITTING

Subtask F.1 - SEPA

HDJ will complete a SEPA checklist in accordance with SEPA (RCW 43.21C) and SEPA Rules (WAC 197-11). It is anticipated that the City will be SEPA lead agency and that the agency determination will be a Determination of Non-Significance (DNS) or a Mitigated Determination of Non-Significance (MDNS).

1. Deliverables
    a. Draft SEPA Checklist (one electronic copy)
    b. Final SEPA Checklist (one electronic copy)

Subtask F.2 – Construction Stormwater Permit

HDJ shall coordinate with the Department of Ecology, prepare and submit a Construction Stormwater General Permit application and transfer of permit to the selected Contractor. HDJ staff will prepare the permit application and Notice of Intent (NOI). The NOI will be submitted to the local newspaper. HDJ will prepare the Transfer of Coverage and Notice of Termination forms for City and Contractor signature and submittal, which will constitute transfer of coverage to the Contractor.

In addition, HDJ will prepare the SWPPP to be kept at the site during construction.

1. Deliverables:
    a. SEPA
    b. Permit Application
    c. Notice of Intent (NOI)
    d. SWPPP
    e. Transfer of Coverage Form
    f. Notice of Termination Form

Subtask F.3 – Archeological Pre-determination

HDJ's sub-consultant, Archaeological Investigations Northwest, Inc. (AINW), will conduct the archeological pre-determination for the project. This sub-task scope of work is as follows:

1. AINW's work will provide the predetermination study and report. The study will be done to determine if an archaeological site is *likely* within the project. The work will be conducted to meet the City of Camas standards for a predetermination, led by one of AINW's professional

archaeologists. The fieldwork will include a pedestrian survey of the project area and excavation of up to 6 shovel tests. If evidence of an archaeological site is found, another step, called a "survey," would be needed, and it would need a separate authorization.

2. AINW will send one copy of the report to the Washington State Department of Archaeology and Historic Preservation, for its files. For the City of Camas' ordinance, they will also send copies via certified mail to seven different Tribes.

3. Deliverables:
    a. Archeological Pre-determination Report

TASK G – DESIGN

HDJ will advance the roadway design through 60 percent, 90 percent, and final construction contract documents as part of this task. Project specifications will be prepared based on the latest approved WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction along with General Special Provisions (GSP) and amendments. City specifications will be incorporated as special provisions as well as project specific requirements. The specifications will be prepared at the 90% and final design phases.

HDJ will also develop an initial Opinion of Probable Costs based preliminary design quantities. Estimates will be compared to historic bid records of City projects and WSDOT records. With each submittal the quantities and unit bid costs will be updated as necessary. As the project details evolve the need for contingency will be reduced.

Subtask G.1 – Design Memorandum

Preparation and submittal of a pre-design memorandum – This memorandum should include all of the design standards and assumptions in which the design is based. Subsequent changes and modifications must be addressed via addendums to the memorandum. This task is important to keep a track record of changes.

1. Deliverables:
    a. Design Memorandum

Subtask G.2 – 60% Design (Plan and Estimate)

The Consultant will develop construction documents to the 60% design stage. These documents will consist of plans, an opinion of probable construction cost, and an anticipated construction schedule. These documents will be used to assist the permit process.

1. Design tasks include the following:

a. Refine alignments and profiles based on review comments from the City
b. Develop detailed geometric layout of intersection and grading for ADA purposes
c. Refine corridor model of the proposed streets in Civil3D based on review comments
d. Refine drainage basin layout and hydrologic model for proposed conditions
e. Refine layout and design for water quality treatment and runoff control facilities.
f. Prepare street light photometric analysis based on WSDOT and City of Camas standards
g. Field investigation of existing signing and striping beyond the survey data.
h. Calculate quantities and prepare a 60% engineer's estimate of construction costs
i. Prepare a conceptual construction schedule
j. Submit 60% plan set and cost estimate for review

2. The 60% plans shall include:
    a. Cover Sheet
    b. Civil Legend Sheet
    c. Typical Sections
    d. Site Prep/Demolition Plans
    e. Erosion Control and Grading Plans
    f. Erosion Control Notes Detail Sheets
    g. Plan over Profile Sheets showing basic geometry information
    h. Utility Plan – Updated general concepts for stormwater system and facilities.
    i. Utility Plan for undergrounding of overhead utilities.
    j. Roundabout Intersection Layout
    k. Street light layout
    l. Signing and striping plan
    m. Construction Staging Plan

3. Deliverables
    a. 60% Design Plans, including Cost Estimates (3 copies of the plans 11X17 and a PDF of the plan set and cost estimate)
    b. Conceptual Construction Schedule
    c. Preliminary Stormwater Report

Subtask G.3 - 90 % Design (PS&E)

HDJ will address review comments from the 60% plans and develop construction documents to the 90% design stage. These documents will consist of plans, specifications, a bid item list, an opinion of probable construction cost, and an anticipated construction schedule.

1. Design tasks include the following:

a. Update roundabout design based on comments from 60% Plans and WSDOT review comments
b. Update construction notes, curb return grades, ADA ramp grading, storm sewer system
c. Update stormwater analysis based on comments from 60% plans
d. Update and finalize the Stormwater Report.
e. Prepare street light circuit design including conduit, service location, junction boxes, and landscape electrical service.
f. Prepare landscape plans per the selected concept
g. Compute quantities and prepare an engineer's estimate of construction costs.
h. Prepare 90% Level Project Specifications including current WSDOT amendments, GSP's and special provisions for unique bid items, materials and construction requirements.
i. Submit 90% plan set, specifications, and cost estimate for review

2. The 90% plan set shall include the following:

    a. Cover Sheet
    b. General Notes and Legend Sheet
    c. Typical Sections
    d. Erosion Control and Grading Plans
    e. Erosion Control Notes and Details
    f. Site Prep/Demolition Plans
    g. Street and Storm Plan / Profile Sheets
    h. Utility Relocations Plans and Details.
    i. Stormwater Facility Plans and Details
    j. Miscellaneous Details Sheet
    k. Signing and Striping Plans
    l. Lighting Plans and Details
    m. Construction Staging Plan
    n. Temporary Traffic Control Plan
    o. Standard Detail Sheets
    p. Landscape Plans and Details

3. Deliverables
    a. 90% PS&E (3 copies on 11X17 and a pdf of the plan set)
    b. 90% Contract Documents in Word format
    c. 90% Construction Cost Estimate in Excel format.
    d. Final Stormwater Report

Subtask G.4: Final Design (PS&E)

HDJ will address review comments from the 90% plans and develop construction documents to the 100% and Final design stage. These documents will consist of plans, specifications, a bid item list, an opinion of probable construction cost, and an anticipated construction schedule.

Design tasks include the following:

a. Prepare final special provisions as needed for nonstandard items shown on the plans, and compile the project specifications.
b. Compute quantities and prepare an engineer's estimate of construction costs.
c. Submit 100% PS&E for Review
d. Address City review comments regarding the plans, specs, and estimate.

100% and final design phase plan set shall include:

a. Cover Sheet
b. General Notes and Legend Sheet
c. Typical Sections
d. Erosion Control and Grading Plans
e. Erosion Control Notes Details
f. Site Prep/Demolition Plans
g. Street and Storm Plan / Profile Sheets
h. Utility Relocation Plans
i. Stormwater Facility Plans and Details
j. Miscellaneous Details Sheet
k. Signing and Striping Plans
l. Lighting Plan and Details
m. Construction Staging Plan
n. Temporary Traffic Control Plan
o. Standard Detail Sheets
p. Landscape Plans and Details
q. Irrigation Plans and Details

Deliverables

- 100% PS&E (3 copies on 11X17 and a pdf of the plan set)
- Contract Documents in Word format
- Construction Cost Estimate in Excel format.

Subtask G.5: QA/QC

HDJ will provide quality assurance/quality control (QA/QC) for all design work in accordance with HDJ's QA/QC standards. HDJ will provide senior level design and construction personnel to review plan submittals and provide technical support.

TASK H – DESIGN UTILITY COORDINATION AND VERIFICATION

Subtask H.1 – Utility Verification and Coordination

This item includes all research, data collection, field review and communications necessary to determine impacts on existing and proposed utilities and to coordinate with the affected utility

companies and agencies. HDJ will take the lead for all utility coordination except for policy level decisions.

1. Obtain utility as-built records from City Staff and all affected utility companies and review base maps for accuracy.
2. Site visit to verify topographic survey picked up all utilities both overhead and underground.
3. Meet with City staff to determine relocation responsibilities. (HDJ has assumed that all design efforts for the relocation of existing facilities except sanitary sewer, storm sewer and water will be the sole responsibility of the appropriate utility company.)
4. Distribute utility base mapping to utility providers for review.
5. Incorporate utility comments into base maps.
6. Distribute plan sets for review to all affected utility companies and agencies at the 50%, 90%, and Final design phases.
7. Develop and distribute a utility relocation/construction schedule to utility providers.
8. Discuss utility conflicts and responsibilities related to agency permits and franchises with the City.
9. Review utility provided relocations for coordination with design.

Subtask H.2 – Utility Coordination Meeting

1. Conduct up to three meetings (up to 2 hours in length) with utility companies to discuss issues regarding undergrounding the utilities along the corridor.
2. Deliverables
   a. Meeting agendas and summaries for each utility meeting

TASK I – BID DOCUMENTS AND BIDDING SUPPORT

Subtask I.1 – Bid Documents

HDJ will prepare the bid documents based on the latest approved WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction along with General Special Provisions (GSP) and amendments. City specifications will be incorporated as special provisions as well as project specific requirements.

1. Deliverables
   a. Bid Documents

Subtask I.2 – Bidding Support

The City will advertise the project and perform all Construction Administration services during the Bid & Award Phase. HDJ will provide support during the bidding process and will assist the City

HDJ will prepare and issue addenda during the bidding process, if necessary. HDJ staff will attend one pre-bid meeting and provide assistance during review of bids if requested by the City.

EXHIBIT B-2

NW 6th Ave and Norwood Intersection Improvements

Roundabout Option

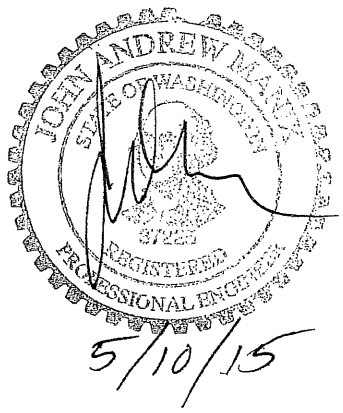
Design fee from 30% through bidding

8-Jun-15

HDJ DESIGN GROUP, PLLC

		HDJ Design Group PLLC (Engineering/Management)																		HDJ	SUBCONSULTANTS		SUB	BUDGET
DP	Task and Description	ENG-PRINCIPAL	TRAFFIC MANAGER	ENG - MANAGER VI	ENG III (PE)	TRAFFIC ENG V	LA MANAGER	LA III	Survey-Mngr	Survey Crew (2)	Survey LSIT	PLANNING MGR	TECH-III	TECH-II	CAD-III	CAD-II	CAD-I	GRAPHIC	ADMIN	Expense	TOTAL	HartCrowser Geotechnical	AINW	TOTAL	AMOUNT
0010	TASK A - PROJECT ADMINISTRATION																							
0020	Sub-task A.1 Contract Administration, Invoicing, and Progress Reports	3.00		21.00															3.00		3,936.00			0.00	$3,936.00
0030	Sub-task A.2 Meetings	10.00	10.00	45.00	32.00		6.00	6.00													15,526.00			0.00	$15,526.00
0040	Sub-task A.3 Management, Coordination and Direction	10.00		30.00																	6,500.00			0.00	$6,500.00
0100	TASK B -DATA COLLECTION																							
0110	Sub-task B.1 Surveying								1.00	7.50	5.00										1,790.00			0.00	$1,790.00
0120	Sub-task B.2 Base Map Update				4.00																480.00			0.00	$480.00
0130	Sub-task B.3 Site Visit			3.00	3.00																810.00			0.00	$810.00
0140	Sub-task B.4 Right-of-Way Mapping								1.00		7.00										850.00			0.00	$850.00
0200	TASK C -GEOTECHNICAL INVESTIGATION																							
0220	Sub-task C.1 Geotechnical Explortions and Reporting			2.00	7.00																1,140.00	27,699.00		27,699.00	$28,839.00
0300	TASK D -INTERSECTION PLAN & ROUNDABOUT ANALYSIS REPORT																							
0310	Sub-task D.1 Intersection Plan		2.00	2.00	16.00										20.00						4,330.00			0.00	$4,330.00
0320	Sub-task D.2 Roundabout Analysis Report		2.00	2.00	24.00										16.00						4,930.00			0.00	$4,930.00
0400	TASK E -ROUNDABOUT LANDSCAPE OPTIONS																							
0410	Sub-task E.1 Landscape Options						20.00	26.00													5,196.00			0.00	$5,196.00
0500	TASK F -PERMITTING																							
0510	Sub-task F.1 SEPA			1.00	2.00							10.00									1,740.00			0.00	$1,740.00
0520	Sub-task F.2 Construction Stormwater Permit (DOE)			4.00	24.00																3,480.00			0.00	$3,480.00
0530	Sub-task F.3 Archeological Pre-Determination			2.00																	300.00		3,667.00	3,667.00	$3,967.00
0600	TASK G -DESIGN																							
0610	Sub-task G.1 Design Memorandum	2.00			16.00																2,320.00			0.00	$2,320.00
0620	Sub-task G.2 60% Design (P&E)	2.00		44.00	120.00	10.00									60.00						28,220.00			0.00	$28,220.00
0630	Sub-task G.3 90% Design (PS&E)	2.00		60.00	100.00	8.00	8.00	24.00						28.00	92.00						37,112.00			0.00	$37,112.00
0640	Sub-task G.4 100% Design (PS&E)	2.00		48.00	80.00	4.00	20.00	32.00						16.00	70.00						31,504.00			0.00	$31,504.00
0650	Sub-task G.5 QA/QC	2.00		36.00																	5,800.00			0.00	$5,800.00
0700	TASK H -UTILITY COORDINATION																							
0710	Sub-task H.1 Utility Verification and Coordination			4.00	16.00																2,520.00			0.00	$2,520.00
0720	Sub-task H.2 Utility Coordination Meetings			4.00	8.00																1,560.00			0.00	$1,560.00
0800	TASK I- BID DOCUMENTS AND BIDDING SUPPORT																							
0810	Sub-task I.1 Bid Documents	2.00		6.00	16.00		2.00	2.00													3,682.00			0.00	$3,682.00
0820	Sub-task I.2 Bidding Support	5.00		1.00	10.00		2.00	2.00													2,812.00			0.00	$2,812.00
	Reimbursable Expenses																				5,000.00			0.00	$5,000.00
	B&O tax (1.8%)																				564.59				$564.59
	TOTAL HOURS	40.00	14.00	315.00	478.00	22.00	58.00	92.00	2.00	7.50	12.00	10.00	0.00	44.00	258.00	0.00	0.00	0.00	3.00						
	HOURLY RATES	200.00	155.00	150.00	120.00	142.00	135.00	96.00	150.00	152.00	100.00	135.00	112.00	104.00	90.00	84.00	78.00	92.00	62.00						
	TOTAL DOLLARS	8,000.00	2,170.00	47,250.00	57,360.00	3,124.00	7,830.00	8,832.00	300.00	1,140.00	1,200.00	1,350.00	0.00	4,576.00	23,220.00	0.00	0.00	0.00	186.00	0.00	172,102.59	27,699.00	3,667.00	31,366.00	203,468.59

HDJ DESIGN GROUP PLLC
engineers | landscape architects | planners | surveyors



Date: May 8, 2015

To: Curleigh Carothers PE, City Engineer, City of Camas

From: John Manix PE, Senior Traffic Engineer

Re: NW 6th and Norwood Intersection – Roundabout Evaluation Update

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This memo updates the April 24, 2015 memo that analyzed the NW 6th Ave and Norwood St intersection. This update is based on input form City staff at the April 30, 2015 project meeting, and the land use assumptions for trips associated with Traffic Analysis Zones (TAZ) which add trips to the intersection.

The land use adjustments include:

- TAZ 393 will not create the jobs typically associated with heavy industrial land use. The consensus was that the westbound to southbound trip growth of 1% is reasonable.
- We assume the east and westbound through movement can be reduced because:
  - The land use off Forest Homes Road associated with TAZ 400, 408, 934, and 935 will not produce the 337 homes, first anticipated, based on environmental constraints such as steep terrain.
  - The trips from the TAZ 400, 408, 934 and 935 have another more direct routes to SR 14 assuming Brady Road is not congested by the future quarry redevelopment.
- The trips from TAZ 915, south of NW 6th Ave will generate fewer trips to NW 6th Ave.

The analysis was also revised due to design refinements that increased the central island diameter from 95 feet to 105 feet.

Recommendations:

Implement a single lane roundabout making provisions in the design for future widening.

Updated 2035 Level of Operation with 1% growth rate for WB to SB left turn volume:

The Level of Service and the intersection is improved somewhat with a reduction in delay at each alternative. Table 1 shows a summary of the LOS and degree of saturation (volume to capacity ratio).

Table 1 - Single lane roundabout with modest growth (1%) in TAZ 393

2035 Scenario	Intersection LOS	Average Intersection Delay	Degree of Saturation (v/c) on Eastbound (worst) Approach
TIF Update – Improved	C	27 seconds	1.03
TIF Update – Base	C	30 seconds	1.06
2035 RTC	A	8 seconds	0.94

See the attached SIDRA reports on Level of Service and Movement Summary for more details.

Updated 2035 Level of Operation with reduction of trips from TAZ 400, 408, 934, 935 and 915.

The trips destined for TAZ 400, 408, 934 and 935 are all off Forest Homes Road and the majority of the new trips are routed eastbound to northbound from NW 6th to Ivy and Forrest Home Road. The number of trips was reduced assuming the growth will not be as high as predicted due to the steep terrain and other possible constraints. The trips were also reduced assuming the traffic will seek a more direct route via 16th Ave to Brady Road to SR 14. The total number of eastbound trips reduced on NW 6th Ave is 100 in the PM peak hour. See TAZ map and table of new employees and households.

The trips from TAZ 915 via Ivy Road south of NW 6th Ave are associated with a large Heavy Industrial zoned parcel that is west of the paper mill and owned by Georgia-Pacific Corporation. If the land was to develop, it is not likely to route the trips to Ivy Road to NW 6th Ave due to the local streets and the residential land use between the site and NW 6th Ave. The total number of westbound trips reduced on NW 6th Ave is 40 in the PM peak hour. See TAZ map and table of new employees and households.

Table 2 summarizes the updated Level of Service and degree of saturation (volume to capacity ratio) with reduced trips to all TAZ's.

Table 2 - Single lane roundabout with reduced trips due to land use assumptions

2035 Scenario	Intersection LOS	Average Intersection Delay	Degree of Saturation (v/c) on Eastbound (worst) Approach
TIF Update – Improved	B	13 seconds	0.96
TIF Update – Base	B	13 seconds	0.99
2035 RTC	A	7 seconds	0.85

See the attached SIDRA reports on Level of Service and Movement Summary for more details.

Roundabout Design Life:

SIDRA Intersection, the industry standard for roundabout analysis software, provides an analysis option of estimating the design life of a roundabout using the existing traffic volumes and a growth rate for each movement. The design life range was estimated using 2014 existing traffic volumes, WSDOT policy settings, RTC's most current model for growth rate and adjustments to the land use assumptions. For volume-to-capacity ratio range of 0.9 to 1.0 the Design Life is estimated at 25 to 34 years.

Conclusion:

Based on updated growth assumptions, in 2035, a single lane roundabout will operate at Level of Service B or better in the PM peak hour. Using the 2035 RTC forecast scenario, the volume to capacity ratio is within acceptable limits for a single lane roundabout. However the volume-to-capacity ratio for the TIF Update scenarios are higher than the suggested guideline limits by 2035. It is prudent to make provisions in the design to allow upgrades in the future.

Based on volume-to-capacity ratio, and updated growth assumptions, a single lane roundabout will reach its design life in 25 to 34 years.

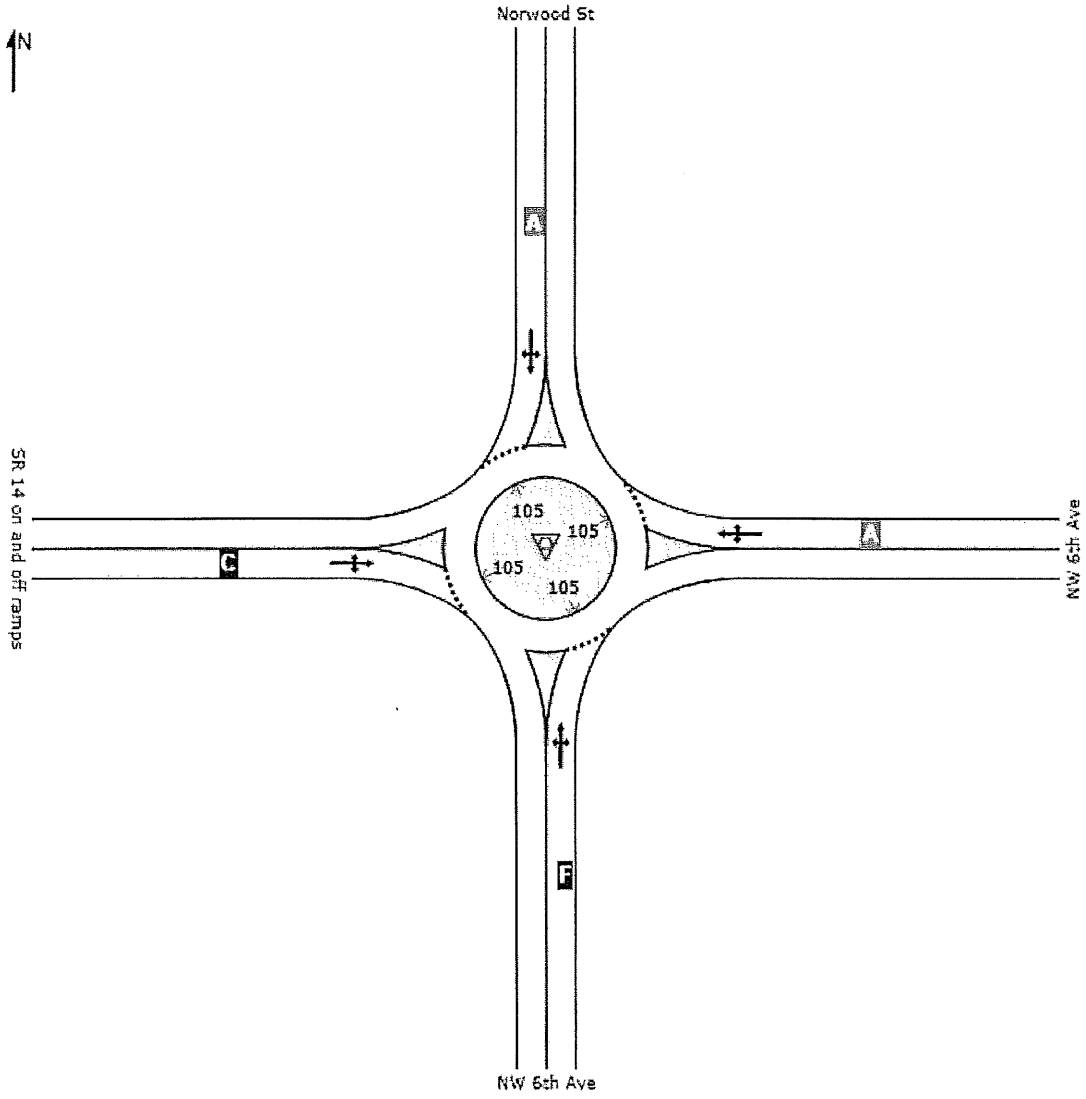
LEVEL OF SERVICE

Site: NW 6th Ave at Norwood 2035 TIF Update (improved) - 1% growth on WB to SB left turn

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for the improved conditions with 1% growth on westbound to southbound left turns
Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	F	A	A	C	C



Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: NW 6th Ave at Norwood 2035 TIF Update (improved) - 1% growth on WB to SB left turn

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for the improved conditions with 1% growth on westbound to southbound left turns
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NW 6th Ave											
3	L2	95	1.0	0.972	84.7	LOS F	17.4	438.0	1.00	1.81	14.8
8	T1	15	1.0	0.972	79.4	LOS E	17.4	438.0	1.00	1.81	13.1
18	R2	170	1.0	0.972	80.3	LOS F	17.4	438.0	1.00	1.81	13.2
Approach		280	1.0	0.972	81.8	LOS F	17.4	438.0	1.00	1.81	13.7
East: NW 6th Ave											
1	L2	60	3.0	0.554	12.3	LOS B	4.4	111.8	0.55	0.57	31.4
6	T1	565	3.0	0.554	6.0	LOS A	4.4	111.8	0.55	0.57	38.5
16	R2	30	3.0	0.554	6.0	LOS A	4.4	111.8	0.55	0.57	29.5
Approach		655	3.0	0.554	6.6	LOS A	4.4	111.8	0.55	0.57	37.2
North: Norwood St											
7	L2	20	3.7	0.106	9.1	LOS A	0.6	15.9	0.70	0.65	29.3
4	T1	20	3.7	0.106	3.8	LOS A	0.6	15.9	0.70	0.65	23.5
14	R2	40	3.7	0.106	4.7	LOS A	0.6	15.9	0.70	0.65	28.6
Approach		80	3.7	0.106	5.6	LOS A	0.6	15.9	0.70	0.65	27.3
West: SR 14 on and off ramps											
5	L2	90	1.6	1.034	33.1	LOS C	60.7	1537.8	1.00	0.84	24.9
2	T1	1155	1.6	1.034	26.9	LOS C	60.7	1537.8	1.00	0.84	29.3
12	R2	140	1.6	1.034	26.8	LOS C	60.7	1537.8	1.00	0.84	23.7
Approach		1385	1.6	1.034	27.3	LOS C	60.7	1537.8	1.00	0.84	28.3
All Vehicles		2400	2.0	1.034	27.3	LOS C	60.7	1537.8	0.87	0.87	26.7

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

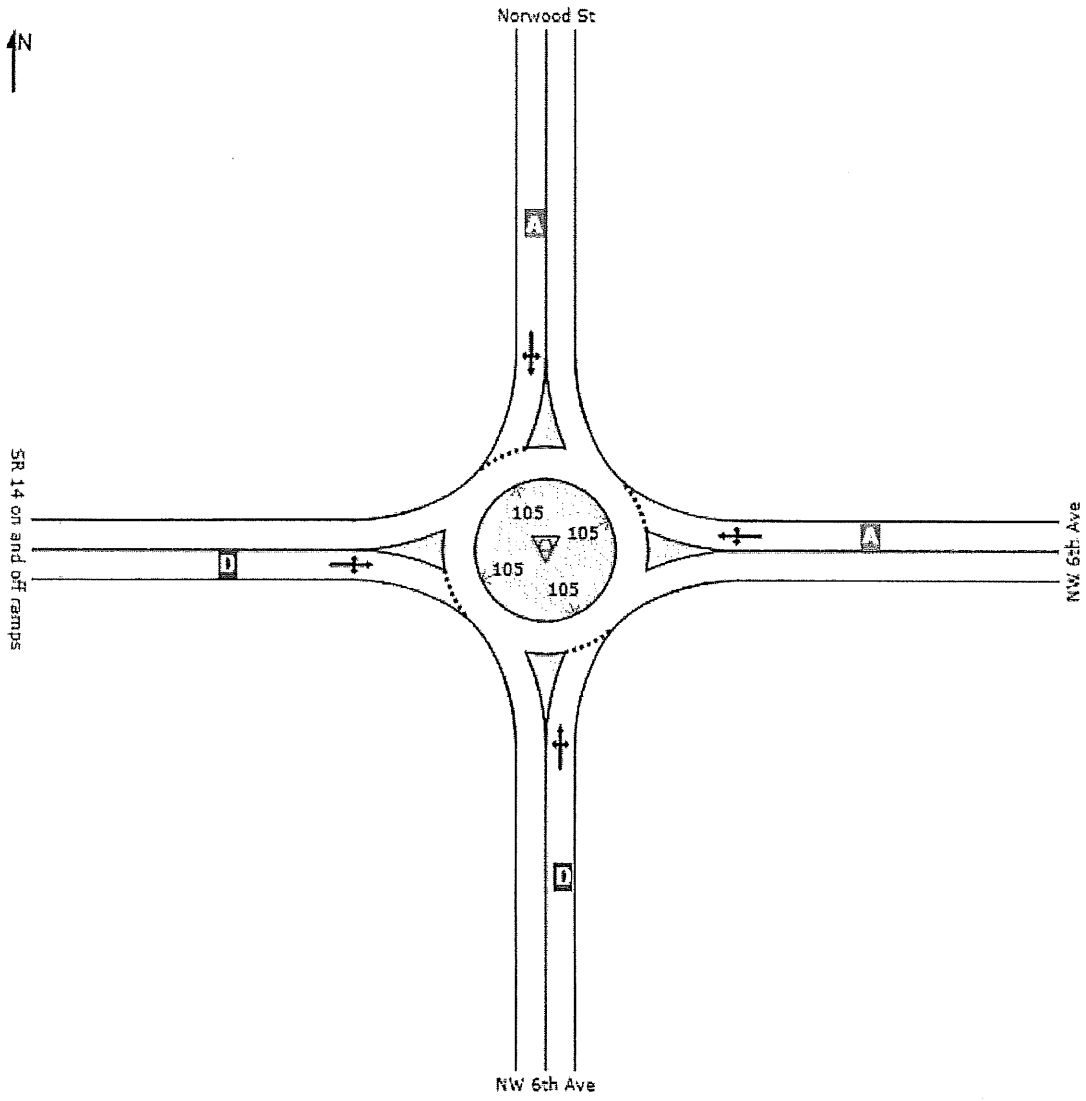
LEVEL OF SERVICE

Site: NW 6th Ave at Norwood 2035 TIF Update (base) - 1% growth on WB to SB left turn

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for base condition with 1% growth on westbound to southbound left turns
Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	D	A	A	D	C



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MOVEMENT SUMMARY

Site: NW 6th Ave at Norwood 2035 TIF Update (base) - 1% growth on WB to SB left turn

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for base condition with 1% growth on westbound to southbound left turns
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NW 6th Ave											
3	L2	95	1.0	0.773	45.2	LOS D	9.3	235.4	1.00	1.38	20.0
8	T1	15	1.0	0.773	39.9	LOS D	9.3	235.4	1.00	1.38	17.0
18	R2	125	1.0	0.773	40.9	LOS D	9.3	235.4	1.00	1.38	17.2
Approach		235	1.0	0.773	42.6	LOS D	9.3	235.4	1.00	1.38	18.2
East: NW 6th Ave											
1	L2	60	3.0	0.569	12.3	LOS B	4.5	116.3	0.57	0.57	31.3
6	T1	580	3.0	0.569	6.1	LOS A	4.5	116.3	0.57	0.57	38.4
16	R2	30	3.0	0.569	6.0	LOS A	4.5	116.3	0.57	0.57	29.5
Approach		670	3.0	0.569	6.7	LOS A	4.5	116.3	0.57	0.57	37.2
North: Norwood St											
7	L2	10	3.7	0.067	9.1	LOS A	0.4	10.1	0.70	0.62	29.4
4	T1	15	3.7	0.067	3.8	LOS A	0.4	10.1	0.70	0.62	23.6
14	R2	25	3.7	0.067	4.8	LOS A	0.4	10.1	0.70	0.62	28.7
Approach		50	3.7	0.067	5.3	LOS A	0.4	10.1	0.70	0.62	27.0
West: SR 14 on and off ramps											
5	L2	100	1.6	1.064	45.9	LOS D	78.4	1984.2	1.00	0.92	21.8
2	T1	1160	1.6	1.064	39.7	LOS D	78.4	1984.2	1.00	0.92	25.2
12	R2	140	1.6	1.064	39.6	LOS D	78.4	1984.2	1.00	0.92	20.9
Approach		1400	1.6	1.064	40.2	LOS D	78.4	1984.2	1.00	0.92	24.4
All Vehicles		2355	2.0	1.064	30.1	LOS C	78.4	1984.2	0.87	0.86	26.1

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

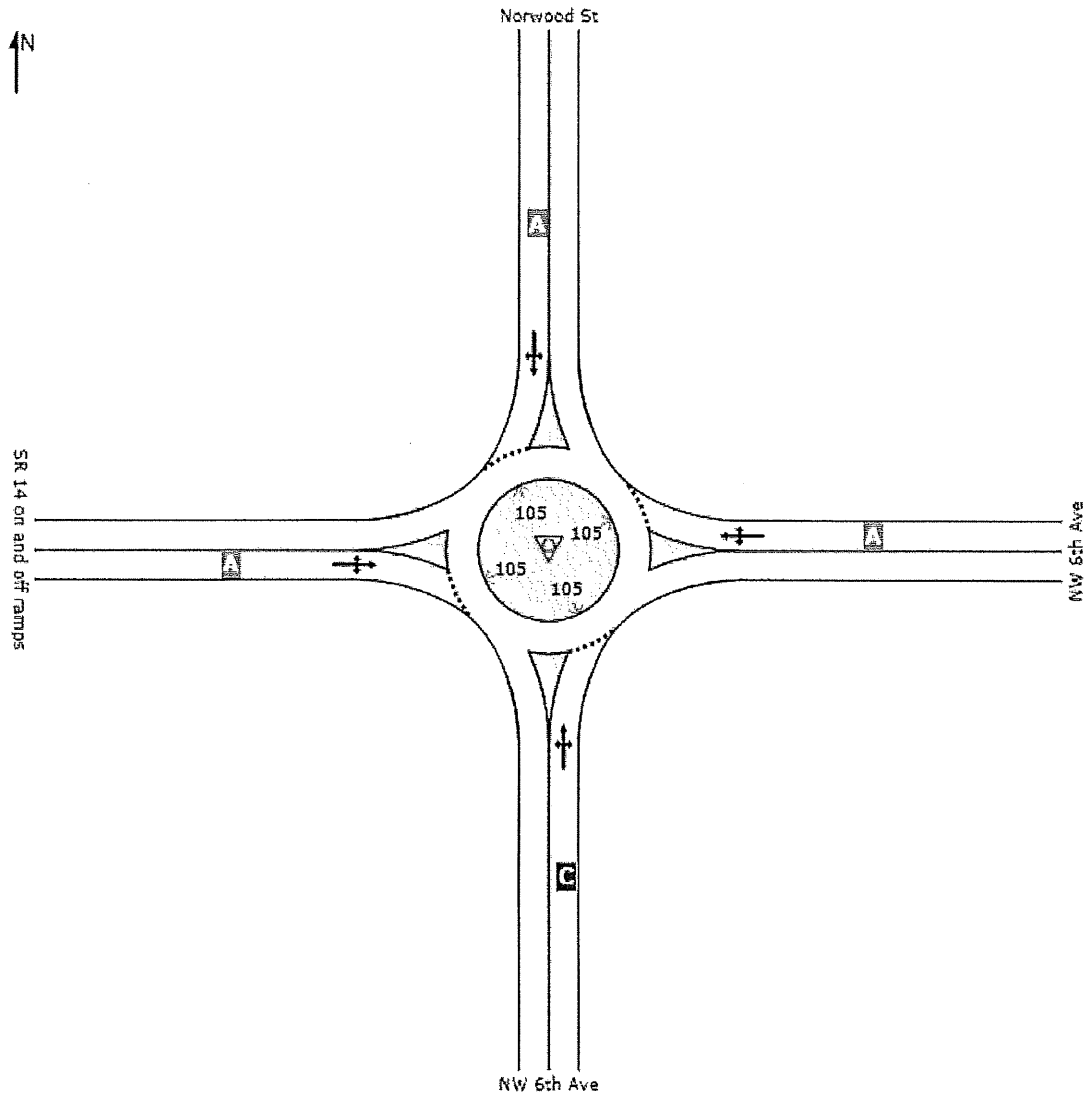
LEVEL OF SERVICE

Site: NW 6th Ave at Norwood 2035 with 2015 RTC travel forecast - 1% growth on WB to SB left turn

Single Lane with 2035 Design Year Volume - 1% growth on WB to SB left turn
Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	C	A	A	A	A



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MOVEMENT SUMMARY

Site: NW 6th Ave at Norwood 2035 with 2015 RTC travel forecast - 1% growth on WB to SB left turn

Single Lane with 2035 Design Year Volume - 1% growth on WB to SB left turn
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NW 6th Ave											
3	L2	43	1.0	0.608	27.2	LOS C	6.1	152.6	1.00	1.19	23.9
8	T1	3	1.0	0.608	21.9	LOS C	6.1	152.6	1.00	1.19	19.8
18	R2	160	1.0	0.608	22.9	LOS C	6.1	152.6	1.00	1.19	20.0
Approach		206	1.0	0.608	23.8	LOS C	6.1	152.6	1.00	1.19	20.7
East: NW 6th Ave											
1	L2	60	3.0	0.621	11.8	LOS B	5.8	149.1	0.50	0.52	31.5
6	T1	708	3.0	0.621	5.6	LOS A	5.8	149.1	0.50	0.52	38.7
16	R2	14	3.0	0.621	5.5	LOS A	5.8	149.1	0.50	0.52	29.7
Approach		782	3.0	0.621	6.1	LOS A	5.8	149.1	0.50	0.52	37.8
North: Norwood St											
7	L2	11	3.7	0.064	9.8	LOS A	0.4	9.8	0.74	0.66	29.0
4	T1	7	3.7	0.064	4.5	LOS A	0.4	9.8	0.74	0.66	23.3
14	R2	26	3.7	0.064	5.5	LOS A	0.4	9.8	0.74	0.66	28.4
Approach		44	3.7	0.064	6.4	LOS A	0.4	9.8	0.74	0.66	27.6
West: SR 14 on and off ramps											
5	L2	69	1.6	0.936	13.0	LOS B	25.2	637.8	1.00	0.52	30.3
2	T1	1059	1.6	0.936	6.8	LOS A	25.2	637.8	1.00	0.52	37.1
12	R2	111	1.6	0.936	6.7	LOS A	25.2	637.8	1.00	0.52	28.6
Approach		1239	1.6	0.936	7.2	LOS A	25.2	637.8	1.00	0.52	35.7
All Vehicles		2271	2.1	0.936	8.3	LOS A	25.2	637.8	0.82	0.58	34.0

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

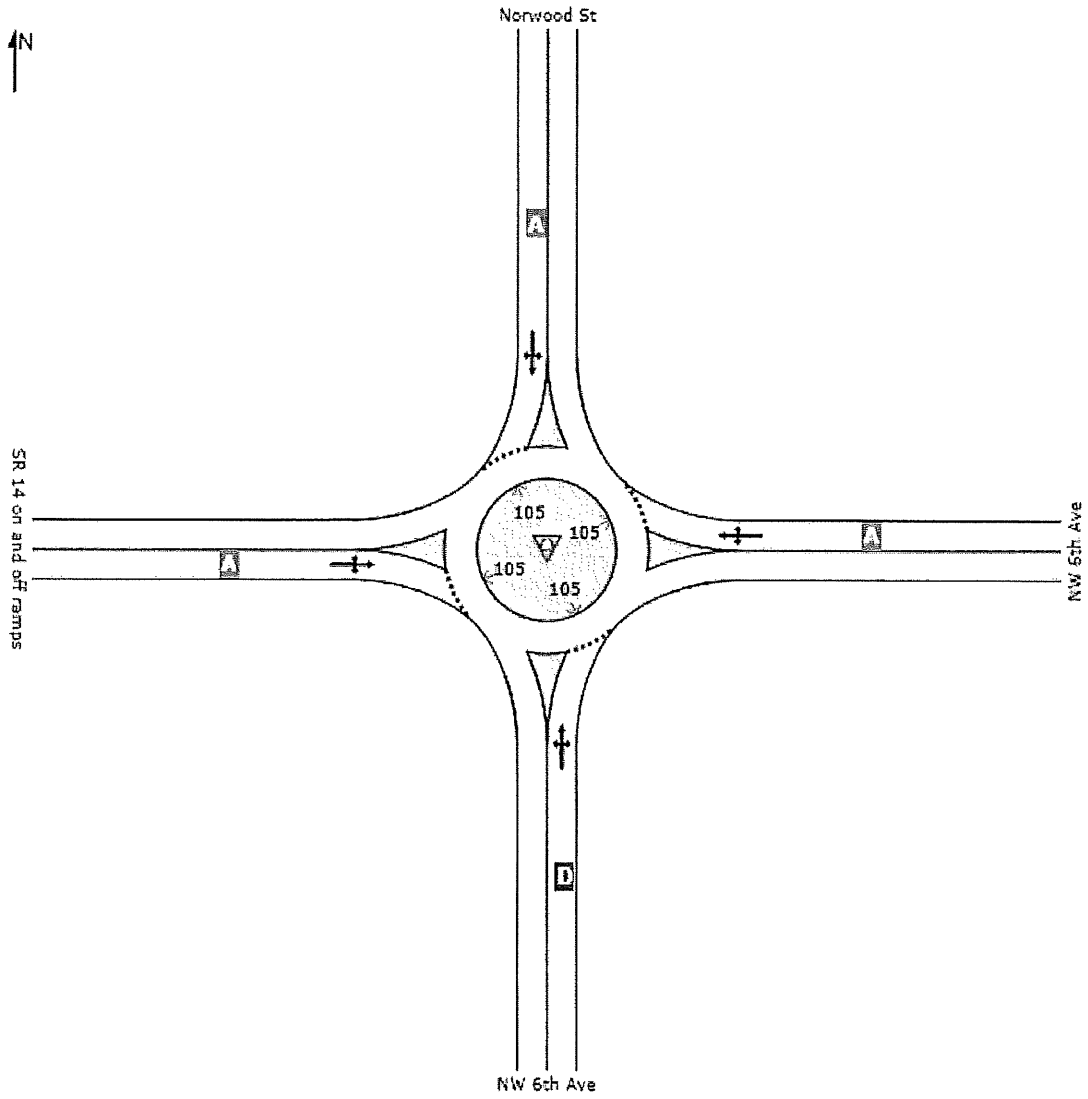
LEVEL OF SERVICE

Site: NW 6th Ave at Norwood 2035 TIF Update (improved) - reduced trips

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for the improved conditions with 1% growth on westbound to southbound left turns and 150 trips to and from TAZ 400, 408, 915, 934 and 935.
Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	D	A	A	A	B



Level of Service (LOS) Method: Delay (HCM 2000).
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MOVEMENT SUMMARY

Site: NW 6th Ave at Norwood 2035 TIF Update (improved) - reduced trips

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for the improved conditions with 1% growth on westbound to southbound left turns and 150 trips to and from TAZ 400, 408, 915, 934 and 935.
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NW 6th Ave											
3	L2	95	1.0	0.863	54.2	LOS D	12.4	312.2	1.00	1.54	18.5
8	T1	15	1.0	0.863	48.9	LOS D	12.4	312.2	1.00	1.54	16.0
18	R2	170	1.0	0.863	49.9	LOS D	12.4	312.2	1.00	1.54	16.1
Approach		280	1.0	0.863	51.3	LOS D	12.4	312.2	1.00	1.54	16.9
East: NW 6th Ave											
1	L2	60	3.0	0.513	12.2	LOS B	3.8	97.8	0.53	0.56	31.4
6	T1	515	3.0	0.513	6.0	LOS A	3.8	97.8	0.53	0.56	38.6
16	R2	30	3.0	0.513	5.9	LOS A	3.8	97.8	0.53	0.56	29.6
Approach		605	3.0	0.513	6.6	LOS A	3.8	97.8	0.53	0.56	37.2
North: Norwood St											
7	L2	20	3.7	0.100	8.6	LOS A	0.6	14.6	0.67	0.61	29.4
4	T1	20	3.7	0.100	3.3	LOS A	0.6	14.6	0.67	0.61	23.6
14	R2	40	3.7	0.100	4.3	LOS A	0.6	14.6	0.67	0.61	28.7
Approach		80	3.7	0.100	5.2	LOS A	0.6	14.6	0.67	0.61	27.4
West: SR 14 on and off ramps											
5	L2	90	1.6	0.959	14.3	LOS B	27.9	706.4	1.00	0.58	30.3
2	T1	1055	1.6	0.959	8.1	LOS A	27.9	706.4	1.00	0.58	37.1
12	R2	140	1.6	0.959	8.0	LOS A	27.9	706.4	1.00	0.58	28.6
Approach		1285	1.6	0.959	8.5	LOS A	27.9	706.4	1.00	0.58	35.4
All Vehicles		2250	2.0	0.959	13.2	LOS B	27.9	706.4	0.86	0.70	31.2

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

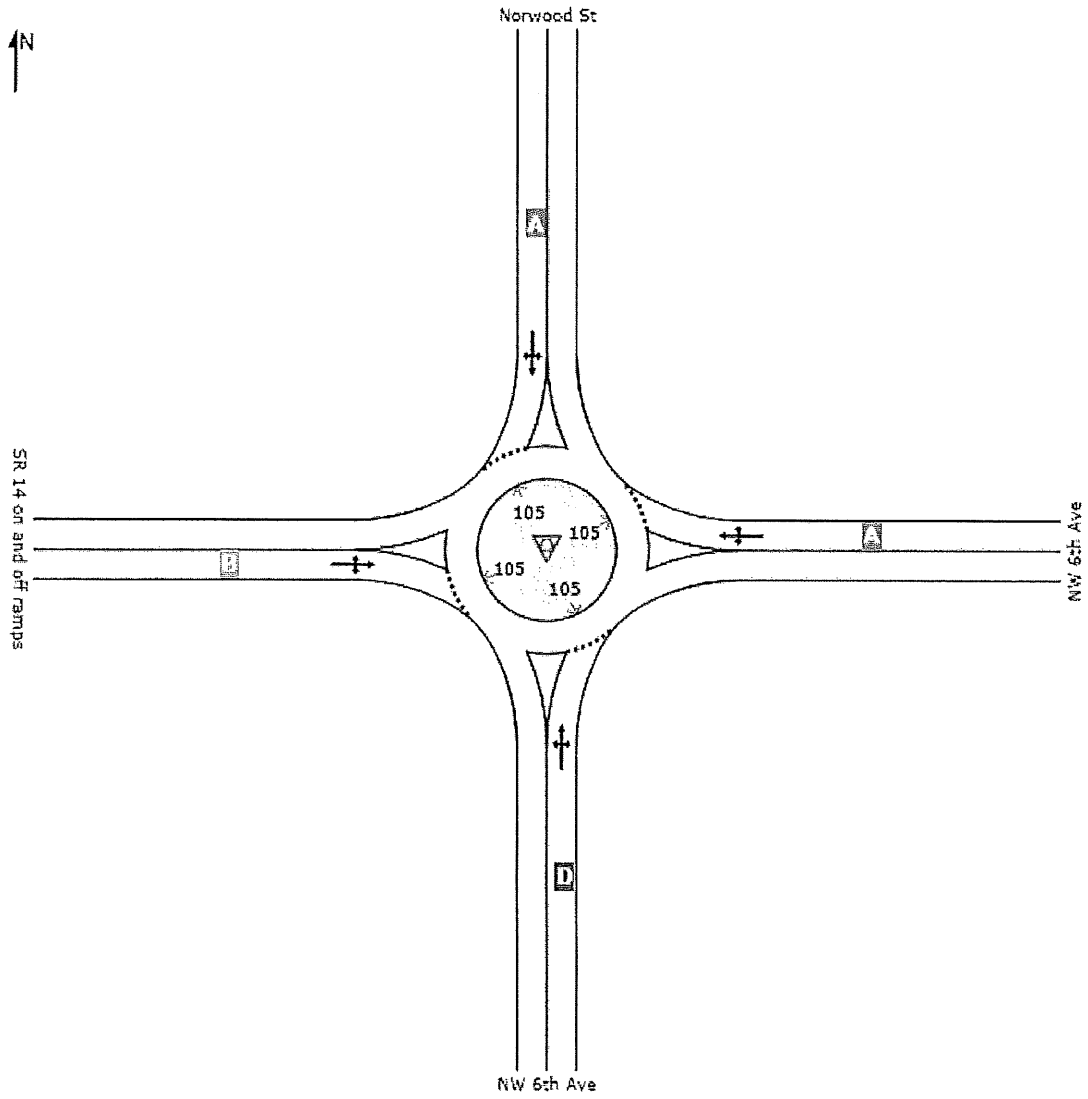
LEVEL OF SERVICE

Site: NW 6th Ave at Norwood 2035 TIF Update (base) - reduced trips

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for base condition with 1% growth on westbound to southbound left turns and 150 trips to and from TAZ 400, 408, 915, 934 and 935.
Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	D	A	A	B	B



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

MOVEMENT SUMMARY

Site: NW 6th Ave at Norwood 2035 TIF Update (base) - reduced trips

Single Lane with 2035 Design Year Volume from Camas TIF update by DKS for base condition with 1% growth on westbound to southbound left turns and 150 trips to and from TAZ 400, 408, 915, 934 and 935.
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NW 6th Ave											
3	L2	95	1.0	0.737	39.0	LOS D	8.5	214.0	1.00	1.33	21.1
8	T1	15	1.0	0.737	33.7	LOS C	8.5	214.0	1.00	1.33	17.9
18	R2	125	1.0	0.737	34.7	LOS C	8.5	214.0	1.00	1.33	18.1
Approach		235	1.0	0.737	36.3	LOS D	8.5	214.0	1.00	1.33	19.2
East: NW 6th Ave											
1	L2	60	3.0	0.529	12.3	LOS B	4.0	101.9	0.55	0.57	31.4
6	T1	530	3.0	0.529	6.1	LOS A	4.0	101.9	0.55	0.57	38.5
16	R2	30	3.0	0.529	6.0	LOS A	4.0	101.9	0.55	0.57	29.6
Approach		620	3.0	0.529	6.7	LOS A	4.0	101.9	0.55	0.57	37.1
North: Norwood St											
7	L2	10	3.7	0.064	8.7	LOS A	0.4	9.2	0.67	0.59	29.5
4	T1	15	3.7	0.064	3.3	LOS A	0.4	9.2	0.67	0.59	23.7
14	R2	25	3.7	0.064	4.3	LOS A	0.4	9.2	0.67	0.59	28.8
Approach		50	3.7	0.064	4.9	LOS A	0.4	9.2	0.67	0.59	27.2
West: SR 14 on and off ramps											
5	L2	100	1.6	0.988	17.4	LOS B	43.7	1105.6	1.00	0.59	30.0
2	T1	1060	1.6	0.988	11.2	LOS B	43.7	1105.6	1.00	0.59	36.7
12	R2	140	1.6	0.988	11.1	LOS B	43.7	1105.6	1.00	0.59	28.4
Approach		1300	1.6	0.988	11.6	LOS B	43.7	1105.6	1.00	0.59	35.0
All Vehicles		2205	2.0	0.988	12.7	LOS B	43.7	1105.6	0.86	0.66	32.5

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

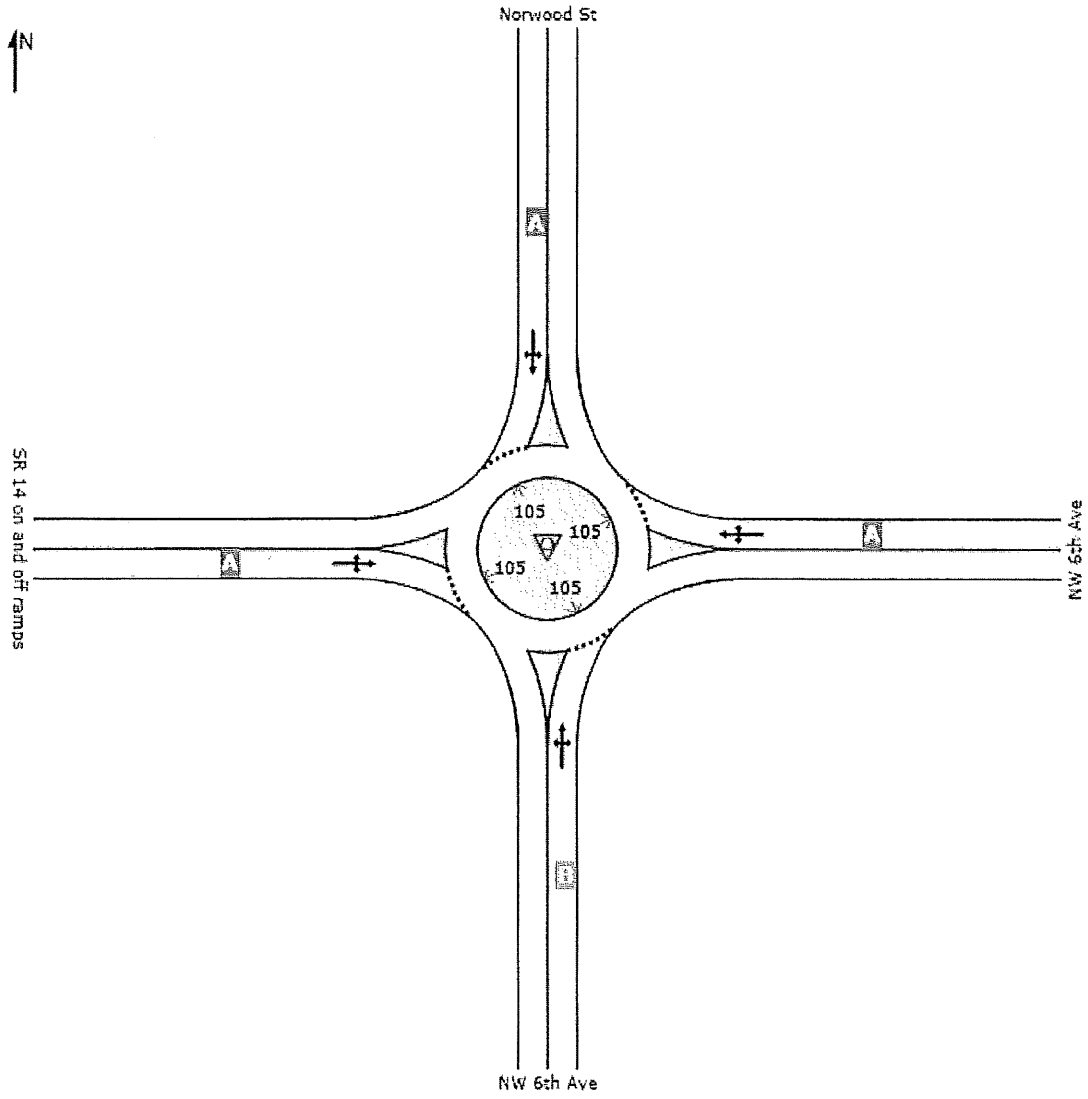
LEVEL OF SERVICE

Site: NW 6th Ave at Norwood 2035 with 2015 RTC travel forecast - reduced trips

Single Lane Roundabout with 2035 Design Year Volume - 1% growth on WB to SB left turn reduction and 150 trips to and from TAZ 400, 408, 915, 934 and 935.
Roundabout

All Movement Classes

	South	East	North	West	Intersection
LOS	B	A	A	A	A



Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: NW 6th Ave at Norwood 2035 with 2015 RTC travel forecast - reduced trips

Single Lane Roundabout with 2035 Design Year Volume - 1% growth on WB to SB left turn reduction and 150 trips to and from TAZ 400, 408, 915, 934 and 935.
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NW 6th Ave											
3	L2	43	1.0	0.420	14.7	LOS B	3.4	85.3	0.99	1.02	27.6
8	T1	3	1.0	0.420	9.4	LOS A	3.4	85.3	0.99	1.02	22.2
18	R2	160	1.0	0.420	10.4	LOS B	3.4	85.3	0.99	1.02	22.5
Approach		206	1.0	0.420	11.3	LOS B	3.4	85.3	0.99	1.02	23.4
East: NW 6th Ave											
1	L2	60	3.0	0.572	11.8	LOS B	4.7	121.3	0.44	0.51	31.7
6	T1	650	3.0	0.572	5.6	LOS A	4.7	121.3	0.44	0.51	38.9
16	R2	14	3.0	0.572	5.5	LOS A	4.7	121.3	0.44	0.51	29.8
Approach		724	3.0	0.572	6.1	LOS A	4.7	121.3	0.44	0.51	38.0
North: Norwood St											
7	L2	11	3.7	0.059	9.2	LOS A	0.3	8.7	0.70	0.62	29.2
4	T1	7	3.7	0.059	3.9	LOS A	0.3	8.7	0.70	0.62	23.5
14	R2	26	3.7	0.059	4.9	LOS A	0.3	8.7	0.70	0.62	28.6
Approach		44	3.7	0.059	5.8	LOS A	0.3	8.7	0.70	0.62	27.8
West: SR 14 on and off ramps											
5	L2	69	1.6	0.853	12.3	LOS B	14.5	367.1	0.72	0.50	31.0
2	T1	950	1.6	0.853	6.0	LOS A	14.5	367.1	0.72	0.50	38.2
12	R2	111	1.6	0.853	6.0	LOS A	14.5	367.1	0.72	0.50	29.2
Approach		1130	1.6	0.853	6.4	LOS A	14.5	367.1	0.72	0.50	36.6
All Vehicles		2104	2.1	0.853	6.8	LOS A	14.5	367.1	0.65	0.56	34.9

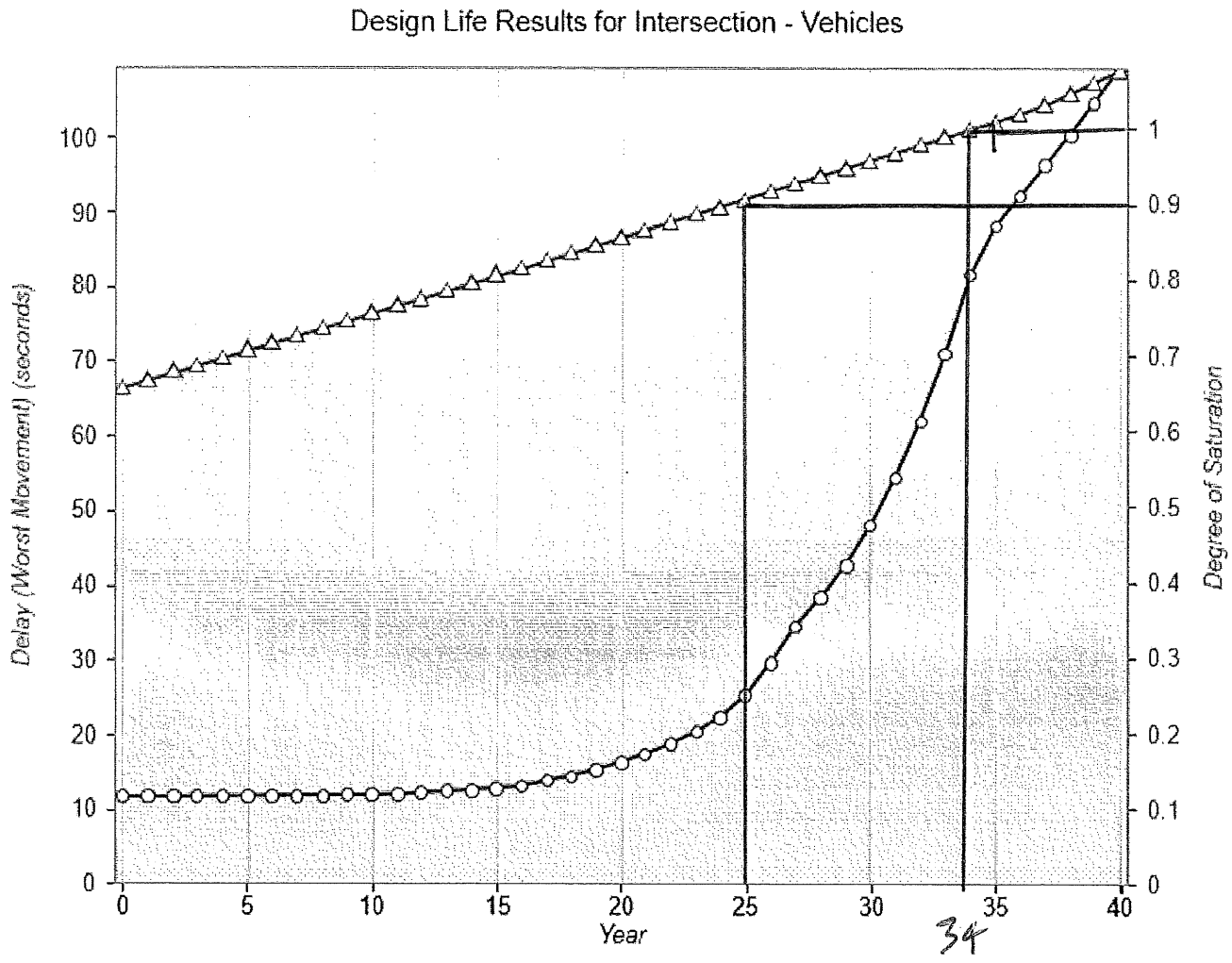
Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

GRAPHS - Design Life Analysis

Average control delay per vehicle for the worst vehicle movement (seconds) and Highest degree of saturation in any lane

Site: NW 6th Ave at Norwood Existing Volumes

Single lane roundabout
Roundabout
Design Life Analysis (Capacity): Results for 34 years



DKS Associates
TRANSPORTATION SOLUTIONS

APPENDIX E

LAND USE ASSUMPTIONS BY TAZ (TRANSPORTATION ANALYSIS ZONE)

	2005			2035			Growth		
TAZ #	Households	Retail Employment	Other Employment	Households	Retail Employment	Other Employment	Households	Retail Employment	Other Employment
392	0	0	0	10	0	2	10	0	1
393	146	0	2	261	0	125	115	0	123
394	63	0	3	93	0	8	30	0	4
395	42	0	2	67	1	149	24	1	147
396	19	0	0	132	0	0	113	0	0
397	158	0	14	361	0	14	204	0	0
398	178	0	8	200	2	6	22	2	-2
399	80	0	0	117	0	0	37	0	0
400	15	0	0	143	0	0	128	0	0
401	0	0	1066	0	0	1051	0	0	-16
402	139	98	17	145	109	23	6	11	7
403	36	0	35	40	0	40	4	0	5
404	0	0	0	0	0	1	0	0	0
405	53	0	1	58	0	13	5	0	12
406	1	0	0	36	97	189	35	97	189
407	0	0	0	40	0	0	40	0	0
408	69	0	2	143	0	2	74	0	0
409	61	0	22	63	0	45	3	0	23
411	0	0	281	0	208	432	0	208	151
412	211	0	0	211	0	0	0	0	0
413	101	0	99	106	0	99	5	0	0
414	222	0	11	242	0	11	20	0	0
415	340	0	29	409	20	47	69	20	18
416	243	0	0	327	0	0	84	0	0
417	100	0	0	133	0	0	33	0	0
419	0	0	0	2	30	185	2	30	185
420	0	0	1065	0	0	1372	0	0	307
421	4	0	4	339	0	4	335	0	-1
422	49	3	165	55	2	164	6	-1	-1
423	265	0	14	308	0	14	43	0	0
424	133	0	17	161	0	18	28	0	1
425	1	0	1	10	0	674	9	0	672
426	2	0	2	334	63	237	332	63	235
480	12	0	1	26	9	121	14	9	120
482	85	0	15	212	1	16	127	1	1
483	28	0	58	512	485	2977	484	485	2919
484	172	0	19	227	0	19	55	0	0
485	38	0	19	231	0	19	193	0	0
487	26	0	7	114	0	10	88	0	3
489	29	0	154	69	144	156	40	144	2
490	55	1	7	662	98	65	607	97	58
629	129	0	0	129	0	0	0	0	0
630	1	23	162	4	23	237	3	0	75
652	23	0	8	56	194	538	33	194	530
653	71	0	0	171	0	0	100	0	0
659	234	0	0	791	0	307	557	0	307
900	0	0	0	0	0	0	0	0	0
901	190	8	43	213	9	110	23	1	68
902	179	0	0	153	0	0	-26	0	0
903	5	0	0	40	0	0	34	0	0
904	5	0	110	7	0	110	1	0	0
905	16	0	0	16	0	0	0	0	0
906	2	0	0	25	0	0	22	0	0
907	76	0	2	86	0	2	9	0	0
908	34	0	0	71	0	0	36	0	0
909	34	0	6	93	0	10	59	0	4
910	29	0	6	41	0	9	12	0	3
911	35	0	0	148	0	0	113	0	0
912	201	0	0	364	0	0	163	0	0
913	177	4	36	234	18	53	57	14	17
914	8	0	68	7	0	66	-1	0	-1
915	94	0	0	147	186	0	53	186	0
916	25	23	19	26	24	49	1	1	29
917	21	43	171	22	52	174	1	8	3

	2005			2035			Growth		
TAZ #	Households	Retail Employment	Other Employment	Households	Retail Employment	Other Employment	Households	Retail Employment	Other Employment
918	0	142	318	0	137	335	0	-5	17
919	37	0	27	48	0	27	11	0	0
920	25	12	63	32	16	94	7	4	31
921	155	0	3	275	16	6	119	16	3
922	50	25	35	56	27	75	7	2	40
923	132	0	3	148	0	29	16	0	26
924	19	0	1	19	0	15	1	0	14
925	0	0	129	0	0	392	0	0	263
926	0	0	528	0	0	632	0	0	104
927	1	0	0	36	97	47	35	97	47
928	13	0	0	15	0	0	2	0	0
929	55	0	0	75	0	0	20	0	0
930	31	0	0	32	0	0	1	0	0
931	36	0	0	75	0	0	39	0	0
932	80	0	0	105	0	0	26	0	0
933	32	0	21	32	0	21	0	0	0
934	10	0	2	73	0	2	64	0	0
935	53	0	2	125	0	2	71	0	0
936	53	0	0	52	0	0	-1	0	0
937	39	19	0	74	23	13	35	4	13
938	0	0	161	0	0	327	0	0	166
939	135	0	9	140	0	19	5	0	10
940	218	0	0	222	0	0	4	0	0
941	1	0	77	8	0	156	7	0	79
942	37	0	0	43	0	0	6	0	0
943	62	8	11	61	10	23	-1	2	12
944	2	0	0	90	170	346	88	170	346
945	0	0	0	0	86	25	0	86	25
946	66	0	52	66	106	140	0	106	88
947	74	0	12	74	0	14	0	0	3
948	167	0	0	167	0	0	0	0	0
949	43	0	0	43	0	0	0	0	0
950	52	0	11	97	0	11	44	0	0
951	99	0	0	112	0	0	13	0	0
952	20	0	0	30	0	0	11	0	0
953	3	0	25	370	0	25	367	0	0
954	109	0	0	129	0	0	20	0	0
955	0	0	0	157	0	0	157	0	0
956	18	0	12	177	0	61	160	0	49
957	6	0	0	39	0	0	33	0	0
958	38	0	1	115	2	4	77	2	3
959	3	0	0	457	0	0	454	0	0
961	0	0	0	0	210	4	0	210	4
962	0	3	112	0	2	114	0	-1	2
963	5	0	3	40	467	505	35	467	502
964	24	0	36	57	0	37	33	0	1
965	24	0	26	57	90	375	33	90	349
966	0	0	0	0	0	0	0	0	0
967	0	0	0	0	0	505	0	0	505
968	129	35	18	129	189	116	0	154	98
970	0	0	0	0	0	6	0	0	6
971	0	0	24	0	0	26	0	0	3
973	4	0	0	40	1	0	36	1	0
975	26	0	7	140	24	40	114	24	33
976	35	0	83	119	0	82	84	0	-1
977	39	0	19	231	0	19	192	0	0
978	1	0	153	3	0	153	2	0	0

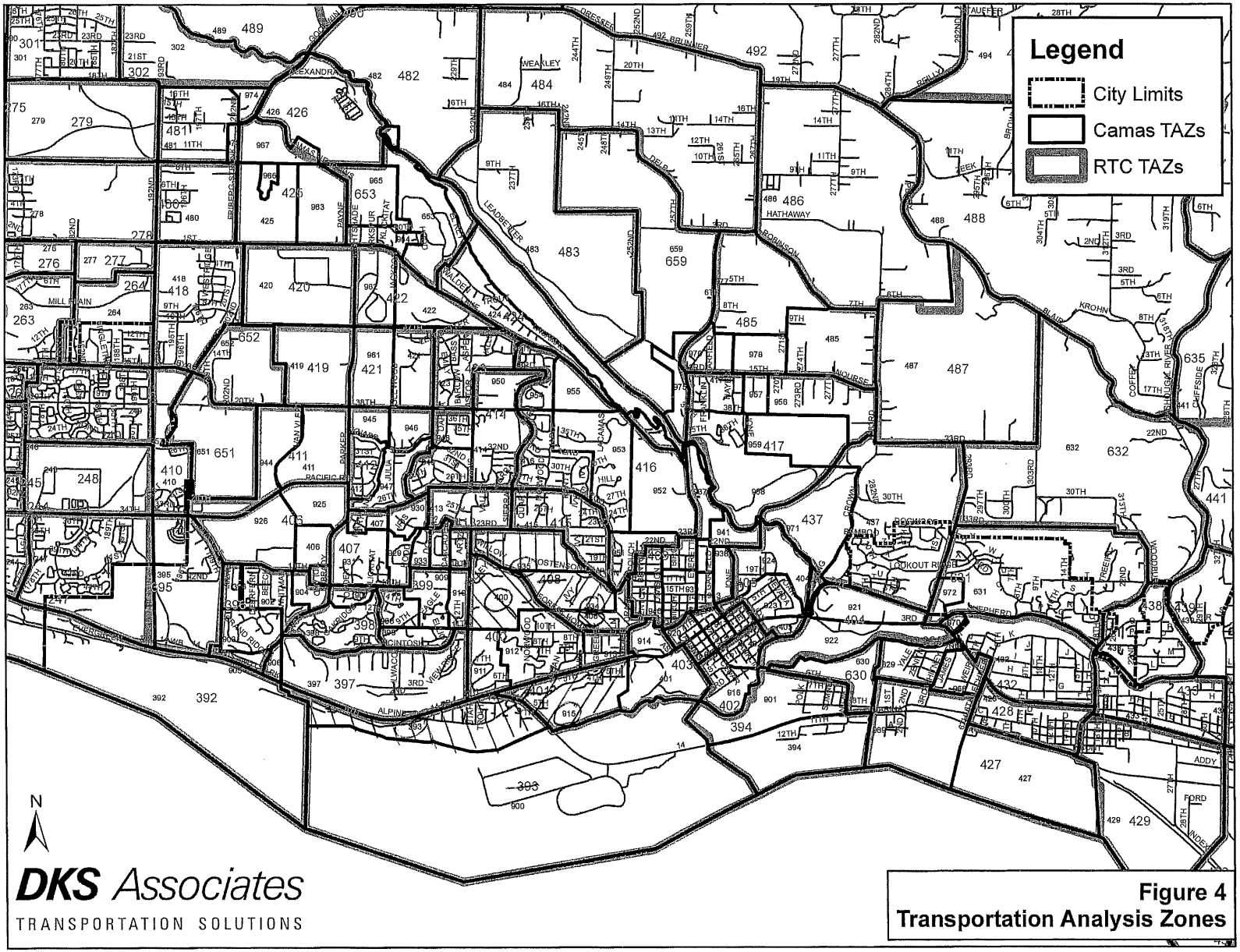


Figure 4
Transportation Analysis Zones