



**TITLE VI ACCOMPLISHMENTS & GOALS REPORT - WSDOT**

This outline is for LPA and other governmental entities to report Title VI activities that occurred over the past year and report Title VI goals for the upcoming year. Reports must be returned on or before due date to meet eligibility requirements for federal funding. Send to TitleVI@WSDOT.wa.gov

*DUE DATES:* Refer to Section 28.3 for scheduled reporting period and due date

**Contact Information**

Name and title of administrator (signature on Standard Assurances): Don E. Vanney, Mayor

Mailing Address: 238 N Olympic Ave

City: Arlington WA Zip Code: 98223 County: Snohomish

Phone #: 360-403-3442 email address: [donv@arlingtonwa.gov](mailto:donv@arlingtonwa.gov)

Name and title of head of transportation-related services: James X. Kelly, Public Works Director

Mailing Address: 238 N Olympic Ave

City: Arlington WA Zip Code: 98223 County: Snohomish

Phone #: 360-403-3505 email address: [jkelly@arlingtonwa.gov](mailto:jkelly@arlingtonwa.gov)

Name and title of designated Title VI coordinator\*: Kris Wallace, PW Staff Accountant

Mailing Address: 238 N Olympic Ave

City: Arlington WA Zip Code: 98223 County: Snohomish

Phone #: 360-403-3538 email address: [kwallace@arlingtonwa.gov](mailto:kwallace@arlingtonwa.gov)

\*When the Title VI coordinator changes, notify TitleVI@WSDOT.wa.gov within 30 days.

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To comply with Title VI requirements, each annual report submission must include signed Standard Assurances (USDOT1050.2A).

**Accomplishments**

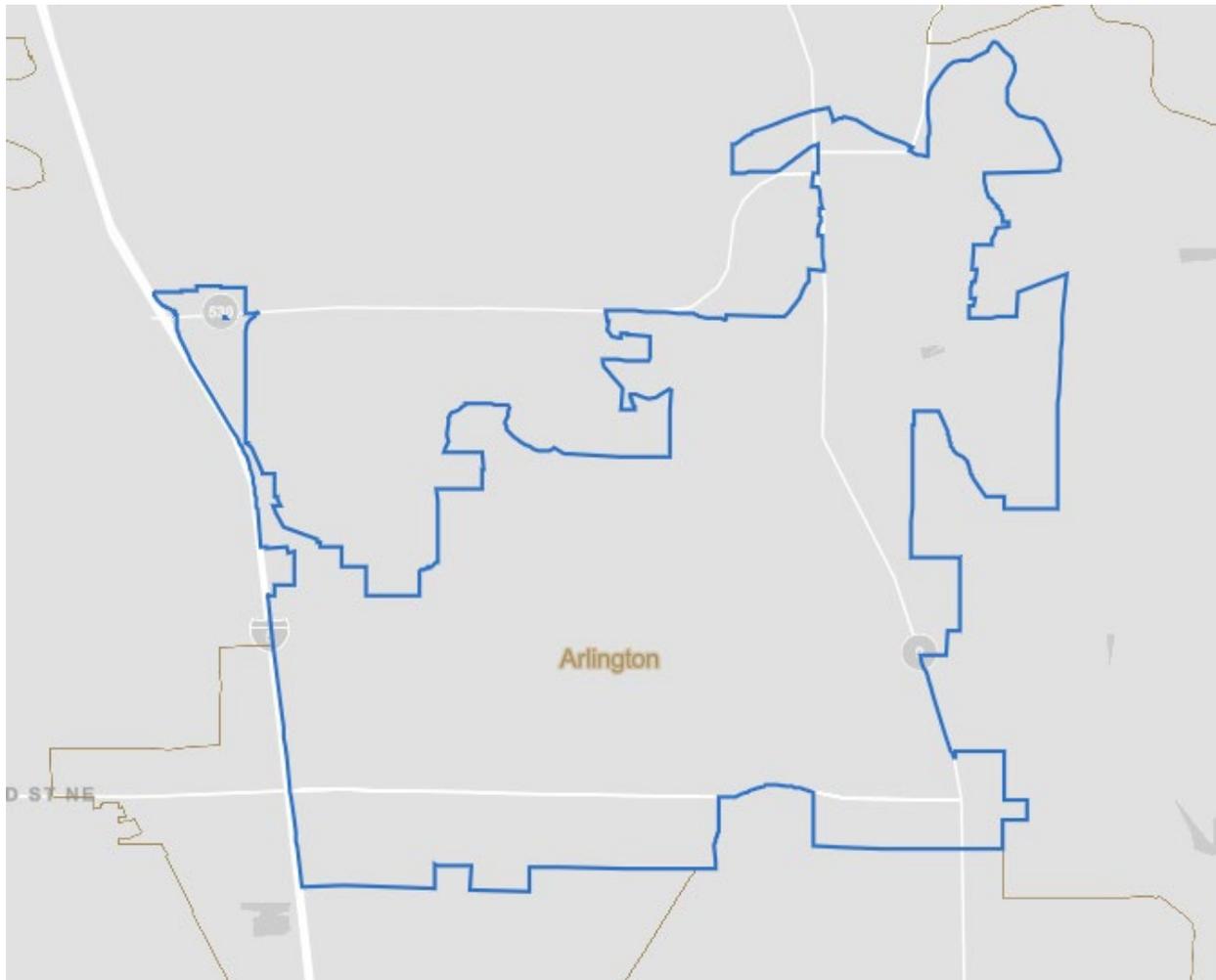
**1. Have there been any changes to the approved Title VI Plan that have not been reported to OECR?**

There have not been any changes to the Title VI Plan

**2. Organization, Staffing, Structure: Describe the Title VI Program reporting structure including the Title VI Coordinator, Administrative Head, and transportation-related staff. The list should include name, race, color, and national origin of each individual. Include the same details if your LPA has a volunteer or appointed board related to transportation decision making.**

Title VI Coordinator – Public Works Accountant – Kris Wallace, Caucasian, USA  
Title VI Specialist – Engineering Administrative Specialist – Katy Shores, Caucasian, USA  
No changes were made to the 2024 Organizational Chart, see Exhibit A

3. **Community Demographics:** Using a map of the LPA's boundaries, describe the demographics of the LPA's service area (e.g., race, ethnicity, and national origin). List, by individual languages, the percentage of the population who is Limited English proficient. If the LPA's Limited English proficient population is 5% of the total population or 1,000 individuals, whichever is less, explain the Four-Factor Analysis by answering the statements listed on the next page.



#### Race

[https://data.census.gov/profile/Arlington\\_city,\\_Washington?g=160XX00US5302585#race-and-ethnicity](https://data.census.gov/profile/Arlington_city,_Washington?g=160XX00US5302585#race-and-ethnicity)

- White – 77.7% - 15.3K
- Hispanic –12.5% - 2,476
- Black –1.2% - 239
- Asian –3.2% - 632
- Native Hawaii or other Pacific Islander - 0.5% - 110
- American Indian & Alaska Native – 1.5% - 301
- Mixed –10.9% - 2,155
- Other – 5.5% - 1086

**Language**

[https://data.census.gov/profile/Arlington\\_city,\\_Washington?g=160XX00US5302585#populations-and-people](https://data.census.gov/profile/Arlington_city,_Washington?g=160XX00US5302585#populations-and-people)

- English only – 84.3%
- Spanish – 9.7%
- Other Indo-European – 1.7%
- Asian & Pacific Island – 4.0%
- Other – 0.3%
- **15.7% speak other than English at home**

**Income**

[https://data.census.gov/profile/Arlington\\_city,\\_Washington?g=160XX00US5302585#income-and-poverty](https://data.census.gov/profile/Arlington_city,_Washington?g=160XX00US5302585#income-and-poverty)

The population of Arlington is 19,868. The median household income is \$84,919, with a poverty rate of 11% +/- 3.4%. 12.7% +/- 1.9% of Arlington’s population are veterans. 14.5% +/- 2.1% of the population in Arlington is considered to have a disability.



<https://statisticalatlas.com/place/Washington/Arlington/Food-Stamps>

There is no large geographic concentration of any one type of LEP individuals in the City of Arlington service area. However, the City will translate major documents in Spanish upon request and has a translation tools webpage on its website. The City is currently looking to contract for translation services with a third-party consultant.

The main reporting transportation-related staff are in the Engineering Department of Public Works. This group has the responsibility for implementing the required statements in solicitations, contracts, and public outreach documentation for all transportation related projects. As part of this process the City works with its consultants to assist in translating multiple outreach project notifications including postcards, letters, flyers and project boards.

**4. Complaints: Provide a copy of the LPA's Title VI complaint log, including new Title VI complaints received during this reporting period and any still pending. Include the basis of the complaint (race, color, national origin) and describe the disposition (status/outcome).**

No complaints were received. Please see Exhibit B for the City of Arlington's Title VI Complaint log, and Exhibit C for City of Arlington's Complaint Form in English, and Spanish. The complaint forms are posted on the City's website.

**5. Planning: Describe the transportation planning activities performed this reporting period. Describe the actions taken to promote Title VI compliance regarding transportation planning, including monitoring and review processes, community involvement, their outcome or status. Include examples of community outreach.**

2025 Utility Improvement & Pavement Preservation – The City of Arlington's yearly overlay project includes pavement repair and full overlay, planning, construction of ADA Ramps, pavement markings, and water line replacements and utility adjustments. Community outreach during the planning process included placing a project page onto the City's website. Further outreach will occur closer to the project start date.

180<sup>th</sup> Street Connector - Project was in the planning and initial design phase in 2023/2024. The project will include the construction of a two-way roadway with a 12-foot wide multi use trail from Smokey Point Blvd east to Airport Blvd connecting this intersection with a roundabout. Outreach included placing a project page onto the City's website. Public outreach included a month long online public survey. The survey was advertised with postcards being mailed to all project area residents and businesses (see Exhibit D), weekly E-News and social media postings and updates to the City's project webpage. The City hosted two open houses in August, one in person and one online. The open houses were advertised with postcards mailed (see Exhibit E) to all project area residents and businesses, weekly E-News and social media postings, and update to the City's project webpage. From the information received at the open houses a on-line webinar was hosted for alternative alignment options in October. Outreach included postcards (see Exhibit F) being mailed to all area residents, E-news and social media events posted, and update to the City's project webpage.

**6. Right-of-way actions: Describe activities during this reporting period associated with the purchase, sale, lease/use, or transfer of real property (related to highway transportation/public right-of-way use). Include demographic information of affected populations. For example, the race, color, national origin of affected property/business owner(s)/tenant(s).**

211th Place Corridor Improvements, this project will include pavement preservation of the existing roadway and the installation of a 12-foot wide multi use trail along the southside of the street, street lighting, ADA curb ramps, upgrades to utilities, and landscaping. In anticipation of the project construction a Temporary Construction Easement (TCE) or right-of-way (ROW) was purchased from the following owners and businesses:

- 211<sup>th</sup> Place Trust – Sharlene Hutton, Caucasian, USA
- AA Gas – Ravindra Wayse, Declined to answer
- Carl & Tennille Box – Caucasian, USA
- Randy & Cathy Devoir – Caucasian, USA
- Richard Fiorito – Declined to answer

- Frank & Ruth Gonzales – Hispanic & Caucasian, USA
- Grandview North LLC – Scott Wammack, Caucasian, USA
- Mark Hangarter & Amy McElroy – Caucasian, USA
- Limantzakis Properties No 2 LLC – Johnny Limantzakis, Caucasian, USA
- Darren Musgrave – Caucasian, USA
- Michael Newsom – Caucasian, USA
- Running C Rentals LLC – Carrie Taylor, Caucasian, USA
- Stillaguamish Square LLP – Dale Duskin, Caucasian, USA
- Jeremy & Anitra Suchan – Caucasian & One or more, USA
- Willett Inc – Guy Willett, Caucasian, USA

Smokey Point Blvd / 188th St Roundabout project, this project is part of the Smokey Point Corridor Improvement project and will install a roundabout at the intersection of Smokey Point Blvd and 188th St NE with ADA ramps, sidewalks, and lighting. In anticipation of the project construction a Temporary Construction Easement (TCE), Permanent Easement, or right-of-way (ROW) was purchased from the following owners and businesses:

- Longhorn Saloon – Richard Alum, Caucasian, USA
- Stillaguamish Tribe of Indians – Native American, USA for all board members
- Bintu & Yaya Jammeh – Declined to answer

**7. Identify right-of-way appraisers and acquisition staff (used during this reporting period) by race, color, national origin.**

Right of way acquisition staff, Commonstreet Consulting

- Theodore Parry – Caucasian, USA
- Lorelei Konvalin – Caucasian, USA
- Chris LaBonte – Caucasian, USA
- Jessica Brown – African American, USA
- Stephanie Golly – Caucasian, USA
- Malisa Enghusen – One or more, USA
- Deborah Sorum – Caucasian, USA

Appraisal Staff, Sova Consulting

- Matthew Sloan – Caucasian, USA

Appraisal Review Staff, ABS Valuation

- Jim Dodge, Caucasian, USA

**8. Studies and Plans: Were any transportation studies (including environmental reviews) conducted or transportation plans completed during this reporting period? Identify the data source(s) and provide data summary (Title VI/Environmental Justice Analysis) relative to ethnicity, race, languages spoken, neighborhoods, income levels, physical environments, and/or travel habits. Explain how data was used in these studies/reviews/plans.**

169th Connection: This project is currently in the design phase. A mounding analysis report was started in 2024 to be completed in 2025.

Division/Broadway Restoration: This project has finished the design phase and is ready for construction. Study conducted this period was a safety and alternatives analysis (see Exhibit G).

Smokey Point Blvd Corridor: This project has been in the design phase since 2020. Studies conducted this period included the completion of the NEPA, and a noise analysis (see Exhibit H and Exhibit I). 90% plans are expected to be completed in 2025.

211<sup>th</sup> Corridor Improvements: This project is currently in the construction phase. Studies conducted this period included a Stormwater Drainage Report (see Exhibit J) and a Geotechnical Engineering Report (see Exhibit K).

180<sup>th</sup> St Connector: This project began the design phase in 2024. No studies have been completed at this time. Environmental, Geotechnical and Cultural are scheduled to begin in 2025.

**9. Project Location and Design: Provide a list of construction projects that began during this reporting period. Using a map of the LPAs service area, identify project locations, and a brief description of the projects' benefits/burdens to affected populations. If possible, provide a map that overlays projects with the racial composition of affected neighborhoods.**

211<sup>th</sup> Place Corridor Improvement Project, overall impact to Arlington residents will be moderate to severe. This project is reconstructing the roadway with the installation of a 12-foot-wide multi-use trail, street and pedestrian lighting, installation of a new stormwater system, and updates to water and sewer infrastructure. Benefits include improved roadway and infrastructure, updated ADA ramps, installation of a multi-use trail, and lighting.

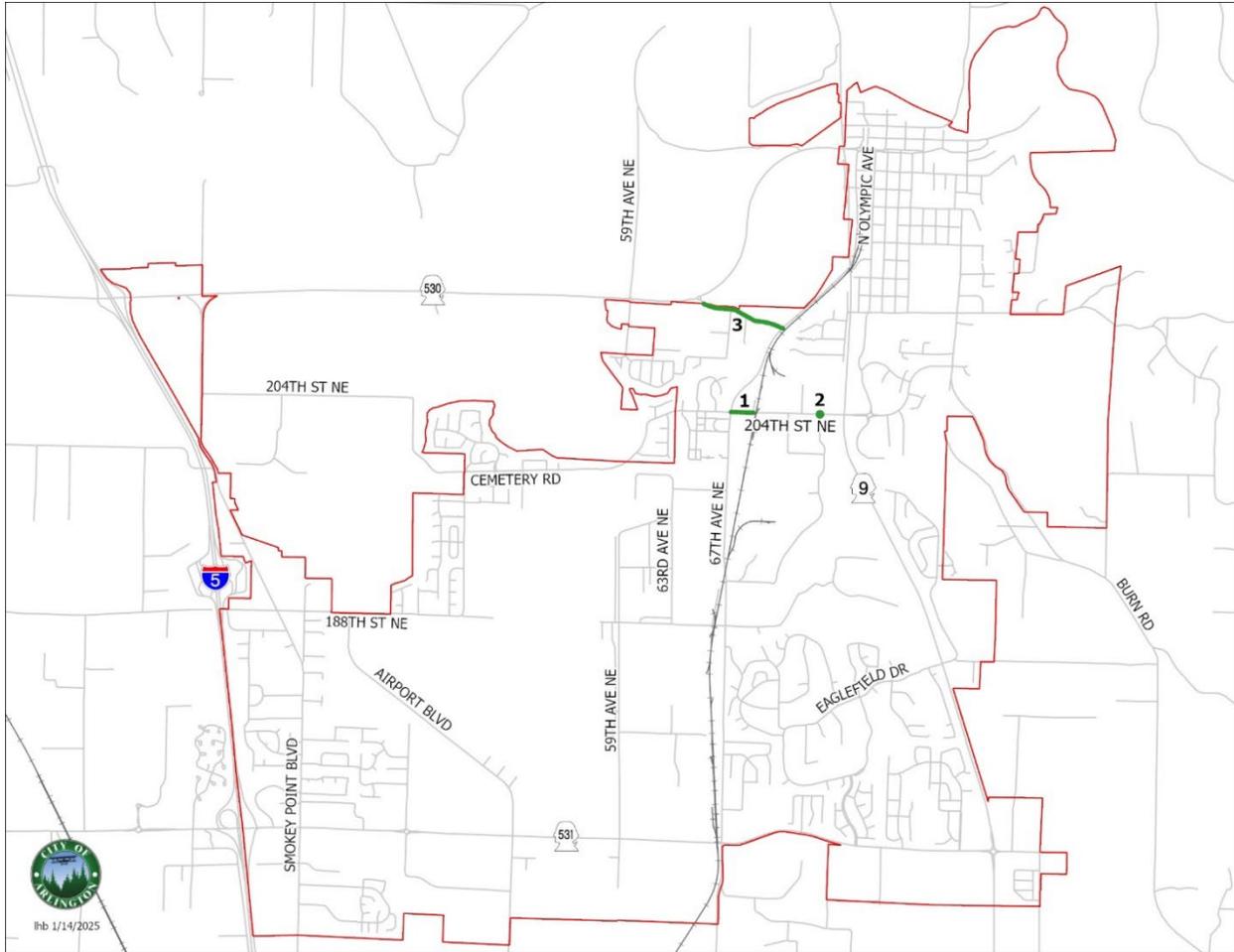
- 211<sup>th</sup> Place NE - 3

204<sup>th</sup> St / 74<sup>th</sup> Ave Intersection Project, overall impact to Arlington residents was minimal. This project updated a two way stop intersection to a 3-way signal intersection with updates to ADA ramps and sidewalks, and installation of new water main in the area. Benefits include updated infrastructure, Updated ADA ramps, sidewalk, public bus pull out, and a controlled intersection.

- 204<sup>th</sup> St / 74<sup>th</sup> Ave Intersection – 2

204<sup>th</sup> Overlay, impact to Arlington residents was minimal for this project. This project was a short overlay project from the intersection at 67<sup>th</sup> Ave to the railroad tracks. Benefits include improved roadway.

- 204<sup>th</sup> St – 1

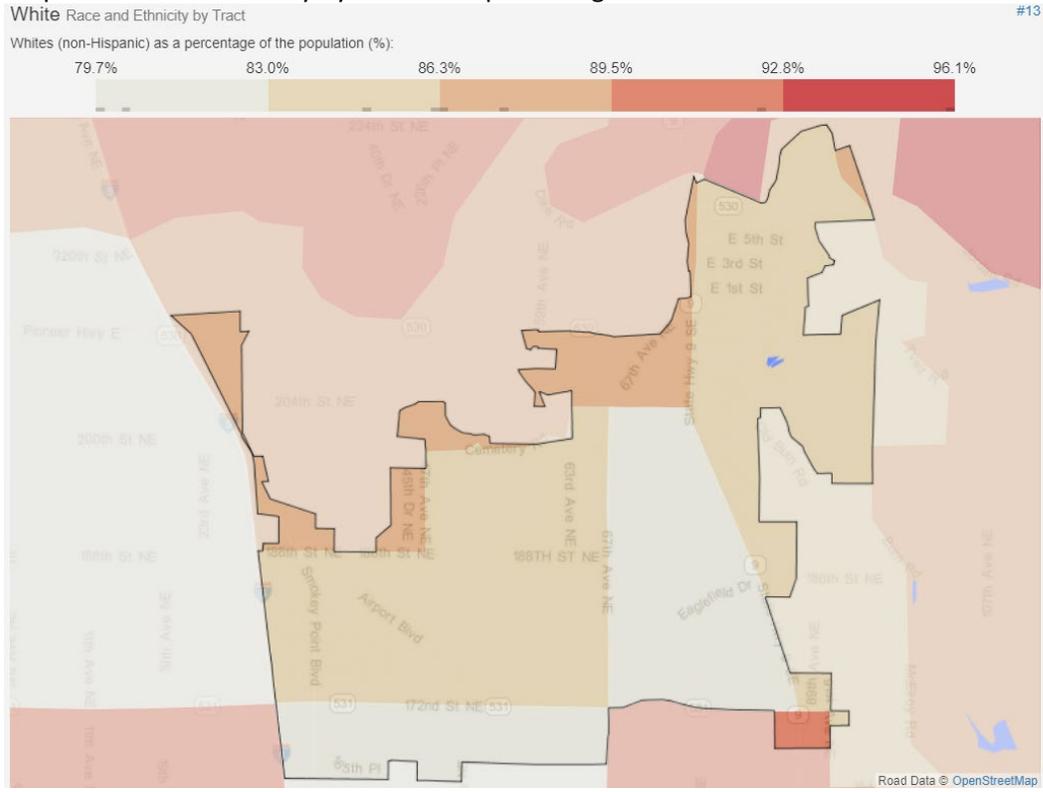


\*The numbers on the map correlate with the numbers next to the streets.

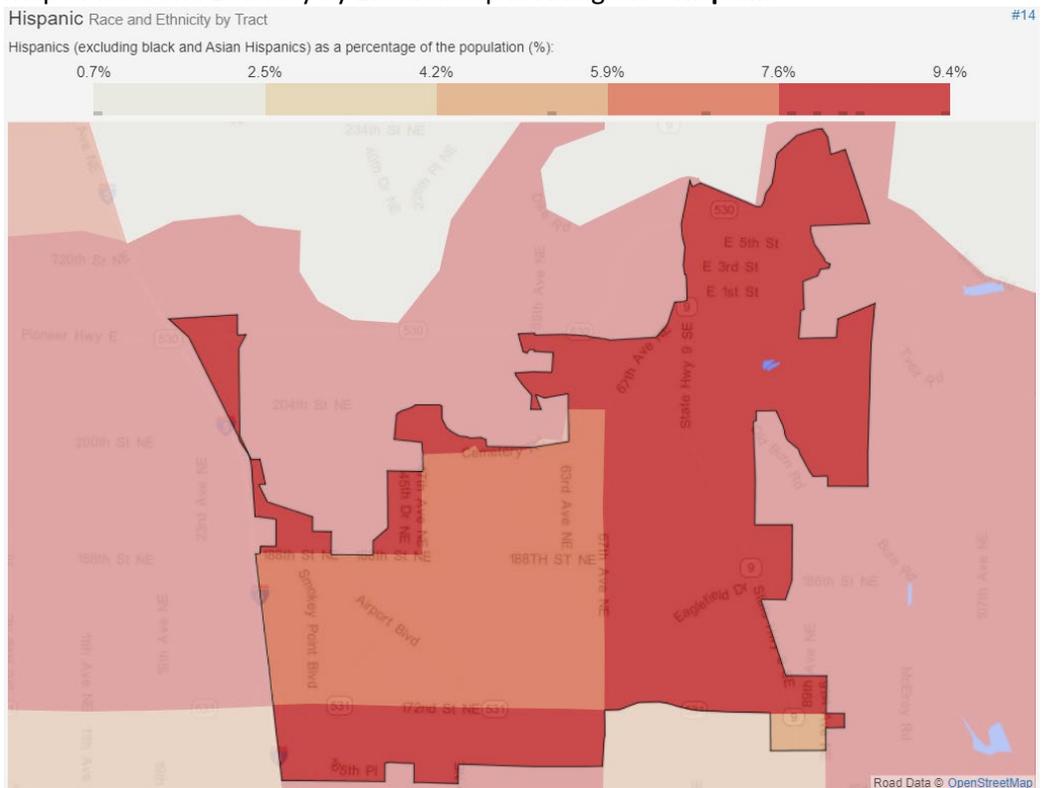
City of Arlington website has an option available to residents to view/read/navigate the website in over 100 different languages. In 2021, the City installed a translation service on all its capital projects webpages for the public to use on all attached documents. Exhibit L shows the language options available on the City's website, and Exhibit M shows the instructions on how to translate a document. The City is currently looking into alternative options for translation services.

<https://statisticalatlas.com/place/Washington/Arlington/Race-and-Ethnicity>

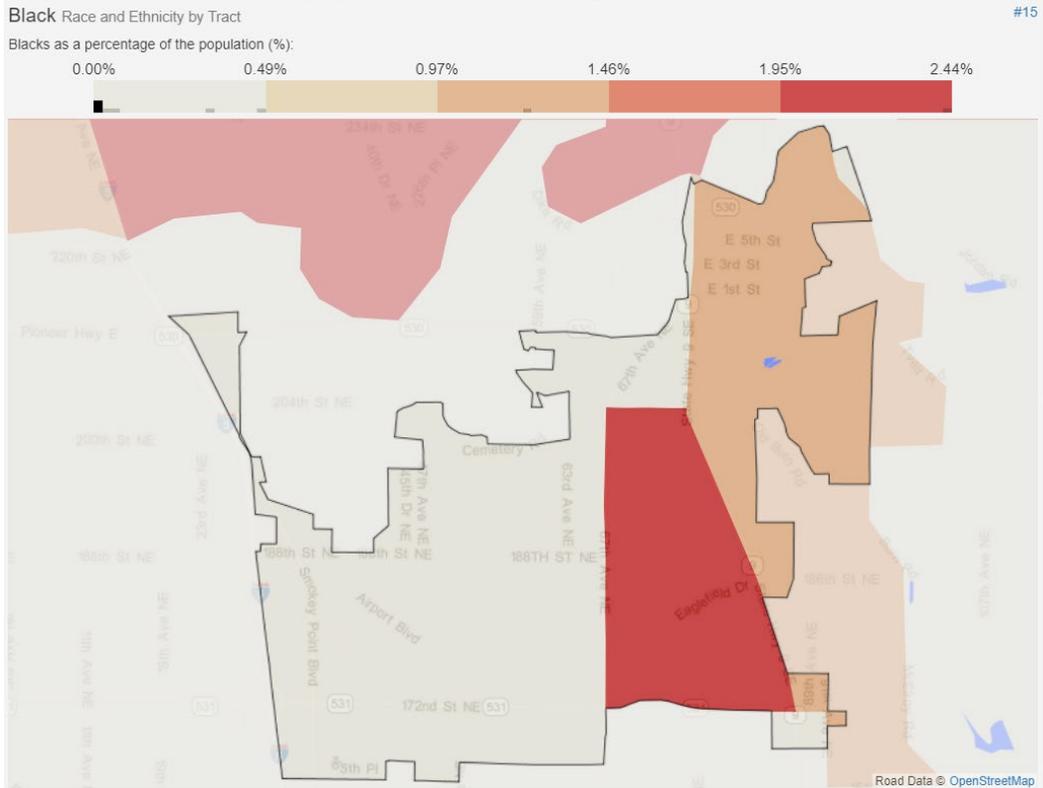
### Map of Race and Ethnicity by Block Group in Arlington – Caucasian



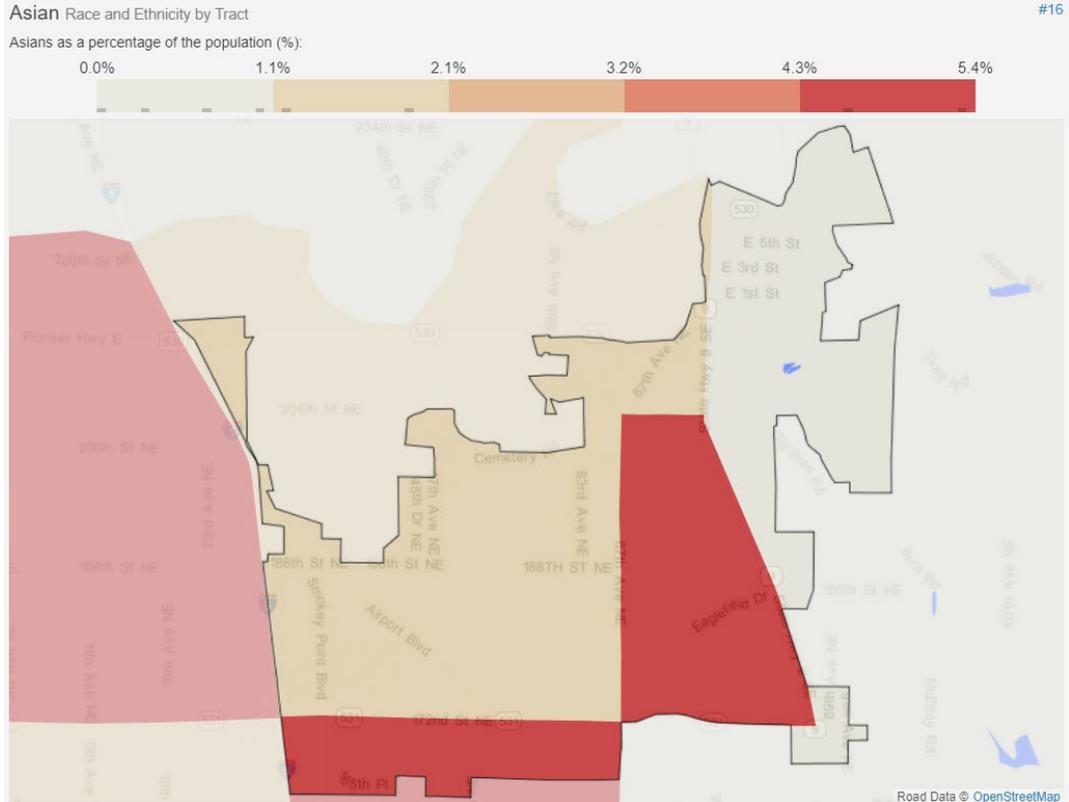
### Map of Race and Ethnicity by Block Group in Arlington – Hispanic



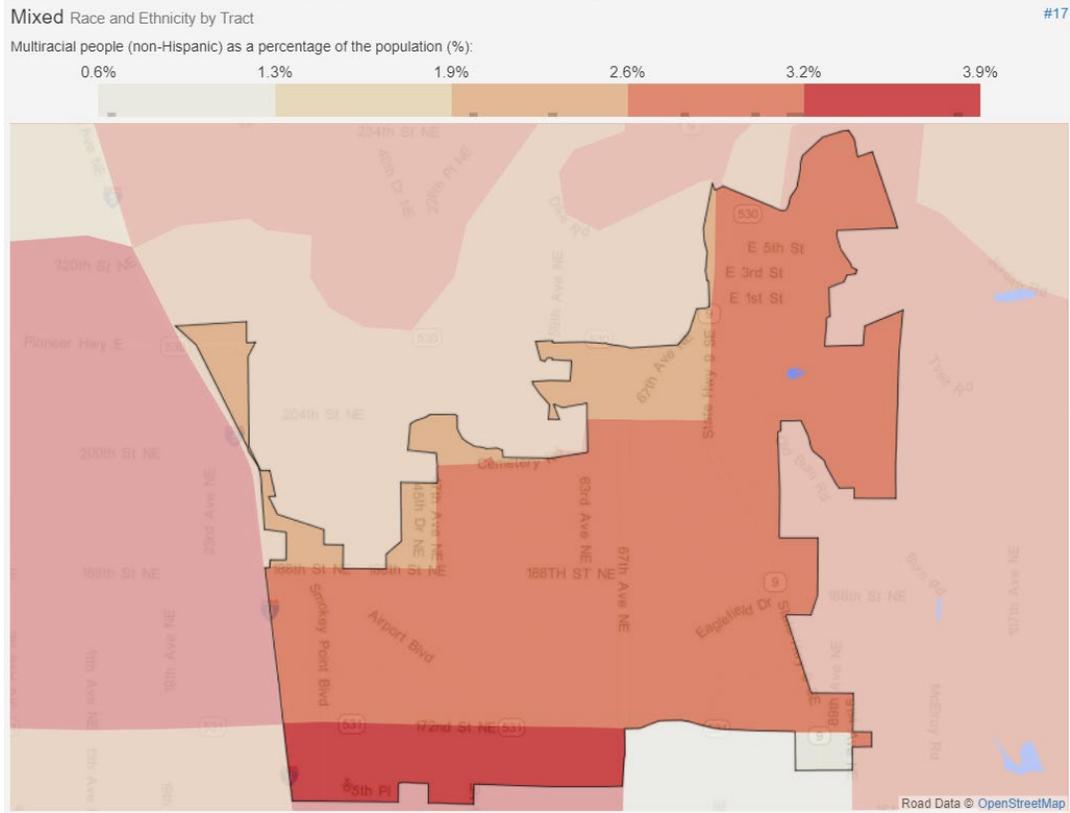
### Map of Race and Ethnicity by Block Group in Arlington – Black



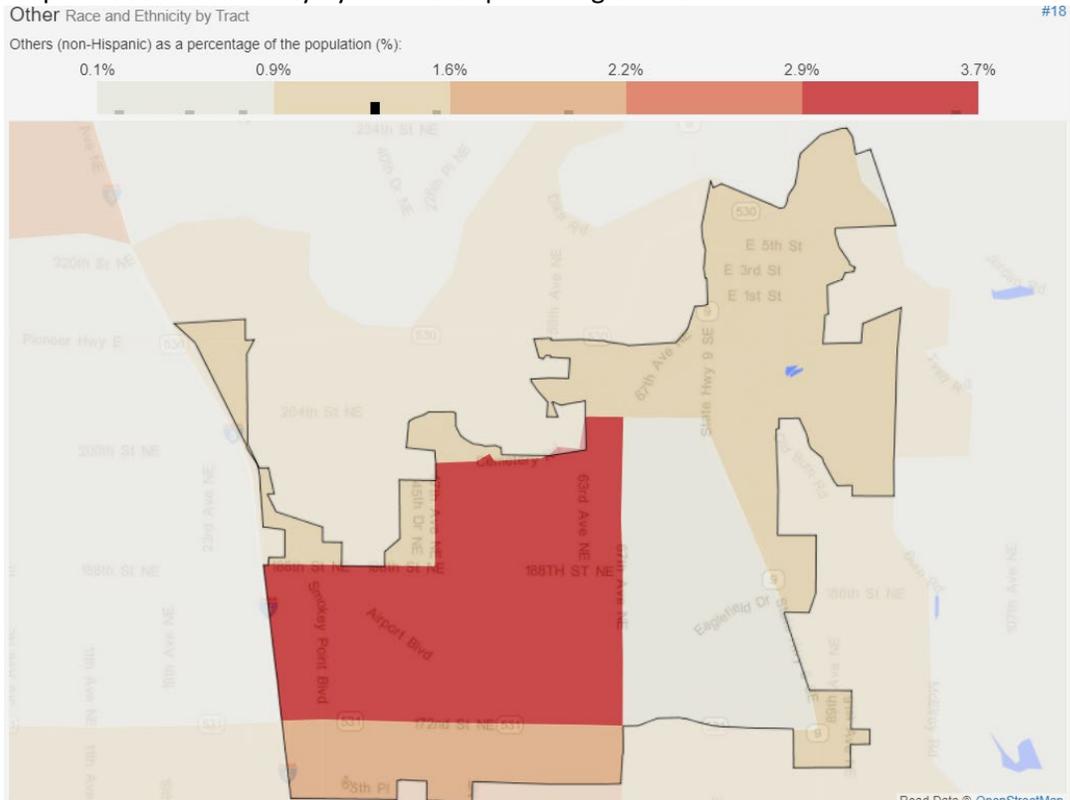
### Map of Race and Ethnicity by Block Group in Arlington – Asian



### Map of Race and Ethnicity by Block Group in Arlington – Mixed



### Map of Race and Ethnicity by Block Group in Arlington – Other



**10. Other Public Meetings: List other public meetings held during this reporting period. Identify efforts used to encourage citizen participation at those meetings. Detail dates, times, locations, attendance, and provide examples of outreach materials.**

In 2024, all city public meetings were in person with a virtual option. All meeting information is posted on the City of Arlington website, at <https://www.arlingtonwa.gov/AgendaCenter>. Translation services are available on a request basis.

- City Council Meetings
  - Regular council meetings are held every other Monday at 6:00 PM, except for the month of August, unless otherwise cancelled. Meetings are posted on the City's website, and on the City of Arlington Facebook and Twitter accounts. Meeting is held at 110 E 3<sup>rd</sup> St, Arlington or through Zoom and YouTube.
- Planning commission
  - Regular planning meetings are 1<sup>st</sup> and 3<sup>rd</sup> Tuesday at 6:30 PM unless Monday is a holiday, in which case, the meetings are moved to the following Thursday. Meetings are held in the council Chambers at 110 E 3<sup>rd</sup> St. Arlington.
- Youth Council
  - Regular youth council meetings are held on the 2<sup>nd</sup> Thursday at 5:30 PM every month and sometimes the 4<sup>th</sup> Thursday.
- Park, Arts & Recreation Commission
  - Regular PARC meetings are held the 4<sup>th</sup> Tuesday of every month at 6:00 PM via zoom or in person. Meetings are announced on the City Meeting Calendar.
- Civil Service Commission
  - Regular Civil Service Meetings are held on the 1<sup>st</sup> Wednesday of most months at 9:00 AM in Butner Boardroom at 110 E 3<sup>rd</sup> St. Arlington.
- Citizen Salary Commission
  - The Citizen Salary Commission meets every other year, and generally takes place in the first of the year.
- Cemetery Board
  - The Cemetery Board meets five times as year, January, March, May, September November on the third Tuesday of the month at 2:30 PM via Zoom or in person.
- Airport Commission
  - The Airport Commission meetings are held the 2<sup>nd</sup> Tuesday of every month at 6:00PM in Putnam Hall at 18204 59<sup>th</sup> Dr. NE. Arlington or via Zoom.

**1. Identify members of the LPA's transportation planning and/or advisory groups by race, color, and national origin**

Planning Commission

- Tim Abrahamson -
- Melissa Johnson, Chair- Caucasian
- Gayle Roeber, Vice Chair – Caucasian
- Nathan Senff – Declined to answer.

- Jennifer Benton – Declined to answer.

#### Public Works

- James Kelly – Caucasian, USA
- Ryan Morrison – Caucasian, USA
- Kris Wallace – Caucasian, USA

**2. Specify methods used to collect demographic information from the transportation-related public meetings. (Self-identification surveys, notes by staff, etc.) Include summaries of Public Involvement Forms collected at each meeting, listing the demographics of those who attended by meeting.**

In March 2024 the City hosted an in person open house for the 211<sup>th</sup> Place Corridor Improvement Project showing the 90% plans. The open house was advertised through the weekly E-Newsletter, social media, post card mailer and email to those that signed up to receive emails from the previous outreach efforts (see Exhibit N for Open House Survey). In August, the City hosted a pop-up event for the 180<sup>th</sup> Street Connector project with the initial design layout. The pop-up event was advertised through the weekly E-Newsletter, social media, project webpage, post card mailer (Exhibit O) and email to those that signed up for notices from the previous outreach effort. In August the City also hosted an online webinar for the 180<sup>th</sup> St Connector for those that could not attend the in-person pop-up event. This was advertised via social media, weekly E-Newsletter, and email (see Exhibit P for the presentation boards). The City hosted an additional online webinar in October for the 180<sup>th</sup> Street Connector project for the alignment of the roadway. Due to the community feedback, staff re-evaluated the alignment and went out to the public for their opinion. This webinar was advertised via weekly E-Newsletter, social media, post card mailers, and email. See Exhibit Q for the Zoom webinar summary. All materials sent to property owners and meeting materials were offered in Spanish and English. Materials are posted online and can be translated in over 100 languages.

**3. List any language assistance services requested. For which languages? Who provided the service? In addition, list vital documents translated during the reporting period and identify the languages.**

No requests for assistance were received by the City. No vital documents were required to be translated. All materials supplied are available on the City's website where translation service is available. The City is currently looking into alternative options for translation.

**11. Transportation-related Construction and Consultant Contracts (if applicable): Briefly describe the process used to advertise and award construction contracts during this reporting period. Include the process for negotiating contracts (e.g., consultants).**

211<sup>th</sup> Place Corridor Improvement Project, Reece Construction. The City advertised for two weeks in the Daily Journal of Commerce and the Everett Herald, on the city website and with Builders Exchange of Washington (BXWA). Upon closing, an in person bid opening occurred, and the bids were announced. The preliminary bid was posted on the City website, and bids were verified and certified. The certified bid was posted online, and the lowest responsible bidder chosen. The contract was then taken through city council process for award signature authorization.

180<sup>th</sup> St Connector Design, SCJ Alliance. The City advertised for 3 weeks in the Daily Journal of Commerce, the Everett Herald, and the City's website. Upon RFQ closing, statements of qualifications were opened, and interviews were conducted. After all interviews the team scored each company and the company with the highest score is chosen. The City could not come to a reasonable cost for the design with the firm chosen, so with the permission of WSDOT the City went out to bid for 3 additional weeks in the Daily Journal of Commerce, the Everett Herald, and the City's website. Upon RFQ closing statements of qualifications were opened and interviews were conducted. After all interviews the team scored each company and the company with the highest score is chosen. This project went to bid and closed in 2023 but was awarded in 2024. The design contract was taken through city council process for award signature authorization.

2024/2025 Utility Improvement & Pavement Preservation, Parametrix. The City advertised for 2 weeks in the Daily Journal of Commerce, the Everett Herald, and the City's website. Upon closing statements of qualifications were opened and interviews were conducted. After all interviews the team scored each company and the company with the highest score was chosen. The contract was taken through city council process for award signature authorization. This was advertised in 2023, and the contract was executed in 2024.

**12. Describe the actions taken to promote construction contractor/consultant compliance with Title VI by construction contractors/consultants, including monitoring and review processes, and their outcomes/status (e.g. what Title VI language was included in contracts and agreements; were contractors and consultants reviewed to ensure compliance; what Title VI responsibilities are explained to contractors and consultants?)**

Title VI language is included in all advertisements, request for proposals, etc. Exhibit R is the standard Advertisement for Bid form. Once a contractor or consultant is under contract all subcontractors must be requested and approved with the WSDOT Request to Sublet Work form (EXHIBIT S). This form has a spot for DBE information and helps to monitor our DBE percentage for each project. Projects with consultants on federally funded projects use the most current WSDOT approved Local Agency Agreement (EXHIBIT T) and federally funded construction projects use the City's construction contract for federally funded projects (EXHIBIT U).

**13. List construction, right-of-way, and consultant contracts with your LPA/MPO/entity for this report period with dollar value of each. Identify funding sources (federal, state, local, other), and how many were awarded to certified disadvantaged contractors (as a prime contractor/consultant).**

- 211<sup>th</sup> Pl Corridor Improvement Project Construction - \$3,357,510.00, State, No DBE award
- 180<sup>th</sup> St Connector - \$597,102.07, Federal, No DBE award
- Smokey Point Blvd & 188<sup>th</sup> St RAB Legal Consultant– Hourly rate, No DBE award, Local
- Smokey Point Blvd & 188<sup>th</sup> St RAB ROW Consultant - \$29,610.00, No DBE award, Local

Zero Projects had a designated DBE during this reporting period.

**14. Education & Training: Describe actions taken to promote Title VI compliance through education and trainings, including monitoring and review processes, and their outcomes/status.**

There were no in-person Title VI trainings offered during this reporting period. All training for Title VI was offered with online webinars or online training.

**1. List Title VI training/webinars your Title VI Coordinator attended this reporting period. Include dates and entity that conducted the training.**

No training was completed during this reporting period.

**2. When was Title VI internal training provided to staff? Who conducted the training? What was the subject of the training? Provide the job titles and race/color/national origin of attendees.**

Title VI training is offered on the WSDOT site and, this training is encouraged for all personnel to attend and complete.

- Katy Shores – Engineering Administrative Specialist III – WSDOT - Title VI Training for LPA’s Caucasian, USA (Exhibit V)

**3. List other civil rights training conducted locally. Provide dates and a list of participants by job title and Title VI role, if applicable.**

Equity in Roadway Safety Webinar Series – March 27, 2024, May 22, 2024 & July 24, 2024

- Katy Shores – Engineering Administrative Specialist III – Title VI Specialist

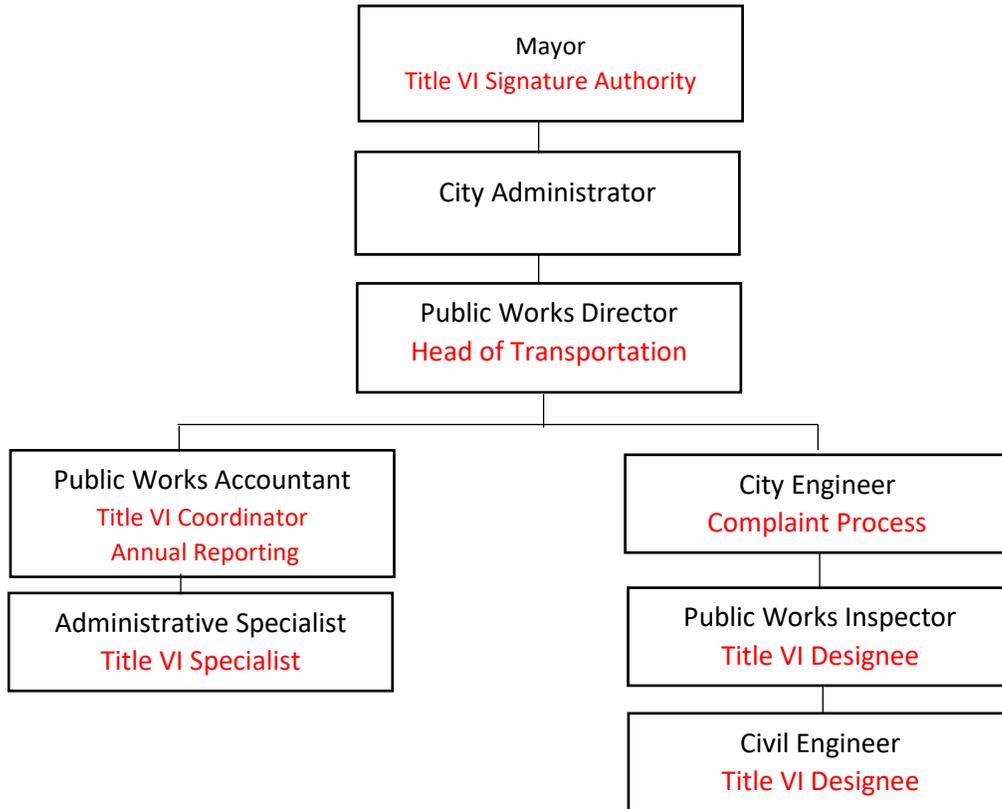
**15. Title VI Goals for Upcoming Year**

**What area(s) of Title VI does your agency plan to focus on in the upcoming year? Describe by particular program area what your agency hopes to accomplish. Include any significant problem areas to focus on and plans to address those.**

- Continue to ensure that all projects, programs, and activities follow WSDOT Title VI Plan.
- Continue to give training opportunities to new and existing staff on Title VI program
- Keep the City project webpages updated accordingly with all Title VI information.

# City of Arlington

## Title VI Organizational Chart



**Complaint Process:** Intake and investigation of Title VI complaints

**Annual Reporting:** Identifies Transportation projects and programs and reports annually to WSDOT as required for Title VI compliance.

**Title VI Specialist:** Responsible for community outreach

**Designee:** Assist with documentation and compilation of reports





ADDITIONAL INFORMATION

**What remedy are you seeking for the alleged discrimination? Please note that this process will not result in the payment of punitive damages or financial compensation.**

**List any other persons that we should contact for additional information in support of your complaint. Please include their phone numbers, addresses, email addresses, etc.**

**List any other agencies with whom you have filed this same complaint:**

Signature (REQUIRED)

Date

## Title VI Complaint Procedures

If you believe that you have been discriminated against because of your race, color, or national origin, then you have the right to file a formal complaint with City of Arlington within 180 days of the alleged incident.

### HOW TO FILE A COMPLAINT

1. Complete the Title VI Complaint Form, answering every question.
2. Submit the **signed** complaint as directed on the form. We cannot accept unless it has been signed.
3. Upon receipt the complaint form, it will be reviewed to ensure that it is complete. A notice acknowledging receipt will be provided within 10 working days. The complaint will then be forwarded to WSDOT, the federal funding agency through Washington State Department of Transportation-Office of Equal Opportunity. The federal funding agency is responsible for all decisions regarding whether a complaint should be accepted (and investigated), dismissed, or referred to another agency.
4. When the federal funding agency decides whether to accept, dismiss, or transfer the complaint, it will notify the complainant and the other agencies (as appropriate) as to the status of the complaint.

These procedures do not deny you the right to file a formal complaint directly with the federal funding agencies or seek private counsel for complaints alleging discrimination. Federal law prohibits intimidation or retaliation against you of any kind.

These procedures cover all complaints filed under Title VI of the Civil Rights Act of 1964 as amended and the Civil Rights Restoration Act of 1987, relating to any program, service, or activity administered by WSDOT as well as its sub-recipients, consultants, and contractors.



City of Arlington  
Ciudad de Arlington

**EXHIBIT C**

Spanish

## Formulario de queja del Título VI

**Uso exclusivo de la agencia**

Received	____/____/____
Response	____/____/____
Report	____/____/____
Briefing	____/____/____

Si cree que ha sido discriminado debido a su raza, color o nacionalidad (incluido el dominio limitado del inglés) en programas o actividades de la agencia, puede presentar una queja formal.

Instrucciones: Complete el siguiente formulario y envíelo a: City of Arlington Attn: Ryan Morrison 238 N Olympic Ave, Arlington, WA 98223 o por correo electrónico a: [rmorrison@arlingtonwa.gov](mailto:rmorrison@arlingtonwa.gov)

<b>Su nombre:</b>		<b>Su teléfono:</b>	
		<b>Mejor momento del día para contactarlo sobre esta queja:</b>	
		7am a 10am	10am a 1pm
		1pm a 4pm	4pm a 7pm
<b>Su dirección de correo electrónico:</b>			
<b>Su dirección de correo postal:</b> (Calle/PO Box, ciudad, estado, código postal)			
<b>Nombre, dirección y número de teléfono de las personas que supuestamente lo discriminaron.</b>			
<b>Fecha del supuesto incidente:</b>		<b>Discriminación por:</b>	
		<input type="checkbox"/> Raza <input type="checkbox"/> Color <input type="checkbox"/> Nacionalidad (incluye dominio limitado del inglés)	
<p><b>Explique lo que sucedió, por qué cree que sucedió y cómo fue discriminado. Indique quién estuvo involucrado. Asegúrese de indicar de qué manera siente que otras personas son tratadas de forma diferente a usted. Si tiene alguna otra información sobre lo que sucedió, adjunte los documentos probatorios a este formulario.</b></p>			

INFORMACIÓN ADICIONAL

**¿Qué solución está buscando por la supuesta discriminación? Tenga en cuenta que este proceso no resultará en el pago de daños punitivos ni compensación económica.**

**Enumere a otras personas con las que deberíamos comunicarnos para obtener información adicional en apoyo de su queja. Incluya sus números de teléfono, domicilios, direcciones de correo electrónico, etc.**

**Enumere cualquier otra agencia con la que haya presentado esta misma queja:**

**Firma: (OBLIGATORIA)**

**Fecha:**

## Procedimientos de queja del Título VI

Si cree que ha sido discriminado por su raza, color u origen nacional, tiene derecho a presentar una queja formal ante la ciudad de Arlington dentro de los 180 días posteriores al presunto incidente.

### CÓMO PRESENTAR UNA QUEJA

1. Complete el Formulario de Queja del Título VI, respondiendo cada una de las preguntas.
2. Envíe la queja firmada como se indica en el formulario. No podemos aceptarla a menos que la haya firmado.
3. Una vez recibido el formulario de queja, será controlado para verificar que está completo. Se enviará un aviso de acuse de recibo dentro de los 10 días hábiles. La queja será enviada a la agencia federal de financiamiento a través de la Oficina de Igualdad de Oportunidades del Departamento de Transporte del Estado de Washington. La agencia federal de financiamiento es responsable de todas las decisiones con respecto a si una queja debe ser aceptada (e investigada), desestimada o remitida a otra agencia.
4. Cuando la agencia federal de financiamiento decida si acepta, rechaza o transfiere la queja, notificará al demandante y a las demás agencias (según corresponda) sobre el estado de la queja.

Estos procedimientos no le niegan el derecho de presentar una queja formal directamente ante las agencias federales de financiamiento o buscar un abogado particular para las quejas que alegan discriminación. La ley federal prohíbe cualquier tipo de intimidación o represalia contra usted.

Estos procedimientos contemplan todas las quejas presentadas bajo el Título VI de la Ley de Derechos Civiles de 1964 y sus modificaciones y la Ley de Restauración de Derechos Civiles de 1987, relacionadas con cualquier programa, servicio o actividad administrados por el WSDOT o Washington State Department of Transportation así como sus subreceptores, consultores y contratistas.



# CITY OF ARLINGTON

## 180TH STREET CONNECTION SURVEY

**Project Description:** The City of Arlington was recently awarded a \$482,700 grant from the Puget Sound Regional Council for the planning and design of a new roadway east of 180th St connecting Smokey Point Blvd to Airport Blvd. The project is about to begin the design stage and we want to engage the public to ensure we develop a project that meets the community's needs.

Share your feedback: <https://arcg.is/1zGjJT>

### Project Benefits:

- Improve vehicle & freight access.
- Support new development.
- Provide pedestrian & bicycle facilities.

### Project Cost:

- Estimated design cost: \$600,000.00.



### Contact Information:

<https://www.arlingtonwa.gov/817/180th-Street-Connector>  
(360) 403-3544 | [cityprojects@arlingtonwa.gov](mailto:cityprojects@arlingtonwa.gov)



## CITY OF ARLINGTON

## NEW 180TH STREET BETWEEN SMOKEY POINT BLVD AND AIRPORT BLVD

**What's it About?** The City is starting the design process of a new East-West road connecting Smokey Point Boulevard to Airport Boulevard.

*La Ciudad está comenzando el proceso de diseño de una nueva carretera de este a oeste que conecta Smokey Point Boulevard con Airport Boulevard.*



SCAN THE  
QR CODE TO  
GO TO THE  
PROJECT  
WEBSITE!

### Project Benefits

- ◆ Improve vehicle and freight access  
*Mejorar el acceso de vehículos y carga*
- ◆ Provide pedestrian and bicycle facilities  
*Proporcionar facilidades para peatones y bicicletas*
- ◆ Increase safety  
*Aumentar la seguridad*
- ◆ Support new development  
*Apoyar el nuevo desarrollo*

Please join us for an Informational Event in your neighborhood to learn more about this project!

Come enjoy hot dogs, play some games, families encouraged!



*¡Únase a nosotros en un evento informativo en su vecindario para obtener más información sobre este proyecto!*

*¡Venga a disfrutar de hot dogs, juega algunos juegos, amigable para familias!*

When: August 22nd, 5-7pm

Where: Smokey Point  
Community Church Parking Lot,  
17721 Smokey Point Boulevard

Questions? (360) 403-3544 • [cityprojects@arlingtonwa.gov](mailto:cityprojects@arlingtonwa.gov)



## CITY OF ARLINGTON

## NEW 180TH STREET BETWEEN SMOKEY POINT BLVD AND AIRPORT BLVD



**Great news! We've listened to your feedback and have 3 new roadway layouts for you to review!**

*¡Buenas noticias! ¡Hemos escuchado sus comentarios y tenemos 3 nuevos diseños de carreteras para que los revise!*



Scan the QR code to go to the project website!

Please join us for an Informational Online Event to learn more about this project!



*¡Únase a nosotros en un evento informativo para obtener más información sobre este proyecto!*

**Questions? (360) 403-3544 • [cityprojects@arlingtonwa.gov](mailto:cityprojects@arlingtonwa.gov)  
<https://www.arlingtonwa.gov/817/180th-Street-Connector>**

SCAN ME FOR ZOOM LINK



ESCANEA ME PARA EL ENLASE DE ZOOM

When: October 16th, 6-7pm

Cuando: 16 de Octubre de 6-7pm

Where: Online through Zoom, scan above QR code

Donde: En línea a través de Zoom, escanea el código QR arriba

## Memo

To: James Kelly, PE, City of Arlington  
Ryan Morrison, PE, City of Arlington

From: Lance Adams, PE

Date: March 14, 2024

Re: Arlington Division/Broadway Restoration Project  
Safety and Alternatives Analysis

---

The purpose of this memorandum is to describe the alternatives that LDC and Transpo Group considered and evaluated as a part of this project. To accomplish this, Transpo provided conceptual roundabout channelization and street lighting analysis. LDC and the City reviewed overall corridor safety and channelization. The stated goals of the project are:

- Increase visibility and sight distance,
- Include design elements that will enhance pedestrian safety,
- Provide recommendations for the improvement of roundabout geometrics, and
- Provide a brief lighting analysis and list opportunities for improvement.

## **Existing Pedestrian Facilities**

The Division Street corridor from West Avenue to Broadway Street consists of twelve pedestrian crossings including six roundabout pedestrian crossings at West Avenue and Broadway Street, one mid-block trail crossing at the Centennial Trail, three stop controlled crossings at North Olympic Avenue, and two crossings at Broadway Street and Gillman Ave. Dedicated pedestrian illumination is not present; however, further discussion of the illumination of the pedestrian crossings is provided later in this memo.

## **Pedestrian Safety Enhancement Recommendations**

The following improvements are recommended in the corridor to enhance pedestrian safety.

### ***Roundabout Revisions***

#### **Geometry**

It is recommended that the roundabout geometry at both West Avenue and Broadway Street be updated to current standards using hardscape (concrete construction) or reinforced delineation (pavement markings with plastic curbing and delineators) to narrow approach lanes and change the vehicle entry alignment to reduce vehicle speeds. The geometry updates will also reduce pedestrian exposure to vehicles by reducing crossing distances. The City prefers bulbout extensions and the design team concurs with that positive delineation approach.

LDC & Transpo developed three roundabout options at Division/Broadway. Option 1 limits access to Macleod to in-bound traffic only, Option 2 allows for right in and right out of Macleod,

and Option 3 allows for right turn exit from Macleod only. City staff preferred right in, right out options at Macleod. See Figure 8. The northern half block of Macleod on street parking may need to be eliminated. Per the City's request, this roundabout will have a two-level truck apron, the outer most three to five feet will be friendly to bus traffic, finished in textured red concrete. This will minimize cars from driving on outer truck apron. Closer to the center, the truck apron will be raised an additional 3 inches and have a colored textured finish as well. Pedestrian routes and access control will also be improved at this roundabout via the use of splinter islands and crosswalks backed off to roundabout approximately 10 feet.

The City prefers curb extensions at NW and SW corner of West Ave/Division Street roundabout. LDC will add a traditional raised concrete truck apron at this location. Concrete will be textured with integral red coloring. Pedestrian routes and access control will also be improved via the use of splinter islands and crosswalks backed off roundabout approximately 10 feet. Lower vegetation will also be placed in the splinter islands to improve sightlines. This will also be done at the Centennial Trail crossing.

### **Signing**

Roundabout signing for the existing roundabouts should be evaluated for improvements. Where appropriate, yield signs should be located as close to the yield line as possible. Relocating the yield signs will allow for installation of pedestrian crossing warning signs at the pedestrian crossing locations to provide additional enhancement for the crossings.

The following figures provide conceptual layouts of the roundabout improvements including geometry and signing recommendations.

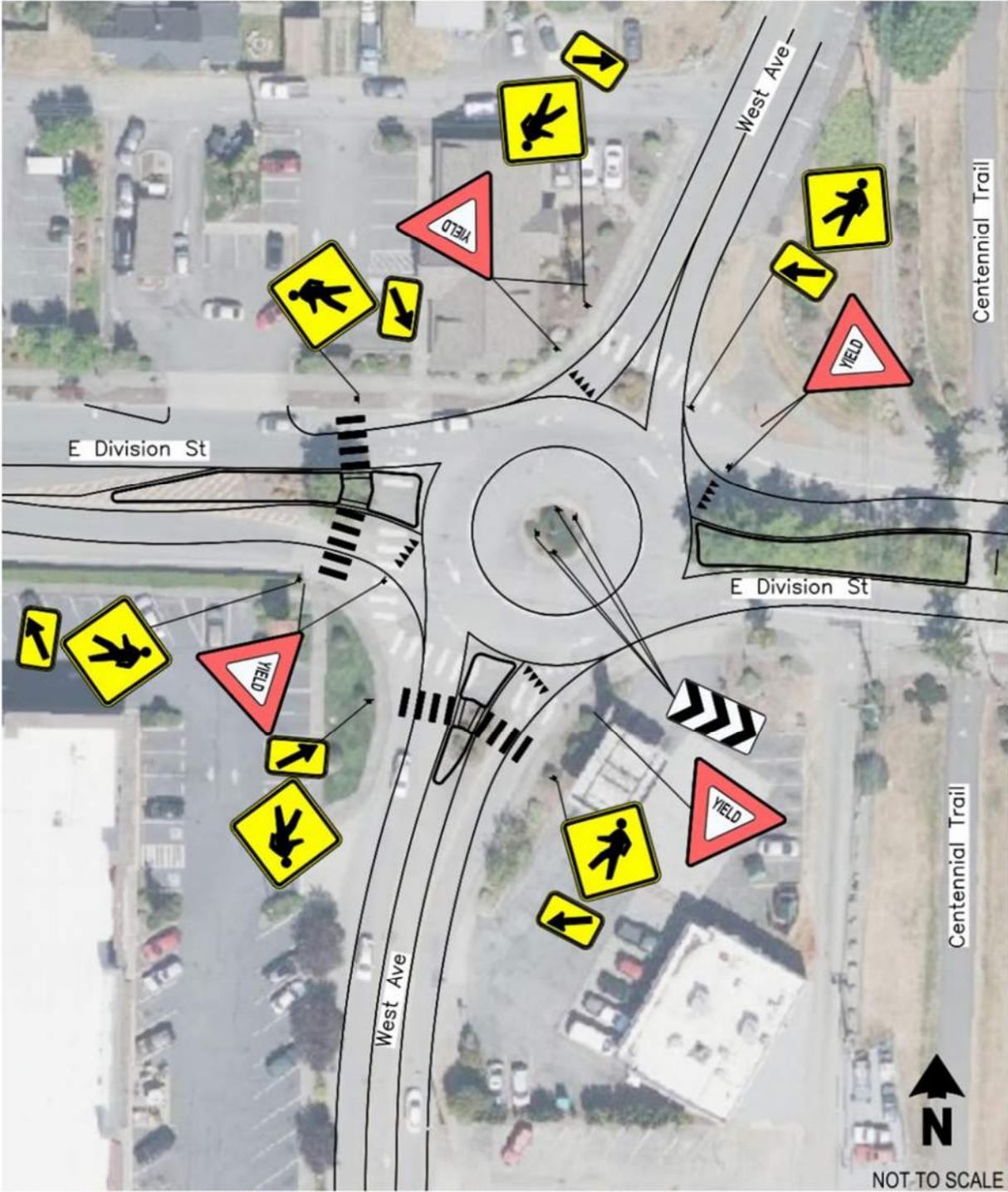


Figure 1: E Division St and West Ave Roundabout Improvement Concept

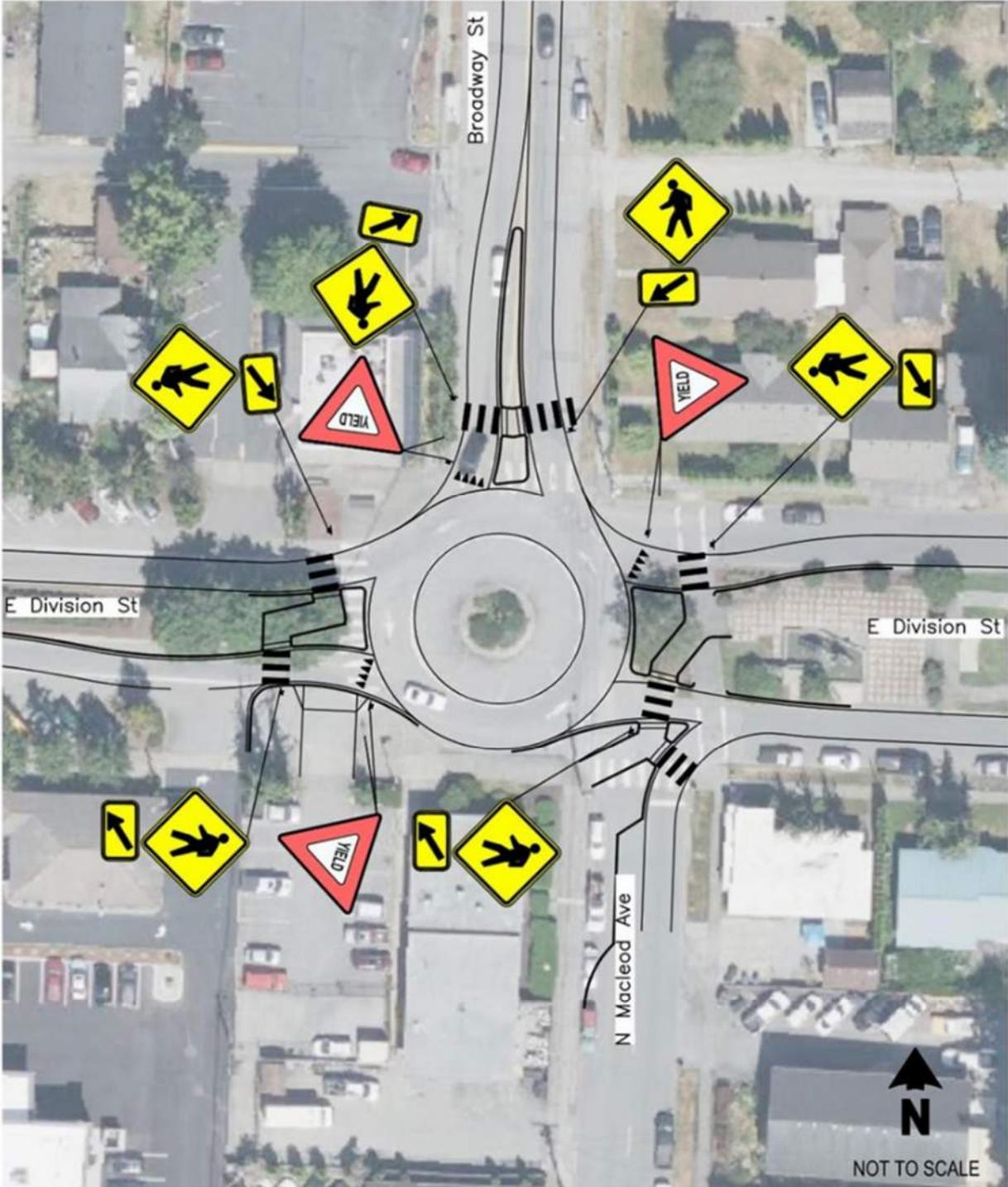


Figure 2: E Division St and Broadway St Roundabout Improvement Concept - Option 1, N Macleod Ave One-Way, Northbound Only

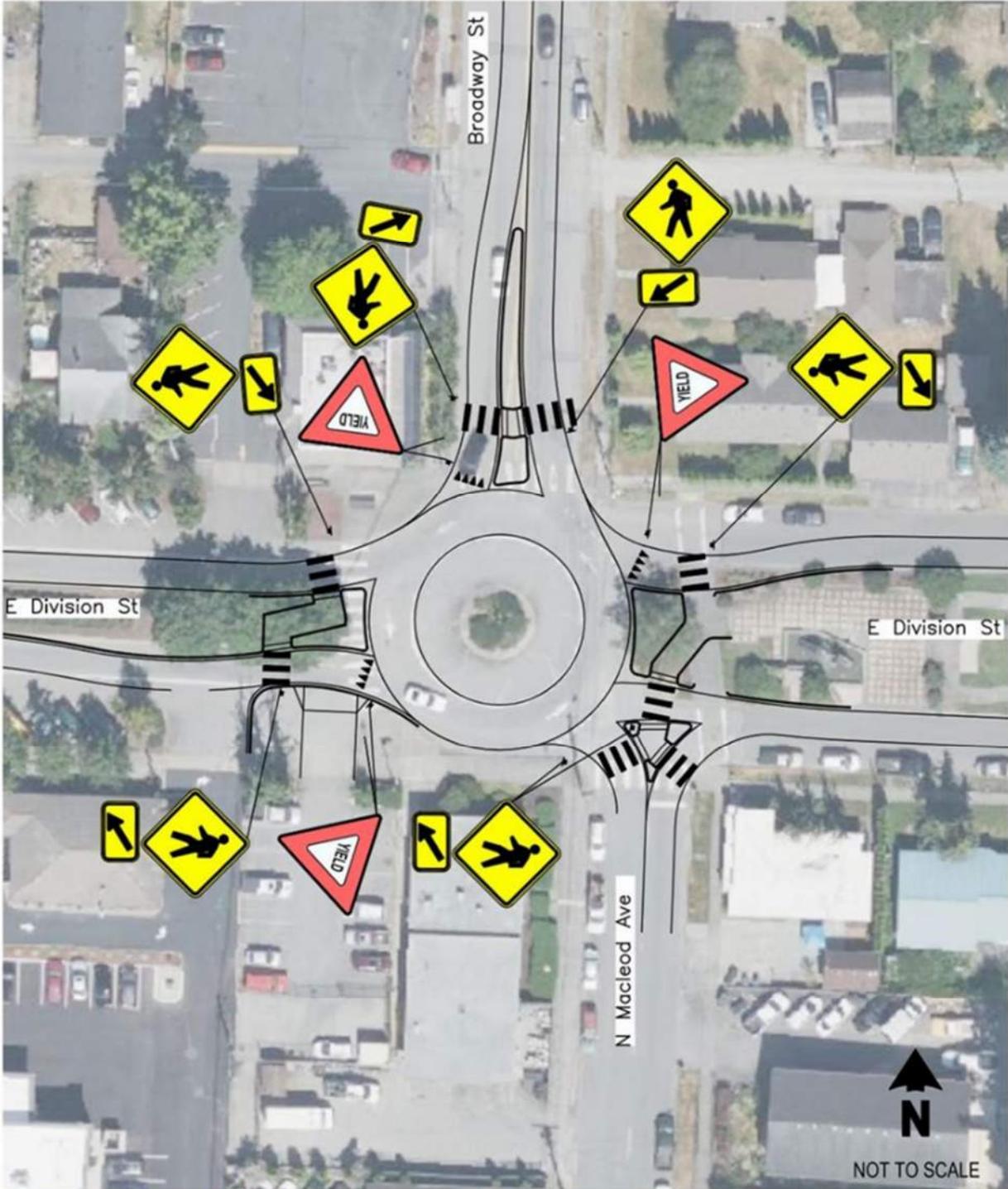


Figure 3: E Division St and Broadway St Roundabout Improvement Concept – Option 2, Maintain Two-Way Operation on N Macleod Ave

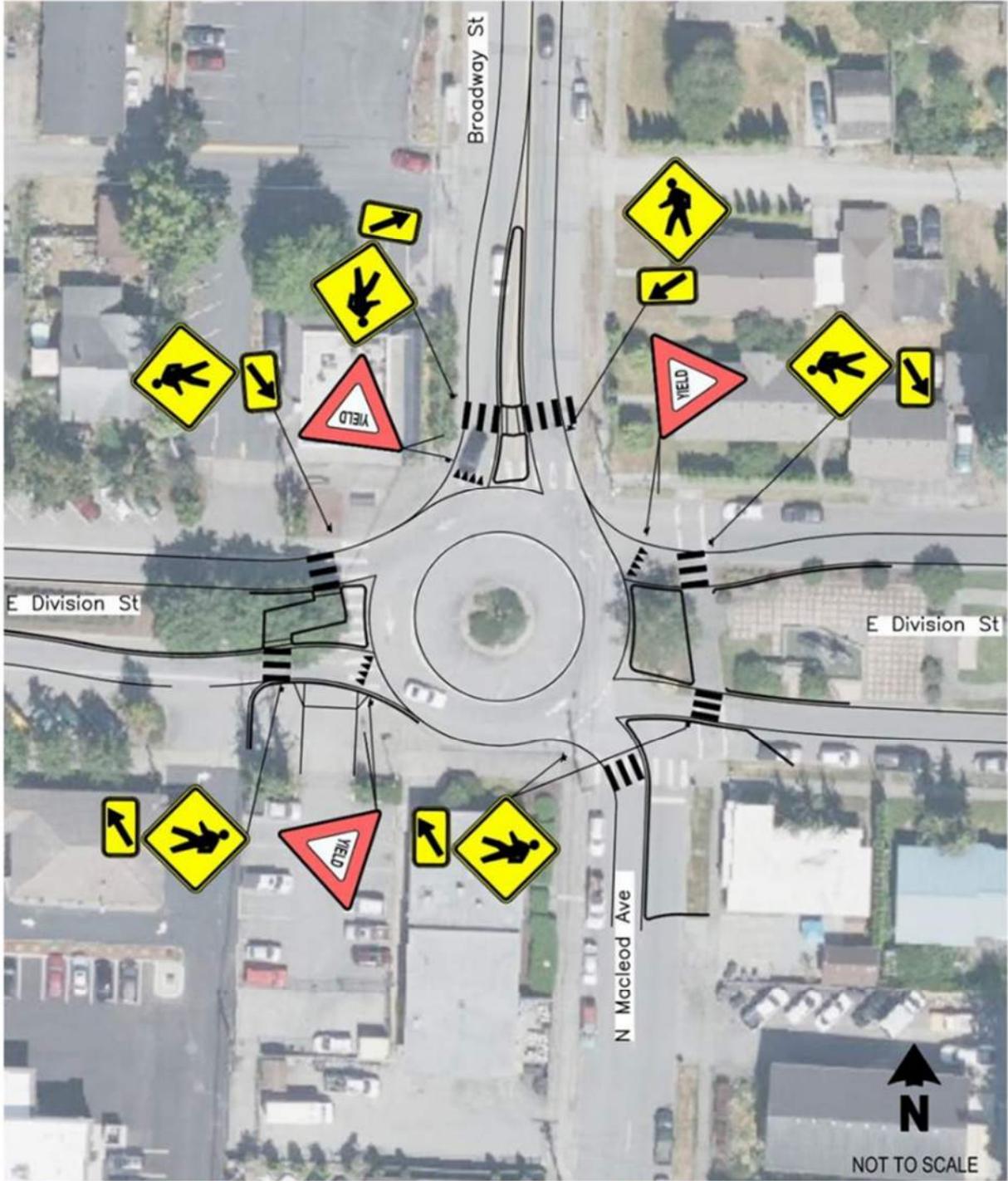


Figure 4: E Division St and Broadway St Roundabout Improvement Concept - Option 3, N Macleod Ave One-Way, Southbound Only

### ***Corridor Improvements***

Chicane will be added to Broadway Street between Division and Gilman. A colored crosswalk will be added along the south leg of Broadway/Gilman intersection. Pedestrian refuge island will also be added. LDC also recommends installing landscape median along Broadway Street to create a continuous boulevard experience.

Enhanced crosswalk channelization is also recommended along the corridor comprised of red MMA crosswalk field and bordered with white crosswalk stripes. These contrasting colors will assist drivers in recognizing pedestrian monuments along this busy corridor.

In addition to the new roundabouts, the entire corridor will be repaved. Areas with minor cracking will receive a 2" grind and overlay, while those areas with severe cracking will be replaced in full.

### ***Sight Distance and Pedestrian Visibility***

The seven roundabouts and mid-block crossings are yield controlled and require adequate sight distance for drivers to effectively make the decision to stop for pedestrians. It is recommended that sight obstructions be removed at these locations to provide sight distance to pedestrians and increase the safety of the corridor. Balancing the desired feel of the corridor with the pedestrian safety needs, the following trees are recommended for removal on the corridor:

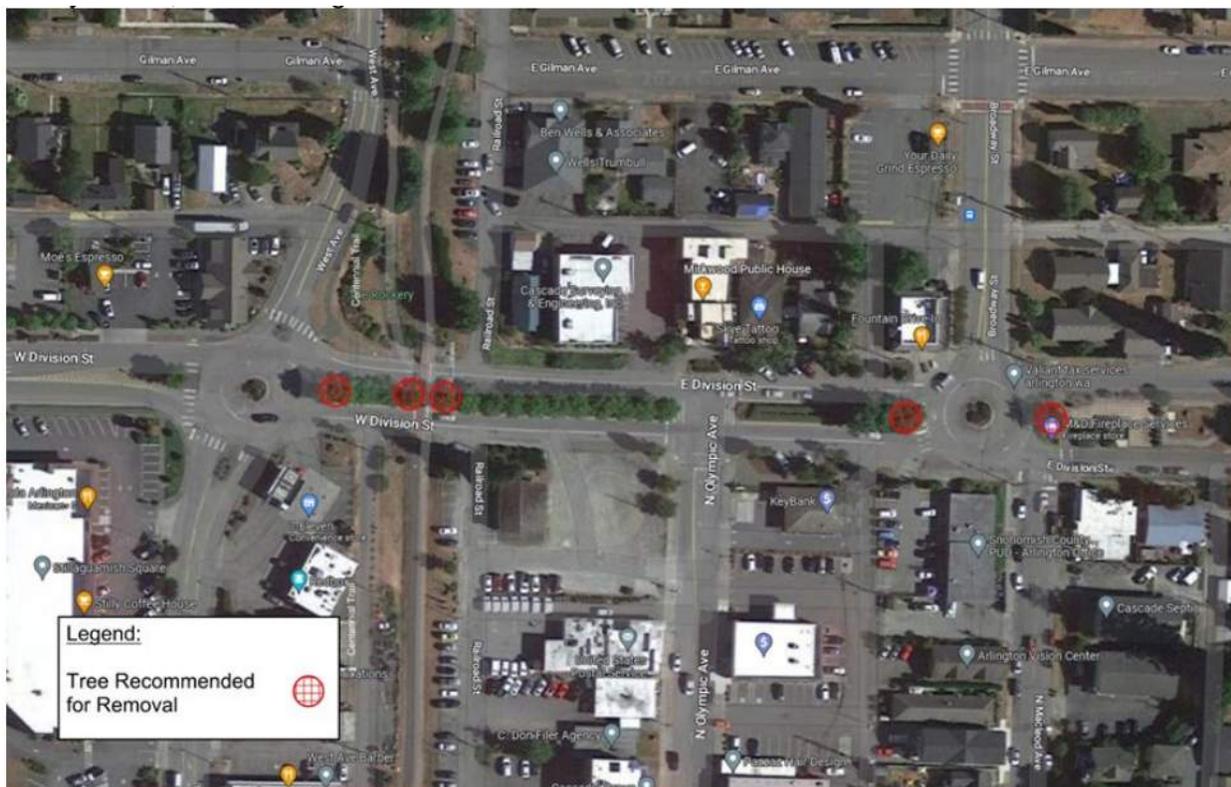


Figure 5: Tree Removal Recommendations

### ***Illumination***

Pedestrian visibility is also enhanced through illumination. A preliminary illumination analysis was limited to the existing pedestrian crosswalks and mid-block crossings areas where they intersect

the roadway area. The photometric analysis calculated the average maintained illuminance, a measure of how brightly the roadway is lit, and uniformity ratio, a measure of bright spots to dark spots, at the crosswalk areas. A high-level graphical depiction of the existing photometric analysis is shown in Figure 6, where the crosswalk areas are highlighted in yellow.

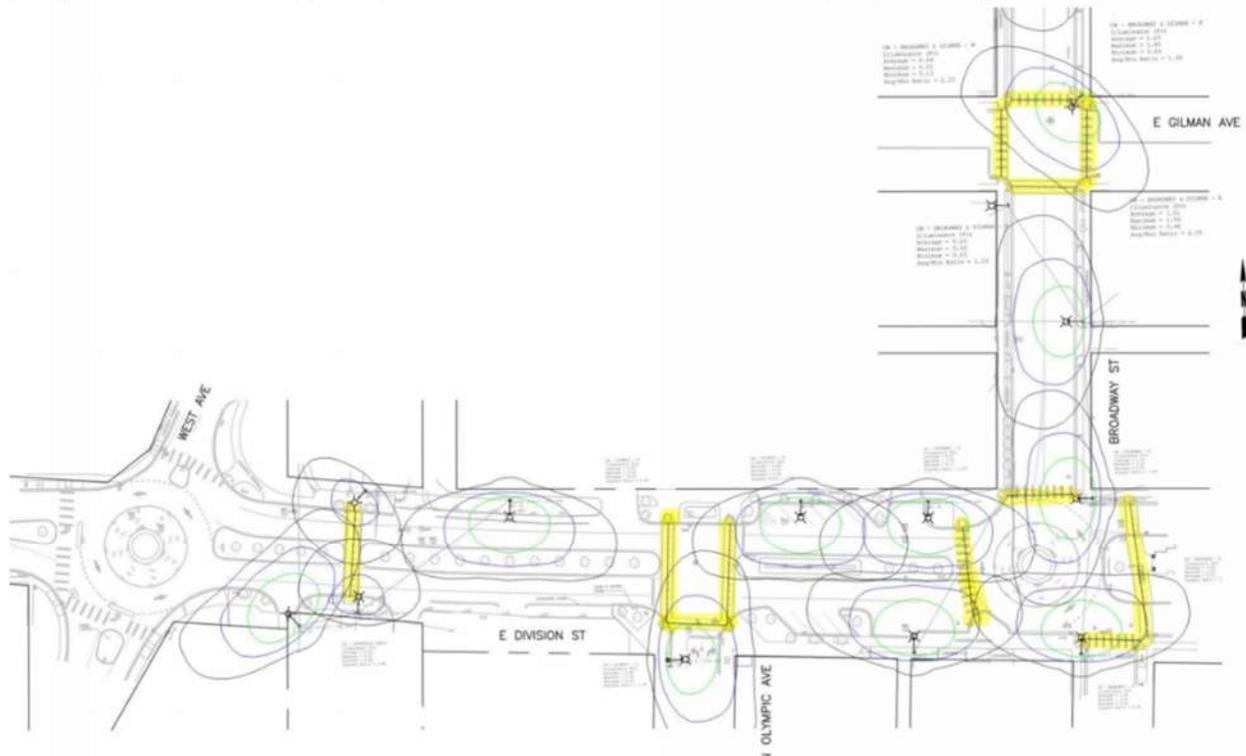


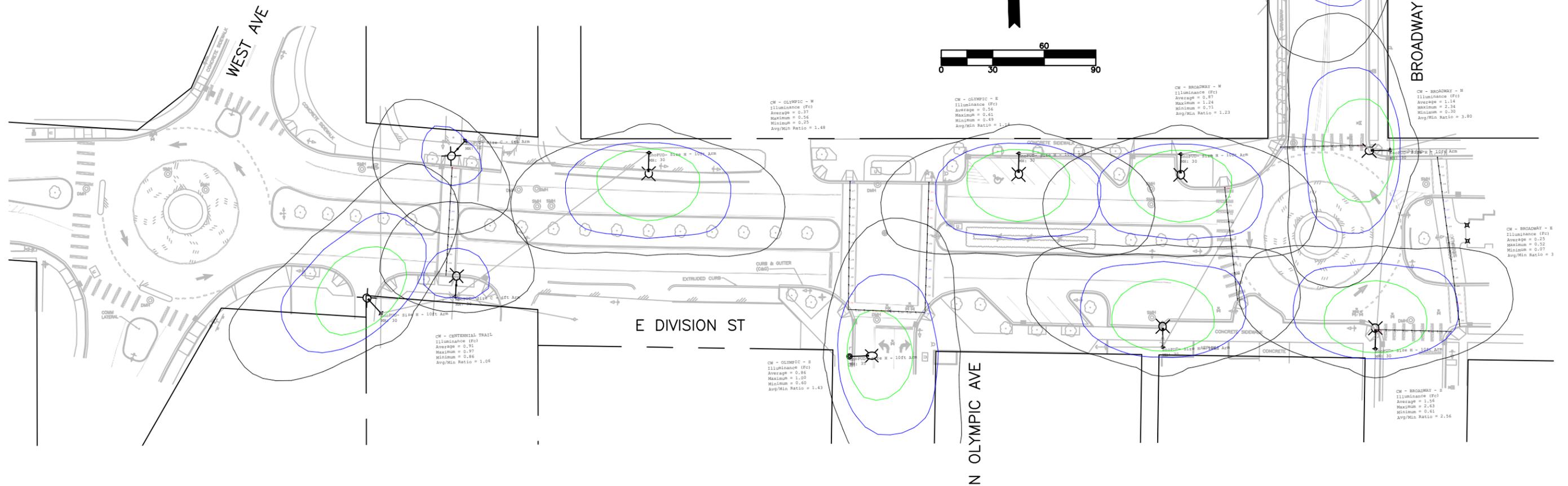
Figure 4: Existing Photometric Analysis Overview

Existing illumination on the E Division St corridor is partially present between West Ave and Broadway St, and along the Broadway St corridor from E Division St to E Gilman Ave. The existing luminaires on the Snohomish PUD (SnoPUD) poles provide lighting to the mid-block crossing at the Centennial Trail, the E Division St/N Olympic Ave intersection, the E Division St/Broadway St roundabout intersection, and the Broadway St/E Gilman Ave intersection. The preliminary photometric analysis shows that the current lighting provides inadequate lighting for both average maintained illuminance and uniformity. There may be opportunities in the future to switch out the existing SnoPUD luminaires with models with a higher lumen output, which will enhance the lighting along the corridor. This will be undertaken in the next phase of the project. For starter understanding of existing light levels refer to Photometric Analysis of existing conditions model in Figure 7 of this document.

No existing illumination is provided at the West Ave/W Division St roundabout intersection. It is recommended that the City further study this area and install luminaire poles to provide adequate lighting in this area to enhance safety and provide a better feeling of comfort for the full intersection area.

CALCULATED LIGHT LEVELS				
DESIGN AREA	AVERAGE LIGHT LEVELS (FC)		UNIFORMITY (AVERAGE/MINIMUM)	
	TARGET*	CALCULATED	TARGET*	CALCULATED
CENTENNIAL TRAIL (MAJOR/COLLECTOR - MED)				
CENTENNIAL TRAIL	2.00	0.91	3.00	1.06
DIVISION & OLYMPIC (MAJOR/COLLECTOR - MED)				
WEST CROSSWALK	2.00	0.37	3.00	1.48
SOUTH CROSSWALK	2.00	0.86	3.00	1.43
EAST CROSSWALK	2.00	0.56	3.00	1.14
DIVISION & BROADWAY (MAJOR/COLLECTOR - MED)				
WEST CROSSWALK	2.00	0.87	3.00	1.23
SOUTH CROSSWALK	2.00	1.56	3.00	2.56
EAST CROSSWALK	2.00	0.25	3.00	3.57
NORTH CROSSWALK	2.00	1.14	3.00	3.80
GILMAN & BROADWAY (COLLECTOR/LOCAL - MED)				
WEST CROSSWALK	1.50	0.29	4.00	2.23
SOUTH CROSSWALK	1.50	0.23	4.00	1.53
EAST CROSSWALK	1.50	1.01	4.00	2.10
NORTH CROSSWALK	1.50	1.25	4.00	1.95

\*PER ANSI/IES RP-8-18 DESIGN STANDARDS.

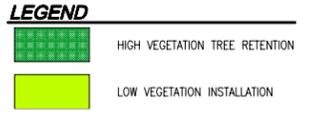
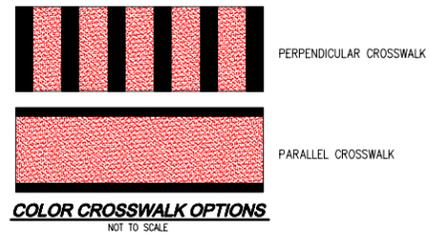


# Arlington Division - Photometric Analysis of Existing Condition

1.22423.00 - Arlington Division Broadway Restoration

March 22, 2023

FIGURE



CITY OF ARLINGTON  
DIVISION/BROADWAY  
RESTORATION PROJECT  
RESTORATION OPTIONS EXHIBIT

**LDC** | Surveying  
Engineering  
Planning

Kent Woodinville Olympia  
20210 142nd Avenue NE  
Woodinville, WA 98072  
F 425.866.1869 www.LDCcorp.com F 425.482.2893

ISSUE DATE: 4-10-23

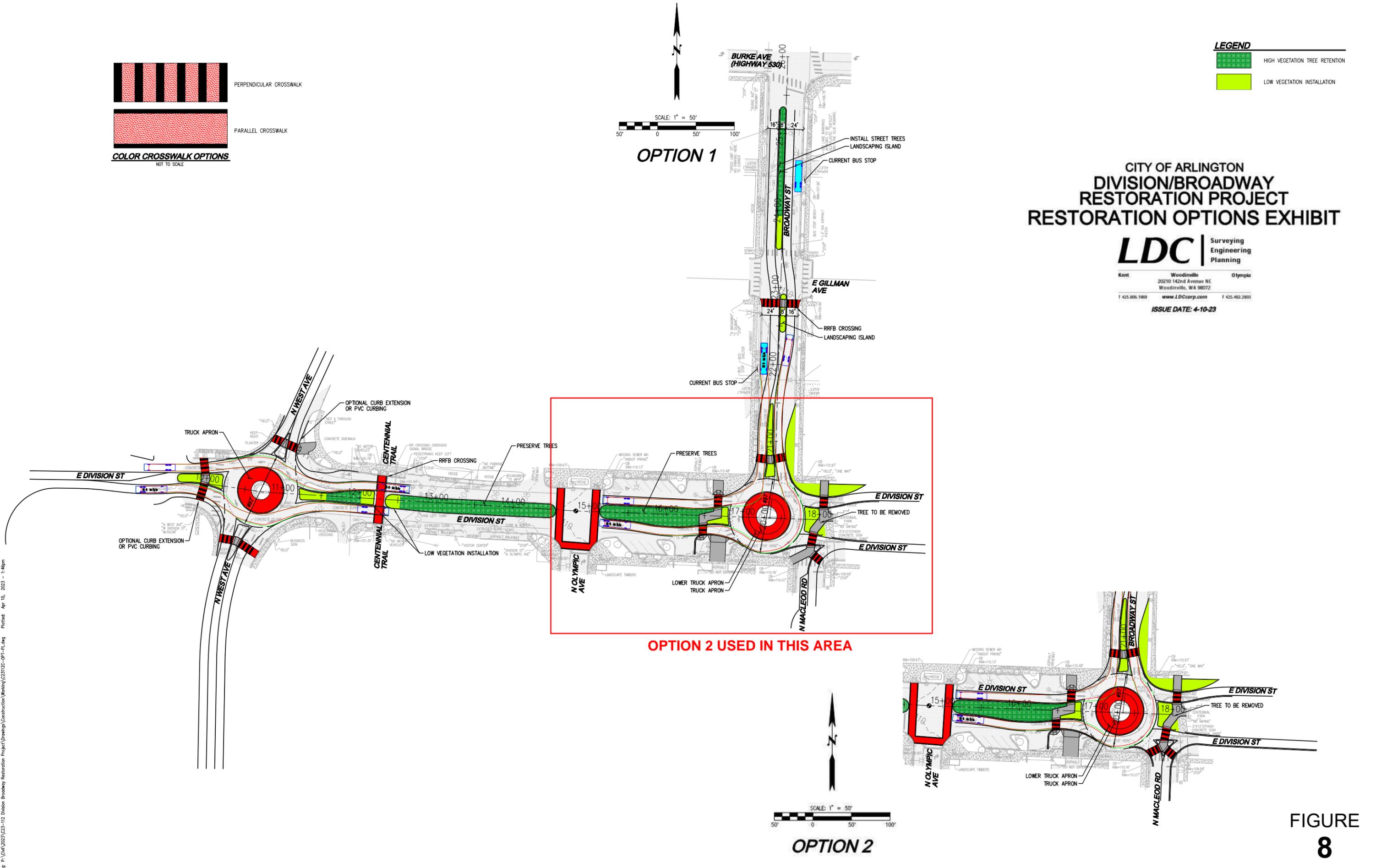


FIGURE  
8

Drawing: P:\04\2023\23-112 Division Broadway Restoration Project\Drawings\Construction\Working\231212-001-FL.dwg Plotter: Apr 10, 2023 - 1:46pm

**Smokey Point Boulevard Project**  
**Arlington, Washington**  
***Noise Impact Analysis***

**February 2024**

***Prepared for:***

The City of Arlington, Washington

and

Perteet, Inc, Everett, Washington

***Prepared by:***

Michael Minor & Associates, Inc, Portland, Oregon

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# Table of Contents

Executive Summary.....	S
<b>1. Introduction and Project Description .....</b>	<b>2</b>
<b>2. Project Purpose and Description.....</b>	<b>2</b>
2.1. Project Description.....	2
<b>3. Analysis Requirement.....</b>	<b>5</b>
<b>4. Introduction to Acoustics .....</b>	<b>5</b>
<b>5. Methodology .....</b>	<b>6</b>
5.1. Regulatory Setting and Impact Criteria .....	6
5.2. Local Noise Control for Construction.....	9
5.3. Analysis and Modeling Procedures .....	9
5.4. Noise Study Area .....	9
<b>6. Affected Environment .....</b>	<b>10</b>
6.1. Existing Land Uses .....	10
6.2. Zoning and Comprehensive Land Use Plan Design .....	10
6.3. Planned and Permitted Projects .....	10
6.4. Structure Removal Due to Project Construction.....	10
<b>7. Noise Monitoring .....</b>	<b>13</b>
7.1. Measurement Results .....	13
<b>8. Noise Modeling Validation and Receivers .....</b>	<b>14</b>
8.1. Noise Model Validation .....	14
8.2. Selection of Receivers.....	15
8.3. Modeling Location Descriptions.....	15
<b>9. Existing Environment.....</b>	<b>20</b>
<b>10. Future No-Build Environment.....</b>	<b>20</b>
<b>11. Future Build Analysis .....</b>	<b>20</b>
<b>12. Noise Level Impact Summary.....</b>	<b>28</b>
<b>13. Noise Abatement Analysis.....</b>	<b>29</b>
13.1. WSDOT Noise Abatement Criteria .....	29
13.1.1. Feasibility of Noise Abatement .....	30
13.1.2. Reasonableness of Noise Abatement.....	30
13.1.3. Cost Effectiveness .....	30
13.1.4. Design Goal Achievement.....	32
13.1.5. Other Considerations .....	32
13.1.6. Summary of Abatement Requirements .....	33
13.2. Noise Abatement Measures .....	33
13.2.1. 188th Wall .....	33
13.2.2. Smokey Point Wall 1 .....	36
13.2.3. Smokey Point Wall 2.....	39
13.2.4. Smokey Point Wall 3.....	42
<b>14. Construction Noise Analysis .....</b>	<b>45</b>
14.1. Construction Noise Levels.....	45
14.2. Construction Noise Mitigation Measures .....	46

## List of Tables

Table 1. Noise Abatement Criteria (NAC) by Land Use Category .....	8
Table 2. Smokey Point Boulevard Project Noise Monitoring Results.....	14
Table 3. Measured vs. Modeled Noise Levels .....	14
Table 4. Traffic Noise Level Summary .....	22
Table 5. Reasonableness Allowances .....	32
Table 6. 188th Wall: Receivers R-82a, R-82b, and R-82c .....	34
Table 7. Smokey Point Wall 1: Receivers R-36 through R-38.....	37
Table 8. Smokey Point Wall 2: Receivers R-49a, R-49b, R-50a, and R-50b.....	40
Table 9. Smokey Point Wall 3: Receivers R-120 through R-122.....	43
Table 10. Construction Equipment List, Use, and Reference Maximum Noise Levels .....	45

## List of Figures

Figure 1. Vicinity Map with Alignment .....	3
Figure 2. Land Use and Noise Monitoring (1 of 2) .....	11
Figure 3. Land Use and Noise Monitoring (2 of 2) .....	12
Figure 4. Modeling Locations (1 of 4).....	16
Figure 5. Modeling Locations (2 of 4).....	17
Figure 6. Modeling Locations (3 of 4).....	18
Figure 7. Modeling Locations (4 of 4).....	19
Figure 8. 188th Wall .....	35
Figure 9. Smokey Point Wall 1 .....	38
Figure 10. Smokey Point Wall 2.....	41
Figure 11. Smokey Point Wall 3.....	44

## Appendices

Appendix A: References

Appendix B: Introduction to Acoustics

Appendix C: Traffic Data

Appendix D: Noise Monitoring Sites and Traffic Counts

## EXECUTIVE SUMMARY

This technical noise analysis for the Smokey Point Boulevard Project in Arlington, Washington was prepared as requested by the city of Arlington and Perteet, Inc. The purpose of the Smokey Point Boulevard Project is to meet current roadway standards and accommodate growth along the Smokey Point Boulevard corridor. The Project includes adding roundabouts at 174th Place NE, 180th Street NE, 183rd Street NE, and 188th Street NE, two drop lanes for protected on-street parking and dedicated bike lanes, a center median, sidewalks, and enhanced bus stops. The purpose of this analysis is to identify all potential traffic noise impacts resulting from the proposed Project and consider noise abatement in accordance with the *Traffic Noise Policy and Procedures*, Washington State Department of Transportation, 2020 (2020 WSDOT Policy).

As part of this study, an on-site inspection and traffic noise monitoring with traffic counts was performed with measured noise levels ranging from 62.4 to 68.3 dBA Leq. The noise monitoring data and traffic counts were used to validate the modeling efforts. Using the *Traffic Noise Model* (TNM) from the Federal Highway Administration (FHWA), and traffic volumes from project traffic engineers, noise levels were modeled at 151 independent locations to determine the potential overall noise effects of the project and identify project impacts. Modeled traffic noise levels for the existing conditions ranged from 52 to 71 dBA Leq during the PM peak hour. Under the No-Build conditions, traffic noise levels ranged from 55 to 72 dBA Leq with variations of 0 to +2 dB when compared to the existing conditions.

Modeled traffic noise levels under the Build alternative range from 55 to 72 dBA Leq, with variations of -1 to +4 dBA Leq over the existing noise levels. The analysis identified 33 residences with noise impacts under the Build alternative.

Noise abatement was considered for all traffic noise impacts; however, noise walls were only recommended at the four locations. The 188th Wall is approximately 157 feet long and 7- to 8-feet tall with a cost of \$57,752 and eliminates all impacts with reductions of 5 to 7 dB. The Smokey Point Wall 1 is 159 feet long and 7-feet tall with a cost of \$57,597 and eliminates all impacts with reductions of 7 dB. The Smokey Point Wall 2 is 155 feet long and 6- to 9-feet tall with a cost of \$65,338 and eliminates all impacts with reductions of 5 to 7 dB. The Smokey Point Wall 3 is 186 feet long and 6- to 9-feet tall with a cost of \$72,615 and eliminates all impacts with reductions of 5 to 7 dB. All four walls are both reasonable and feasible under WSDOT policy. See Section 13 for more information on why noise abatement is not recommended at the other locations where noise impacts were identified.

Noise from construction would be similar to other highway construction projects. Maximum noise levels for construction activities can be expected to range from 70 to 90 dBA as measured at sites 50 feet from the construction activities. Construction activities would be required to meet the city of Arlington noise control ordinance.

# 1. INTRODUCTION AND PROJECT DESCRIPTION

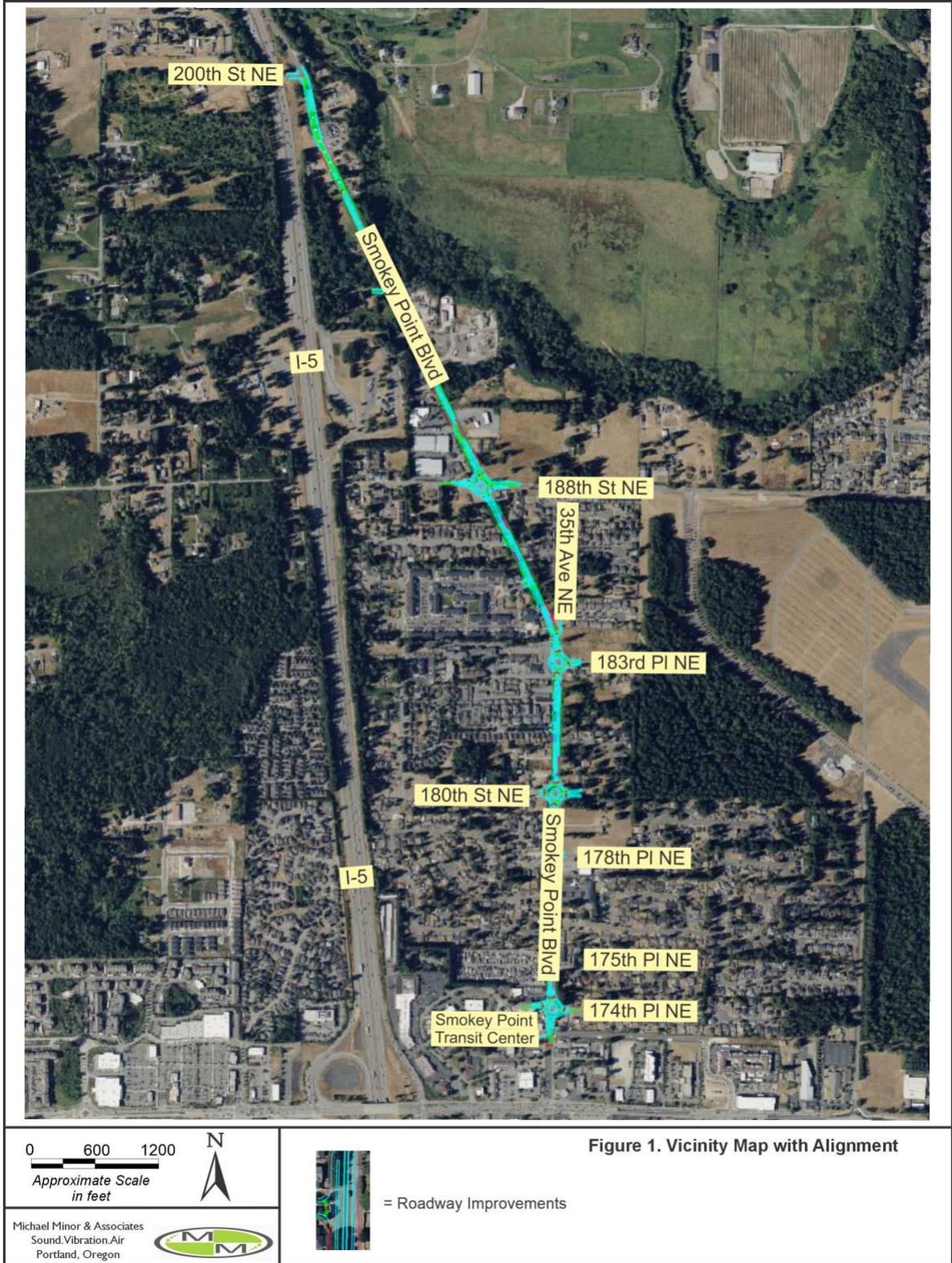
This technical noise analysis for the Smokey Point Boulevard Project in Arlington, Washington was prepared as requested by the city of Arlington and Perteet, Inc. The purpose of this analysis is to identify traffic noise impacts resulting from the proposed Project and provide future traffic noise levels that can be used for future land use planning. Where traffic noise impacts were identified, noise abatement was considered and analyzed in accordance with the policy and procedures given in the current 2020 WSDOT Policy. Noise abatement that is found to meet WSDOT criteria will be reviewed by WSDOT and could be recommended for inclusion in the Project.

## 2. PROJECT PURPOSE AND DESCRIPTION

The purpose of the Smokey Point Boulevard Project is to meet current roadway standards and accommodate growth along the Smokey Point Boulevard corridor. Figure 1 provides an overview of the project area.

### 2.1. Project Description

The City of Arlington proposes to make improvements to Smokey Point Boulevard from 174th Place NE to 200th Street NE to support future growth. The project will make traffic improvements along the corridor, and adding roundabouts at 174th Place NE, 180th Street NE, 183rd Street NE, and 188th Street NE. The project also includes two drop lanes for protected on-street parking and dedicated bike lanes, a center median, sidewalks, and enhanced bus stops. Medians will separate travel lanes and side aisles and multiple pedestrian crossings will be added along the corridor. Utility relocation, potential utility upgrades, lighting, and stormwater facilities will also be installed by this project.





### 3. ANALYSIS REQUIREMENT

A Traffic Noise Analysis is required whenever a Type I project is federally funded or requires FHWA approval. A Type I project is a project that includes construction of a new highway or roadway, an increase in the number of traffic lanes, a substantial realignment (horizontal or vertical) of an existing highway, or significant changes to the existing topography around roadways. The proposed Project would include new roundabouts causing a substantial horizontal realignment along Smokey Point Boulevard and, therefore, meets the requirement for a detailed noise impact and abatement analysis for a Type 1 project.

### 4. INTRODUCTION TO ACOUSTICS

Noise is generally defined as unwanted sound. Noise is measured in terms of sound pressure level. It is expressed in decibels (dB), which are defined as  $10 \text{ Log } P^2/P^2_{\text{ref}}$ , where  $P$  is the root-mean-square (RMS) sound pressure and  $P_{\text{ref}}$  is the reference RMS sound pressure of  $2 \times 10^5$  Newtons per square meter.

The number of fluctuation cycles or pressure waves per second of a particular sound is the frequency of the sound. The human ear is less sensitive to higher and lower frequencies than to mid-range frequencies. Therefore, sound level meters used to measure environmental noise generally incorporate a weighing system that filters out higher and lower frequencies in a manner similar to the human ear. This system produces noise measurements that approximate the normal human perception of noise. Measurements made with this weighing system are termed "A-weighted" and are specified as "dBA" readings.

Several noise descriptors are used that take into account the variability of noise over time. The minimum noise level during a measurement period is denoted as  $L_{\text{min}}$ . The maximum noise levels ( $L_{\text{max}}$ ) that occur during an event, such as the passing of a heavy truck or the flyover of an airplane, can be useful indicators of interference with speech or sleep.

The equivalent sound level ( $L_{\text{eq}}$ ) is the level of a constant sound for a specified period of time that has the same sound energy as an actual fluctuating noise over the same period of time. It is an energy average sound level.

In summary, the noise level descriptors are defined as follows:

<b>Symbol</b>	<b>Description</b>
$L_{\text{eq}}$	The average noise level (energy basis)
$L_{\text{min}}$	The minimum noise level
$L_{\text{max}}$	The maximum noise level

Noise levels decrease with distance from a noise source. For each doubling of the distance from a point source (such as an engine), noise levels decrease by 6 dBA because of the

geometric divergence of the sound waves. Additional noise reduction (attenuation) can be provided by vegetation, terrain, and atmospheric effects that block or absorb noise.

For traffic noise, the level of noise reduction depends on the type of descriptor in use. The Leq noise level from a line source (such as a road) will decrease by 3 dBA for each doubling of distance (3 dB / DD) because of geometric divergence alone. However, the Lmax from individual vehicles on the road will decrease by 6 dBA / DD. In simple terms, the maximum noise levels (Lmax) decrease more rapidly with distance from the road than do the average noise levels (Leq).

It is important to understand how humans perceive noise and changes in noise levels. Subjectively, a 10-dBA change in noise level is judged by most people to be approximately a twofold change in loudness (e.g., an increase from 50 dBA to 60 dBA causes the loudness to double). A 3-dBA increase is a barely perceptible increase. Therefore, if traffic noise levels increase by 1 to 2 dB, the majority of people may not even notice the change in noise levels.

It is also important to understand the compatibility with land use based on area noise levels. For example, noise levels at night in a quiet rural area are typically between 32 and 35 dBA. Quiet urban nighttime noise levels range from 40 to 50 dBA. Daytime noise levels in a noisy urban area are frequently as high as 70 to 80 dBA.

Areas with PM peak hour traffic noise levels below 50 dBA Leq are typically found in quiet bedroom communities (rural and suburban) that are far from interstate or state highways, major arterial roadways, and urban areas. PM peak hour traffic noise levels from 50 dBA to 60 dBA Leq are typically found in quiet bedroom communities with arterial roadways nearby and primarily passenger traffic accessing the area (little or no truck traffic). Communities with traffic noise levels of 60 dBA to 67 dBA Leq are typically closer to urban areas and / or major arterial roadways where some truck traffic is present.

A more detailed section about acoustics is provided in Appendix B.

## 5. METHODOLOGY

This section provides a summary of the methods used for the Traffic Noise Analysis. In general, the methods follow the WSDOT policy and procedures for a traffic noise study as published in the 2020 WSDOT Policy. Reference policies, manuals and guides used for this report are provided in Appendix A.

### 5.1. Regulatory Setting and Impact Criteria

The FHWA traffic noise impact criteria, against which the Project traffic noise levels are evaluated, are taken from Title 23 of the Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. The FHWA criterion applicable for residences is an exterior hourly equivalent sound level (Leq) that approaches or exceeds 67 dBA. The exterior criterion for places of worship, schools, recreational uses, and similar areas is also 67 dBA Leq. The criterion applicable for hotels,

motels, offices, restaurants / bars, and other developed lands is an exterior Leq that approaches or exceeds 72 dBA. There are no FHWA traffic noise impact criteria for retail facilities, industrial, warehousing, undeveloped lands that are not permitted for development, or construction noise. No traffic noise analysis is required for those uses for which no criteria exist. See Table 1 for the list of categories and impact criteria if one exists.

The FHWA allows each state to define the term “approach”. WSDOT considers a predicted sound level of 1 dBA below the NAC as sufficient to satisfy the condition of “approach,” or approaching the NAC, required by FHWA for all land use categories. For example, where the NAC is 67 dBA for outdoor use at a residence, a noise level of 66 dBA is considered an impact. Receivers are also considered impacted when the worst hourly traffic noise is predicted to increase 10 dBA (“substantial increase”) or more between the Existing and Build conditions. Impacts at places of worship, schools, and recreational areas (Category C properties) also occur at 66 dBA or higher in Washington. Hotel / motel, office building, and restaurant / bar impacts (Category E properties) occur at 71 dBA or higher. Table 1 summarizes the FHWA and the WSDOT traffic noise abatement criteria.

<b>Table 1. Noise Abatement Criteria (NAC) by Land Use Category</b>				
<b>Activity Category</b>	<b>Activity Criteria in hourly Leq (dBA)</b>		<b>Evaluation Location</b>	<b>Activity Description</b>
	<b>FHWA NAC</b>	<b>WSDOT NAC</b>		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B <sup>1</sup>	67	66	Exterior	Residential (single and multi-family units)
C <sup>1</sup>	67	66	Exterior	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E <sup>1</sup>	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	--	Undeveloped lands that are not permitted
Notes: 1. Includes undeveloped lands permitted for this activity category				

The primary FHWA categories applicable to this analysis are FHWA categories applicable to this analysis are FHWA Categories B and C, which include residential land uses (B) and parks and churches (C). Under FHWA policy, the noise impact criteria is applicable to frequently used exterior areas, for example, a back-yard deck or patio at a residence, frequent outdoor uses at parks, or entrances and frequent outdoor uses at churches.

## 5.2. Local Noise Control for Construction

Project construction would be required to meet the state, county, or local noise control ordinances. The City of Arlington noise control ordinance is found in Section 7.05.040(4)(A) of the city code, where the City of Arlington exempts sounds originating from construction sites and activities between 7:00 a.m. and 10:00 p.m. daily. Construction activities outside the permitted hours must be first approved by the city (City of Arlington Municipal Code Section 7.05.040 – Nuisances – Public nuisances prohibited).

## 5.3. Analysis and Modeling Procedures

The methodology used for a Type I traffic noise analysis is defined in the 2020 WSDOT Policy. Following this policy, traffic noise levels were calculated using the FHWA Traffic Noise Model (TNM). Noise emission levels used in the model were nationwide averages for automobiles, medium trucks, and heavy trucks provided by the FHWA and built into the TNM. Model inputs included traffic volumes, vehicle type, and speed information. The area was evaluated for noise-reducing effects of sensitive receivers, existing outbuildings, roadway depressions, and topography. Actual roadway width and average pavement type were used for existing and future conditions. The effects of signalized intersections and roundabouts were also included where appropriate.

Traffic volumes and vehicle class percentages used for the modeled roadways were provided by the city of Arlington, Perteet, Inc, and Transpo Group traffic engineers. The traffic data used for the analysis is provided in Appendix C. Vehicle speeds used are the current or proposed posted speeds and are also provided in Appendix C. The PM peak traffic hour on weekdays has the highest total traffic volumes and, therefore, was used throughout the analysis to ensure the worst-case noise levels were predicted. The traffic data is provided by vehicle types, with percentages of passenger vehicles and heavy trucks.

## 5.4. Noise Study Area

The study area for traffic noise studies must be large enough to identify all potential noise impacts at noise sensitive properties related to the Project. For this Project, the study area includes noise sensitive properties within 300 feet of the project roadway construction between the intersection of Smokey Point Boulevard and 200th Street NE at the north end of the corridor to Smokey Point Boulevard and 173rd Place NE at the south end of the Project corridor. The 300-foot distance is sufficient to make sure all project related noise impacts are identified. In addition to the north-south limits, the study area also includes noise sensitive uses east and west of the Project corridor. Even though not all individual receivers in the study area were modeled, sufficient receivers were modeled to show that all potential impacts were identified. The Project boundary and noise analysis area is found in Figure 2 and Figure 3.

## 6. AFFECTED ENVIRONMENT

This section provides a summary of the land use in the project area, including planned and permitted developments and project related structure removal.

### 6.1. Existing Land Uses

Land use in the Project area includes single- and multi-family homes (FHWA Category B), church (FHWA Category C), and a proposed city park (FHWA Category C). Single- and multi-family residences are found throughout the Project corridor. There are two churches in the Project corridor. The Faith Baptist Church is located between Smokey Point Boulevard and 35th Avenue NE. The Smokey Point Community Church is located east of Smokey Point Boulevard between 178th Place NE and 176th Place NE. The remaining land uses in the area are undeveloped lots and commercial uses.

Project area land uses, and noise monitoring sites, are shown in Figure 2 and Figure 3. Land use not identified in the figures are either FHWA Category E with no exterior noise sensitive use or Category F or G and is therefore not noise sensitive.

### 6.2. Zoning and Comprehensive Land Use Plan Design

A study of the Project area indicated that the area is a mix of high density to medium density residential and commercial lands. There are no planned or approved land use changes that would affect this noise study.

### 6.3. Planned and Permitted Projects

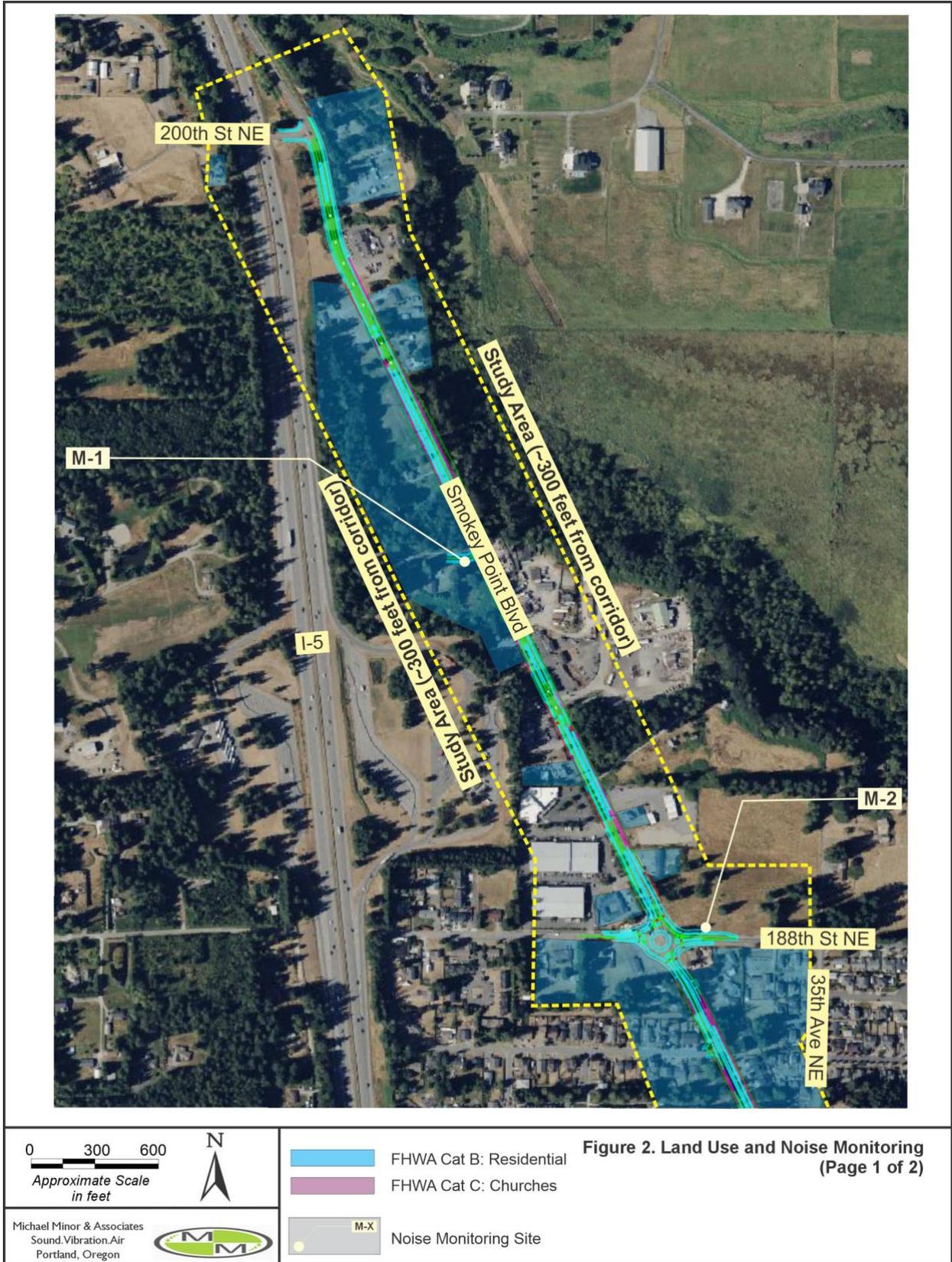
There is currently only one planned or permitted project that would affect this noise study. There is future planning for new developments along the east side of Smokey Point Boulevard, however, at the time of this report no projects have received permits from the City of Arlington.

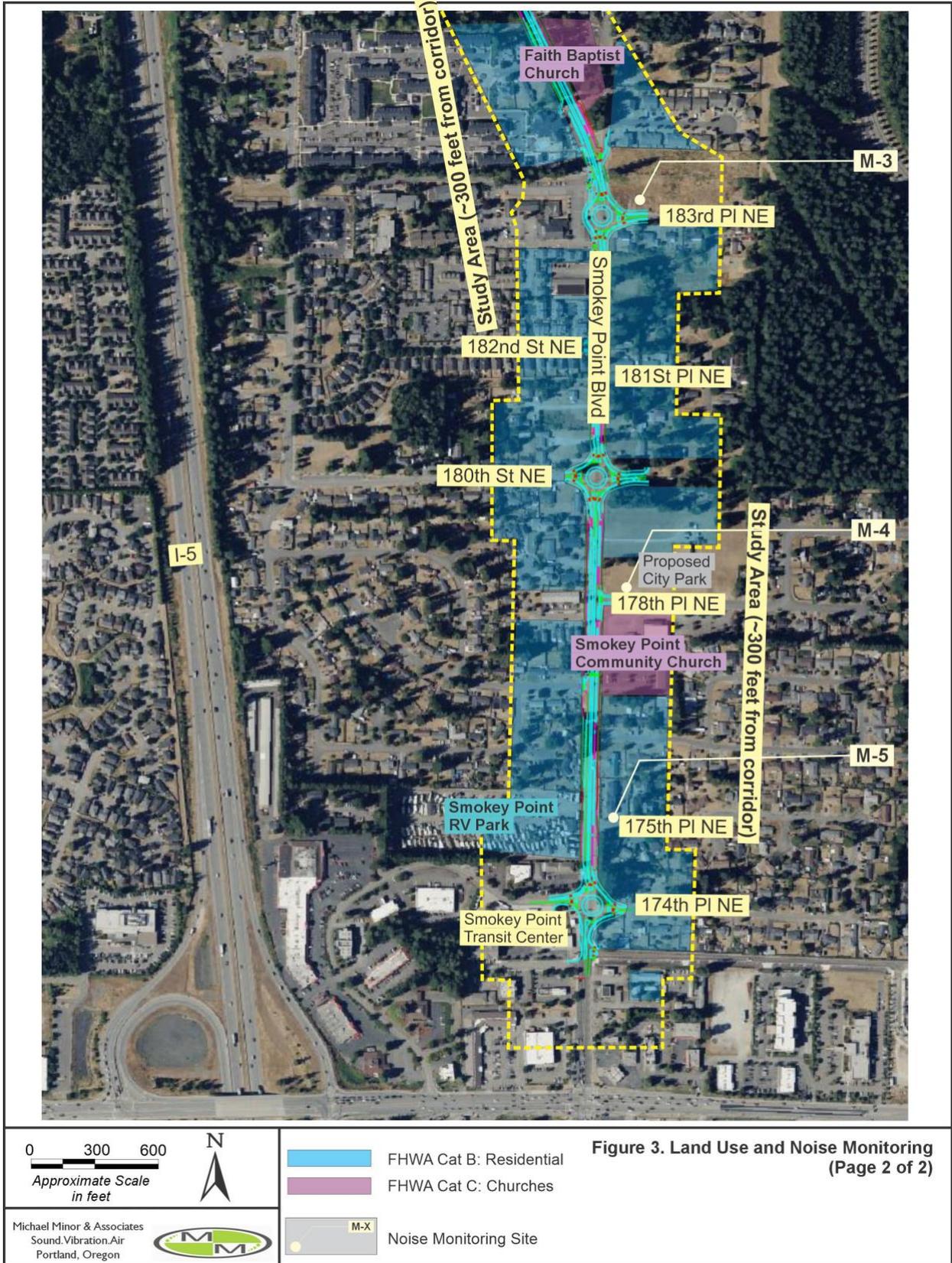
In addition, there is a city owned parcel located north of 178th Place NE that is under review for a new city park. Although the park is not yet planned or permitted, the parcel will most likely be converted to a park and therefore was included for noise planning purposes.

### 6.4. Structure Removal Due to Project Construction

There is one displacement of a residence located east of 180th Street NE along Smokey Point Boulevard. The Longhorn Saloon Bar and Restaurant is located at 18802 Smokey Point Boulevard and will be displaced to allow for construction of the roundabout at Smokey Point Boulevard and Bjon Road.

There are no other displacements planned that would affect the transmission of noise, noise impacts, or noise abatement measures.





## 7. NOISE MONITORING

On-site noise monitoring and traffic counts were performed at 5 locations within the Project corridor. These sites were selected to provide noise modeling validation and to aid in the understanding of existing noise levels along the corridor. Figure 2 and Figure 3 provide an overview of the monitoring locations denoted M-1 through M-5, and detailed monitoring slides are provided in Appendix D. The noise monitoring was performed on November 17, 2023.

Noise measurements were taken in accordance with methods provided in the 2020 WSDOT Policy and in accordance with the American National Standards Institute (ANSI) procedures for community noise measurements (ANSI/ANA S12.9-2013/Part1). Traffic noise monitoring is typically collected as 15-minute Leq measurements and represent the sound-level environments in the study area, per the FHWA and WSDOT policy. The number of cars during the 15-minute window is then multiplied by four and the total is used in the TNM model to validate noise measurements. The equipment used for noise monitoring were Bruel & Kjaer Type 2238 Sound Level Meters. All meters were calibrated prior to and after the measurement period using a Bruel & Kjaer Type 4231 Sound Level Calibrator. Calibration varied by less than 0.1 dB during the measurement period. Complete system calibration is performed on an annual basis by an accredited instrument calibration laboratory. System calibration is traceable to the National Institute of Standards and Testing (NIST). The system meets or exceeds the requirements for an ANSI Type 1 noise measurement system.

### 7.1. Measurement Results

Noise Monitoring sites were located within the public right-of-way, with clear line of sight to the roadway in order to take concurrent traffic counts with the noise measurements. Noise levels ranged from 62.4 to 68.3 dBA Leq. Traffic on local roads was the primary noise source at most of the monitoring locations. Secondary noise sources included typical neighborhood activities such as dogs barking and, in some cases, small plane flyovers. The highest traffic noise measurement of 68.3 dBA Leq occurred at M-1, located along the west side of Smokey Point Boulevard between 200th Street NE and 188th Street NE. The lowest noise measurement of 62.4 dBA Leq was recorded at M-4, located along the northeast corner of Smokey Point Boulevard and 175th Place NE. Table 2 provides a summary of the measured noise levels.

<b>Site<sup>1</sup></b>	<b>Description or Address<sup>1</sup></b>	<b>Noise Level<sup>2</sup></b>
M-1	Smokey Point Boulevard between 200th Street NE and 188th Street NE	68.3
M-2	Northeast corner of Smokey Point Boulevard and 188th Street NE	65.6
M-3	Northeast corner of Smokey Point Boulevard and 183rd Place NE	62.7
M-4	Northeast corner of Smokey Point Boulevard and 178th Place NE	62.4
M-5	Northeast corner of Smokey Point Boulevard and 175th Place NE	68.0

Notes:

- Monitoring sites are shown in Figure 2 and Figure 3.
- All data is presented as an hourly Leq.

## 8. NOISE MODELING VALIDATION AND RECEIVERS

As previously described, the noise levels used for describing the existing and future conditions are taken from the FHWA TNM. This section describes the noise model validation results and selection of receivers used for modeling noise levels related to the Smokey Point Boulevard Project.

### 8.1. Noise Model Validation

Traffic noise levels were modeled to test the agreement of calculated and measured noise levels. For model verification, the actual traffic counts and speeds as observed during the noise monitoring were used as input to the model. All five monitoring sites are in areas where traffic noise was the dominating noise source and, thereby, could be used to validate the traffic noise model. TNM was used to predict the traffic noise levels based on the traffic counts and a comparison of the measured and modeled noise levels are provided in Table 3.

<b>Receiver</b>	<b>Measured</b>	<b>Modeled</b>	<b>Difference</b>
M-1	68.3	67.0	-1.3
M-2	65.6	66.2	0.6
M-3	62.7	62.2	-0.5
M-4	62.4	61.4	-1.0
M-5	68.0	66.7	-1.3

The modeled and measured noise results agree within +/- 2dBA at both locations. Because a 2 dBA change in noise levels is barely perceptible to a person with average hearing, an agreement of +/- 2 dBA or less is considered acceptable deviation for modeled and measured

noise levels. It is important to remember that TNM only predicts noise for traffic on roadways that are included in the model, while other noise sources (most side street traffic, residential activities, maintenance, and aircraft), which will be included in the onsite monitoring data, would not be included in the traffic noise model.

## **8.2. Selection of Receivers**

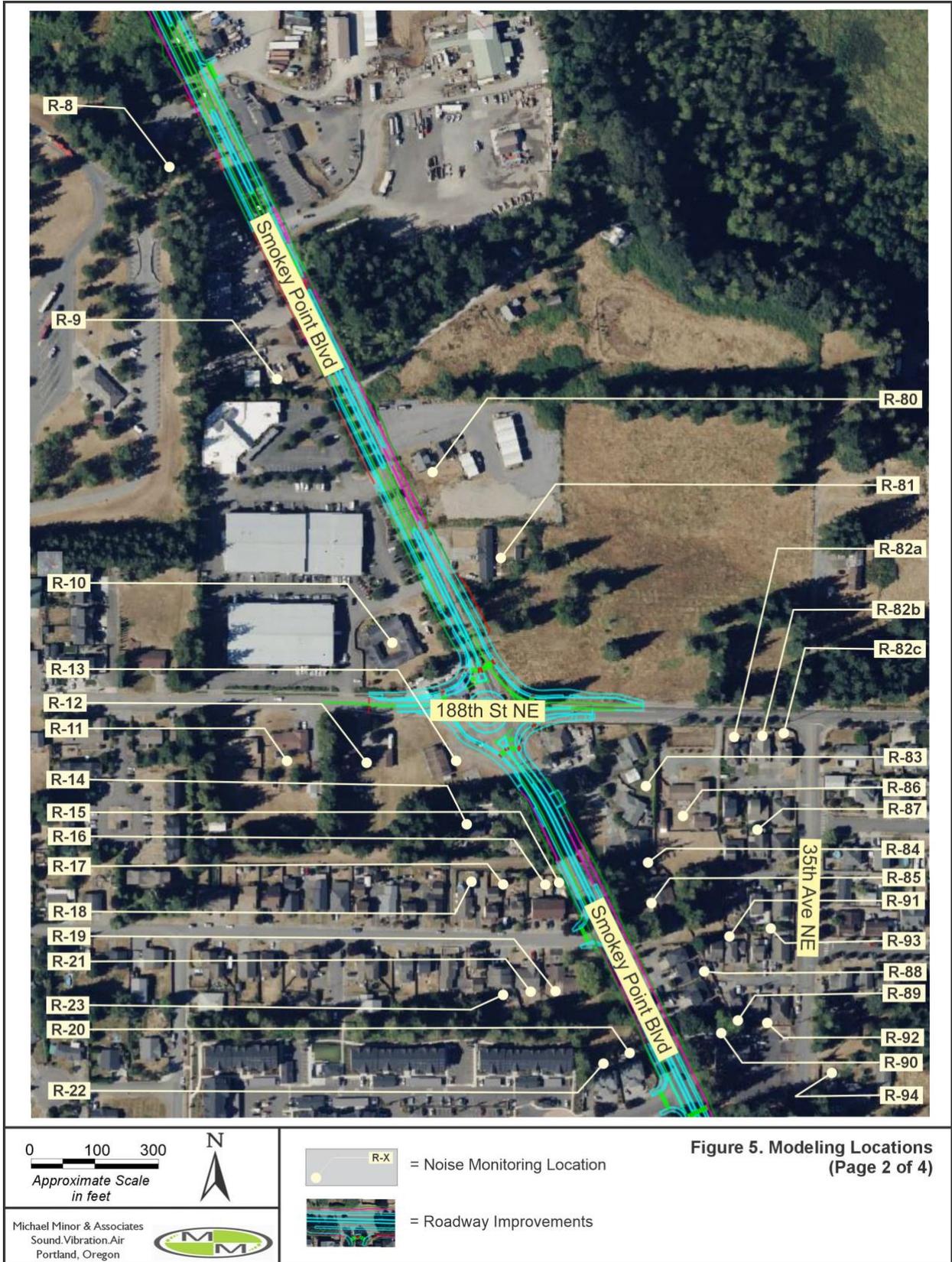
Noise modeling sites were selected to represent noise-sensitive areas within the Project area, where traffic noise impacts are most likely to occur. More specifically, the receiver locations were located in areas of frequent outdoor human use such as back yards and balconies, church entrances, and parks. Because it is likely that this area will continue to grow, with several long range plans for residential developments in the near future, care was taken to make sure this analysis provided a comprehensive summary of noise levels along both sides of Smokey Point Boulevard. Therefore, in addition to receiver locations immediately adjacent to the Project roadways, modeled receiver locations were also extended beyond the distance where impacts can be modeled to verify that the full impacted area is captured. This resulted in 151 noise modeling sites that provided representative traffic noise levels for 238 residences, two churches, and one park.

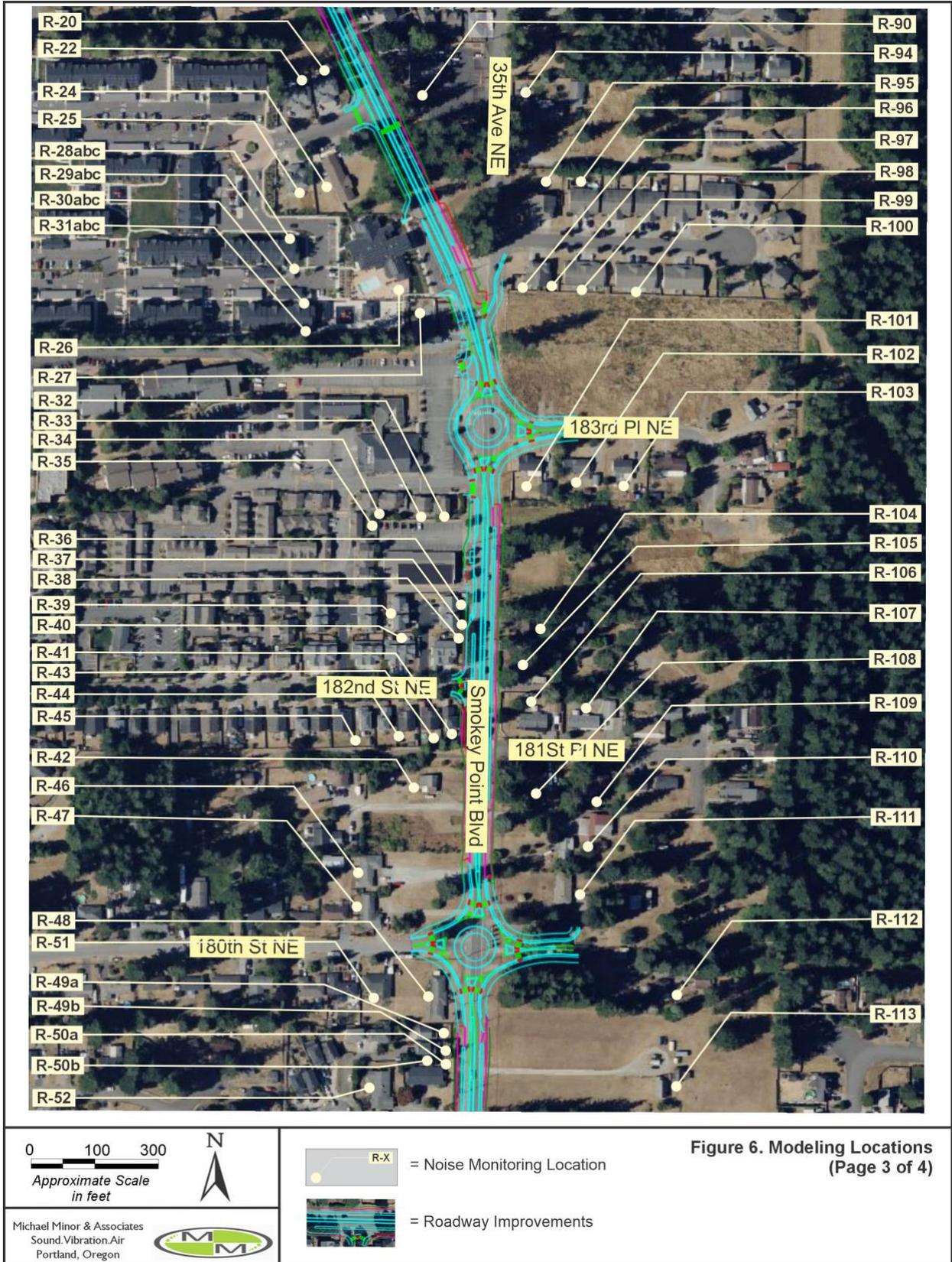
## **8.3. Modeling Location Descriptions**

Traffic noise modeling was performed using the FHWA TNM. Existing and future traffic noise levels were predicted throughout the Project corridor at 151 locations representing 242 sensitive uses, denoted as R-1 through R-137b. In several instances, one receiver location is used to represent a group of two or more neighboring residences expected to experience similar sound levels for both existing and future conditions and have comparable noise reductions if a noise barrier was constructed. Receivers denoted as R-Xa, b, or c represent multistory apartments with outdoor use balconies or single-family residences where noise mitigation was modeled. Figures 4 through 7 provide an aerial view of all Project noise modeling locations.



Figure 4. Modeling Locations (Page 1 of 4)





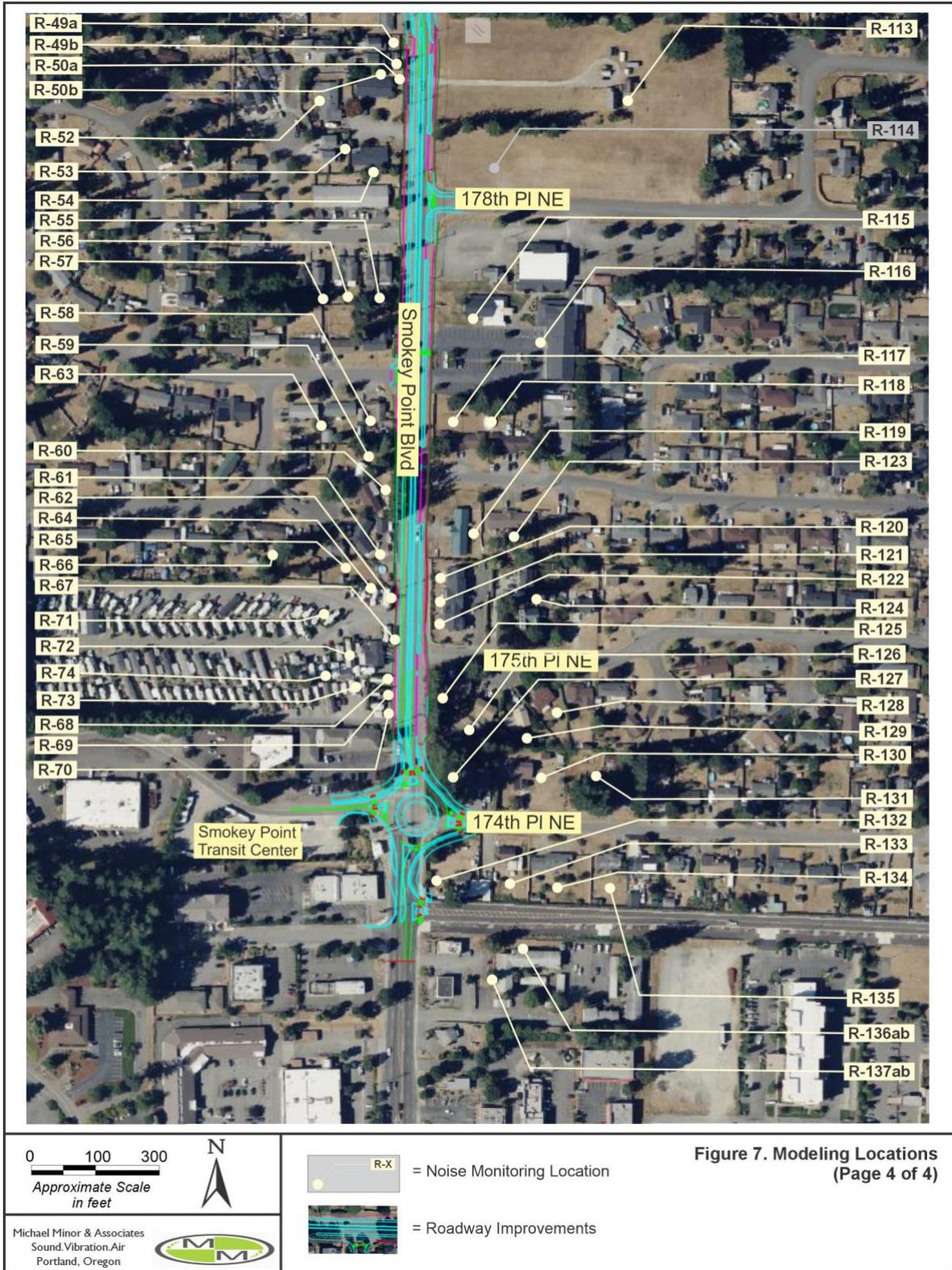


Figure 7. Modeling Locations  
(Page 4 of 4)

## 9. EXISTING ENVIRONMENT

Modeling was performed for 151 representative receiver locations shown in Figures 4 through 7 for the Existing conditions (year 2020) PM peak traffic hour. Inputs to the TNM model include Existing roadway conditions. Overall, noise levels ranged from 52 to 71 dBA Leq, and 16 receivers that would meet the WSDOT NAC but are not considered impacts under the Existing conditions. Receivers meeting the NAC are located along Smokey Point Boulevard and nearest to I-5 (R-1 through R-3), closest to Smokey Point Boulevard (R-62, R-67 through R-71, R-122, R-125, R-127, and R-132) or closest to 188th Street NE (R-82a through R-82b).

Table 4 provides a summary of the existing modeled traffic noise levels.

## 10. FUTURE NO-BUILD ENVIRONMENT

Noise modeling was also performed for the No-Build condition using traffic volumes projected for the year 2040. The same modeling locations used for the existing conditions were used for the No-Build conditions.

Based on the future projected traffic data for the year 2040 without the proposed Project, increased traffic volumes have resulted in increased traffic noise levels when compared to the existing conditions. Overall, noise levels ranged from 55 to 72 dBA Leq. Changes in noise levels range from 0 to +2 dB over the Existing conditions. There are 24 residences with noise levels meeting the WSDOT NAC but are not considered impacts under the future No-Build conditions. In addition to the same receivers meeting the NAC under the Existing conditions, new receivers are located along Smokey Point Boulevard and nearest to I-5 (R-7) and closest to Smokey Point Boulevard (R-36, R-37, R-120, and R-121).

Table 4 provides a summary of the No-Build modeled traffic noise levels.

## 11. FUTURE BUILD ANALYSIS

The same 151 noise modeling locations used to model the existing conditions were modeled for the Build Alternative with year 2040 PM peak hour traffic conditions. The TNM inputs include the proposed realignment of Smokey Point Boulevard and roundabouts at 188th Street NE, 183rd Place NE, 180th Street NE, and 174th Place NE and year 2040 traffic volumes and speeds prepared for the Project. The traffic noise levels for the Build Alternative are the worst-case noise levels for the year 2040.

Future Build Alternative traffic noise levels are predicted to range from 55 to 72 dBA Leq during the PM peak hour, with changes ranging from -1 to +4 dB over the Existing conditions. There are 33 residences with noise levels that meet the WSDOT NAC of 66 dBA Leq and are considered impacts under the future Build Alternative. The same residents meeting the NAC under the No-Build conditions include R-1 through R-3, R-7, R-36, R-37, R-62, R-67 through R-70, R-82a through R-82c, R-120 through R-122, R-125, R-127, and R-

132. New impacts include R-15, R-38, R-41, R-49a, R-49b, R-50a, and R-60 through R-61, where the proposed realignment moves the roadway closer to the residence and increased traffic volumes contribute to higher noise levels.

Table 4 provides a summary of the build modeled traffic noise levels. Note that this table comprises a full summary of the Existing, No-Build and Build traffic noise levels, change in noise levels and a summary of potential traffic noise impacts.

Receiver <sup>1</sup>	Land Use <sup>2</sup>	Units <sup>3</sup>	Criteria (dBA Leq) <sup>4</sup>	Existing Conditions	No-Build Conditions		Build Alternative			
				Level (Leq dBA) <sup>5</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>6</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>7</sup>	No. of Impacts <sup>8</sup>	Vs. No-Build (in dB) <sup>9</sup>
R-1	B	1	66	71	72	1	72	1	1	0
R-2	B	1	66	68	70	2	70	2	1	0
R-3	B	1	66	67	69	2	69	2	1	0
R-4	B	1	66	62	64	2	65	3	0	1
R-5	B	1	66	60	62	2	63	3	0	1
R-6	B	1	66	63	65	2	65	2	0	0
R-7	B	2	66	64	66	2	66	2	2	0
R-8	B	1	66	59	61	2	62	3	0	1
R-9	B	1	66	59	60	1	62	3	0	2
R-10	B	1	66	59	60	1	62	3	0	2
R-11	B	1	66	57	58	1	59	2	0	1
R-12	B	1	66	57	59	2	60	3	0	1
R-13	B	1	66	61	62	1	62	1	0	0
R-14	B	1	66	59	60	1	61	2	0	1
R-15	B	1	66	64	65	1	67	3	1	2
R-16	B	2	66	61	62	1	64	3	0	2
R-17	B	2	66	58	59	1	60	2	0	1
R-18	B	1	66	56	58	2	59	3	0	1
R-19	B	1	66	59	60	1	61	2	0	1
R-20	B	2	66	62	63	1	63	1	0	0
R-21	B	2	66	56	57	1	58	2	0	1
R-22	B	1	66	58	59	1	60	2	0	1
R-23	B	1	66	55	56	1	57	2	0	1
R-24	B	1	66	57	58	1	59	2	0	1
R-25	B	2	66	55	57	2	57	2	0	0
R-26	B	1	66	58	59	1	60	2	0	1
R-27	B	1	66	61	61	0	62	1	0	1

Receiver <sup>1</sup>	Land Use <sup>2</sup>	Units <sup>3</sup>	Criteria (dBA Leq) <sup>4</sup>	Existing Conditions	No-Build Conditions		Build Alternative			
				Level (Leq dBA) <sup>5</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>6</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>7</sup>	No. of Impacts <sup>8</sup>	Vs. No-Build (in dB) <sup>9</sup>
R-28a <sup>10</sup>	B	2	66	54	56	2	56	2	0	0
R-28b <sup>10</sup>	B	2	66	57	59	2	59	2	0	0
R-28c <sup>10</sup>	B	2	66	59	60	1	61	2	0	1
R-29a <sup>10</sup>	B	2	66	54	55	1	56	2	0	1
R-29b <sup>10</sup>	B	2	66	57	58	1	59	2	0	1
R-29c <sup>10</sup>	B	2	66	59	60	1	61	2	0	1
R-30a <sup>10</sup>	B	2	66	54	55	1	56	2	0	1
R-30b <sup>10</sup>	B	2	66	57	58	1	59	2	0	1
R-30c <sup>10</sup>	B	2	66	59	60	1	61	2	0	1
R-31a <sup>10</sup>	B	2	66	54	55	1	56	2	0	1
R-31b <sup>10</sup>	B	2	66	57	58	1	59	2	0	1
R-31c <sup>10</sup>	B	2	66	59	60	1	61	2	0	1
R-32	B	1	66	61	62	1	64	3	0	2
R-33	B	2	66	59	60	1	61	2	0	1
R-34	B	2	66	56	57	1	59	3	0	2
R-35	B	2	66	55	56	1	57	2	0	1
R-36	B	1	66	65	66	1	69	4	1	3
R-37	B	1	66	65	66	1	68	3	1	2
R-38	B	2	66	65	65	0	68	3	2	3
R-39	B	2	66	56	57	1	59	3	0	2
R-40	B	2	66	57	58	1	59	2	0	1
R-41	B	1	66	64	64	0	66	2	1	2
R-42	B	1	66	58	59	1	60	2	0	1
R-43	B	1	66	60	61	1	62	2	0	1
R-44	B	2	66	57	58	1	59	2	0	1
R-45	B	2	66	54	56	2	57	3	0	1
R-46	B	2	66	55	57	2	57	2	0	0
R-47	B	2	66	56	57	1	58	2	0	1
R-48	B	2	66	62	63	1	63	1	0	0
R-49a	B	1	66	64	65	1	67	3	1	2

Receiver <sup>1</sup>	Land Use <sup>2</sup>	Units <sup>3</sup>	Criteria (dBA Leq) <sup>4</sup>	Existing Conditions	No-Build Conditions		Build Alternative			
				Level (Leq dBA) <sup>5</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>6</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>7</sup>	No. of Impacts <sup>8</sup>	Vs. No-Build (in dB) <sup>9</sup>
R-49b	B	1	66	65	65	0	67	2	1	2
R-50a	B	1	66	65	65	0	67	2	1	2
R-50b	B	2	66	61	62	1	63	2	0	1
R-51	B	1	66	57	58	1	59	2	0	1
R-52	B	1	66	57	58	1	59	2	0	1
R-53	B	2	66	58	59	1	59	1	0	0
R-54	B	2	66	63	64	1	64	1	0	0
R-55	B	3	66	63	64	1	64	1	0	0
R-56	B	3	66	59	60	1	60	1	0	0
R-57	B	4	66	56	57	1	57	1	0	0
R-58	B	1	66	62	62	0	62	0	0	0
R-59	B	1	66	61	62	1	61	0	0	-1
R-60	B	1	66	64	65	1	66	2	1	1
R-61	B	1	66	64	65	1	66	2	1	1
R-62	B	1	66	67	68	1	69	2	1	1
R-63	B	2	66	59	60	1	59	0	0	-1
R-64	B	3	66	63	64	1	63	0	0	-1
R-65	B	1	66	60	61	1	60	0	0	-1
R-66	B	3	66	57	58	1	57	0	0	-1
R-67	B	1	66	67	68	1	69	2	1	1
R-68	B	1	66	67	68	1	68	1	1	0
R-69	B	1	66	67	68	1	68	1	1	0
R-70	B	1	66	67	68	1	67	0	1	-1
R-71	B	2	66	59	60	1	59	0	0	-1
R-72	B	4	66	62	63	1	62	0	0	-1
R-73	B	3	66	63	63	0	62	-1	0	-1
R-74	B	5	66	60	61	1	60	0	0	-1
R-75	B	1	66	56	58	2	59	3	0	1
R-76	B	1	66	58	59	1	61	3	0	2
R-77	B	1	66	62	64	2	64	2	0	0

Receiver <sup>1</sup>	Land Use <sup>2</sup>	Units <sup>3</sup>	Criteria (dBA Leq) <sup>4</sup>	Existing Conditions	No-Build Conditions		Build Alternative			
				Level (Leq dBA) <sup>5</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>6</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>7</sup>	No. of Impacts <sup>8</sup>	Vs. No-Build (in dB) <sup>9</sup>
R-78	B	1	66	61	63	2	64	3	0	1
R-79	B	1	66	61	63	2	64	3	0	1
R-80	B	1	66	58	59	1	62	4	0	3
R-81	B	2	66	58	59	1	60	2	0	1
R-82a	B	1	66	67	68	1	67	0	1	-1
R-82b	B	1	66	67	68	1	67	0	1	-1
R-82c	B	1	66	67	68	1	67	0	1	-1
R-83	B	2	66	60	61	1	61	1	0	0
R-84	B	1	66	58	59	1	60	2	0	1
R-85	B	1	66	60	61	1	62	2	0	1
R-86	C	1	66	57	58	1	58	1	0	0
R-87	B	6	66	56	57	1	56	0	0	-1
R-88	B	4	66	57	58	1	59	2	0	1
R-89	B	1	66	56	58	2	58	2	0	0
R-90	B	1	66	59	60	1	61	2	0	1
R-91	B	3	66	55	56	1	57	2	0	1
R-92	B	2	66	55	56	1	57	2	0	1
R-93	B	4	66	54	55	1	56	2	0	1
R-94	B	1	66	58	60	2	60	2	0	0
R-95	B	1	66	55	56	1	57	2	0	1
R-96	B	2	66	52	54	2	55	3	0	1
R-97	B	1	66	61	62	1	63	2	0	1
R-98	B	1	66	59	60	1	61	2	0	1
R-99	B	2	66	58	59	1	60	2	0	1
R-100	B	2	66	57	58	1	60	3	0	2
R-101	B	1	66	61	62	1	64	3	0	2
R-102	B	1	66	55	56	1	59	4	0	3
R-103	B	1	66	54	56	2	58	4	0	2
R-104	B	1	66	59	59	0	61	2	0	2
R-105	B	1	66	62	62	0	64	2	0	2

Receiver <sup>1</sup>	Land Use <sup>2</sup>	Units <sup>3</sup>	Criteria (dBA Leq) <sup>4</sup>	Existing Conditions	No-Build Conditions		Build Alternative			
				Level (Leq dBA) <sup>5</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>6</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>7</sup>	No. of Impacts <sup>8</sup>	Vs. No-Build (in dB) <sup>9</sup>
R-106	B	1	66	60	61	1	63	3	0	2
R-107	B	1	66	55	56	1	58	3	0	2
R-108	B	1	66	58	59	1	61	3	0	2
R-109	B	1	66	54	55	1	58	4	0	3
R-110	C	1	66	55	56	1	58	3	0	2
R-111	C	1	66	54	55	1	58	4	0	3
R-112	C	1	66	57	59	2	59	2	0	0
R-113	B	1	66	57	58	1	59	2	0	1
R-114	B	1	66	58	59	1	60	2	0	1
R-115	B	1	66	58	59	1	59	1	0	0
R-116	B	1	66	54	55	1	56	2	0	1
R-117	B	1	66	64	65	1	65	1	0	0
R-118	B	3	66	58	59	1	59	1	0	0
R-119	B	2	66	59	60	1	60	1	0	0
R-120	B	2	66	65	66	1	66	1	2	0
R-121	B	2	66	65	66	1	66	1	2	0
R-122	B	2	66	66	66	0	66	0	2	0
R-123	B	2	66	56	57	1	58	2	0	1
R-124	B	2	66	56	57	1	57	1	0	0
R-125	B	1	66	67	68	1	66	-1	1	-2
R-126	B	1	66	61	62	1	61	0	0	-1
R-127	B	1	66	66	67	1	66	0	1	-1
R-128	B	1	66	56	57	1	57	1	0	0
R-129	B	1	66	57	59	2	58	1	0	-1
R-130	B	1	66	57	58	1	58	1	0	0
R-131	B	1	66	56	57	1	57	1	0	0
R-132	B	1	66	66	67	1	66	0	1	-1
R-133	B	1	66	59	60	1	59	0	0	-1
R-134	B	1	66	57	58	1	58	1	0	0
R-135	B	1	66	56	58	2	58	2	0	0

<b>Table 4. Traffic Noise Level Summary</b>										
Receiver <sup>1</sup>	Land Use <sup>2</sup>	Units <sup>3</sup>	Criteria (dBA Leq) <sup>4</sup>	Existing Conditions	No-Build Conditions		Build Alternative			
				Level (Leq dBA) <sup>5</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>6</sup>	Level (Leq dBA) <sup>5</sup>	Vs. Exist (in dB) <sup>7</sup>	No. of Impacts <sup>8</sup>	Vs. No-Build (in dB) <sup>9</sup>
R-136a <sup>10</sup>	B	4	66	58	59	1	58	0	0	-1
R-136b <sup>10</sup>	B	4	66	60	61	1	61	1	0	0
R-137a <sup>10</sup>	B	3	66	59	60	1	60	1	0	0
R-137b <sup>10</sup>	B	3	66	62	62	0	62	0	0	0
<b>Summary</b>		<b>Minimum</b>		52	54	0	55	-1	0	-2
		<b>Maximum</b>		71	72	2	72	4	2	3
		<b>Total Meeting NAC</b>								<b>33</b>
<b>Substantial increase noise impacts with future noise levels 10 dB or more above existing = 0</b>										
Notes:										
<ol style="list-style-type: none"> <li>1. All receivers are shown in Figures 4 through 7.</li> <li>2. FHWA land use: See Table 1.</li> <li>3. Number of dwellings represented by each receiver. In some cases, a single receiver is used to represent more than one residence, all expected to have similar noise levels.</li> <li>4. WSDOT traffic noise abatement criteria by land use type.</li> <li>5. Predicted peak hour noise levels in dBA Leq for condition stated, taken from TNM version 2.5 with <b>bold red</b> typeface used to indicate noise levels that are equal to or greater than the NAC of 66 dBA Leq for Category B uses.</li> <li>6. Change in noise: No-Build compared to existing conditions.</li> <li>7. Change in noise: Build compared to existing conditions with <b>bold red</b> typeface used to indicate noise level increases of 10dB or greater (substantial increase impacts).</li> <li>8. Number of uses predicted to meet or exceed the WSDOT NAC, either the level criteria or substantial increase criteria.</li> <li>9. Change in noise: Build compared to No-Build for reference only.</li> <li>10. Receivers R-Xa represent first floor apartments, R-Xb represent second floor apartments, and R-Xc represent third floor apartments.</li> </ol>										

## 12. NOISE LEVEL IMPACT SUMMARY

The following locations were identified with noise levels meeting the WSDOT NAC:

Noise Impact Summary:

- R-1: One first row receiver representing one residence located along 200th Street NE and west of I-5, where the dominant noise source is traffic from I-5. The noise level is 72 dBA Leq.
- R-2 and R-3: Two first row receivers representing 2 residences located along Smokey Point Boulevard, where the dominant noise source is traffic from I-5. The noise levels range from 69 to 70 dBA Leq.
- R-7: One first row receiver representing 2 residences located along Smokey Point Boulevard, where the dominant noise source is from increased traffic along I-5. The noise level is 66 dBA Leq.
- R-15: One first row receiver representing one residence located along Smokey Point Boulevard, where the dominant noise source is from the realignment shifting the roadway closer to the residence and increased traffic along Smokey Point Boulevard. The noise level is 67 dBA Leq.
- R-36 through R-38: Three first row receivers representing four residences located along Smokey Point Boulevard, where the dominant noise source is from increased traffic along Smokey Point Boulevard. The noise levels range from 68 to 69 dBA Leq.
- R-41: One first row receiver representing one residence located along Smokey Point Boulevard, where the dominant noise source is from increased traffic along Smokey Point Boulevard. The noise level is 66 dBA Leq.
- R-49a, R-49b, and R-50a: Three first row receivers representing three residences located along Smokey Point Boulevard, where the dominant noise source is from increased traffic along Smokey Point Boulevard. The noise levels are all the same, at 67 dBA Leq.
- R-60 through R-62: Three first row receivers representing three residences located along Smokey Point Boulevard, where the dominant noise source is from the realignment shifting the roadway closer to the residences and increased traffic along Smokey Point Boulevard. The noise levels range from 66 to 69 dBA Leq.
- R-67 through R-70: Four first row receivers representing four residences at the Smokey Point RV Park, where the dominant noise source is from increased traffic along Smokey Point Boulevard. The noise levels range from 67 to 69 dBA Leq.
- R-82a, R-82b, and R-82c: Three first row receivers representing three residences located along 188th Street NE, where the dominant noise source is traffic along 188th Street NE. Noise levels are all the same, at 67 dBA Leq.

- R-120 through R-122: Three first row receivers representing six residences located along Smokey Point Boulevard, where the dominant noise source is from increased traffic along Smokey Point Boulevard. The noise levels are all the same, at 66 dBA Leq.
- R-125 and R-127: Two first row receivers representing two residences located along Smokey Point Boulevard, where the dominant noise source is from traffic along Smokey Point Boulevard. The noise levels are the same, at 66 dBA Leq.
- R-132: One first row receiver representing one first row residence located along Smokey Point Boulevard, where the dominant noise source is from traffic along Smokey Point Boulevard. The noise level is 66 dBA Leq.

## 13. NOISE ABATEMENT ANALYSIS

In accordance with the current 2020 WSDOT Policy, when traffic noise impacts are identified, noise abatement measures must be considered for those developments that existed or have been issued a building permit prior to the date of public knowledge of the Project. This includes identifying noise abatement measures that are feasible and reasonable and that are likely to be incorporated into the Project. In addition, the noise analysis must also identify noise impacts for which no apparent solution is available and an explanation of why noise abatement was not recommended.

Whenever noise impacts are expected, noise abatement measures, including noise barriers and earthen berms, are evaluated. Construction of noise barriers between the roadways and the affected receivers would reduce noise levels by physically blocking the transmission of traffic-generated noise. Barriers can be constructed as walls or earthen berms. Earthen berms require more right-of-way than walls and are usually constructed with a 3-to-1 slope. Noise barriers should be high enough to break the line-of-sight between the noise source and the receiver. They must also be long enough to prevent significant flanking of noise around the ends of the barriers. Due to limited right-of-way within the study area, only noise walls were considered for noise abatement.

### 13.1. WSDOT Noise Abatement Criteria

For noise abatement to be recommended for inclusion with a project, the abatement must meet the feasibility and reasonability criteria set forth by WSDOT. Feasibility deals primarily with engineering considerations, such as whether substantial or meaningful noise level reductions can be achieved or whether there would be a negative effect on property access. Reasonableness assesses the practicality of the abatement measure based on a number of factors. Required factors are cost-effectiveness, consideration of the viewpoints of the property owners and residents of benefiting receivers, and noise abatement performance (noise reduction design goal). Details on the requirements are provided in the following sections.

### 13.1.1. Feasibility of Noise Abatement

In evaluating whether a particular noise abatement measure is feasible, WSDOT considered acoustic and engineering, and requires the following to occur for noise abatement to be feasible:

- Abatement must be physically constructible.
- A minimum of three (3) first row impacted receivers must obtain a minimum 5 dBA of noise reduction as a result of abatement (insertion loss), assuring that every reasonable effort will be made to assess outdoor use areas as appropriate.

In general, noise barriers are ineffective at reducing traffic noise levels when constructed along roadways that have uncontrolled access points (e.g., driveways and pedestrian access) due to the openings in the noise barrier required to accommodate access. These openings can allow sufficient noise onto the property, making it difficult if not impossible to meet the required noise reduction requirement for residences adjacent to the roadway. While noise abatement measures are considered for all project-related impacts, some noise barriers that would clearly not meet the feasibility criteria are evaluated qualitatively without extensive modeling efforts.

The noise abatement must be physically constructible as well to meet feasibility requirements. WSDOT also considers engineering factors when determining feasibility. Safety factors that should be considered in the feasibility assessment of noise abatement include: maintaining a clear recovery zone, redirection of errant vehicles, ensuring adequate sight distance, and fire/emergency vehicle access. The consideration of abatement may also include potential environmental impacts to wetlands, property access, placement of utilities and stormwater control facilities, and construction on steep slopes. Engineering considerations should be made in concert with the project engineering office.

### 13.1.2. Reasonableness of Noise Abatement

Once noise abatement is determined feasible, the abatement is evaluated for its reasonableness. Two primary criteria are used in considering the reasonableness of a particular abatement measure: cost-effectiveness and the WSDOT design goal achievement. In areas where homes are scattered too far apart for noise barriers to be built at a reasonable cost, the noise abatement analysis is limited to qualitative discussion without extensive modeling efforts.

### 13.1.3. Cost Effectiveness

The cost of noise abatement sufficient to provide at least the minimum feasible noise reductions must be equal to or less than the allowable cost of abatement for each noise wall location analyzed. The current average cost used for a Washington State Type I project is \$51.61 per square foot of noise wall (WSDOT 2020).

Either the barrier size or cost outlined in Table 5 below can be used to describe the reasonableness evaluation. However, a cost description must be included if there are non-

standard additional costs, or costs that would not occur “but for” the barrier (e.g., additional foundation costs for steep slopes, unique drainage requirements). Additional cost estimates for abatement are added to the planning-level costs as part of the reasonableness evaluation.

Barriers are evaluated independently for feasibility and reasonableness, with some exceptions for barrier systems. On projects where noise barriers are considered for multiple locations, a feasibility and reasonableness evaluation will be done for each area independently.

Allowable costs are shown in Table 5 and are a function of the current planning-level barrier cost (\$51.61 per square foot in 2020) multiplied by the allowable wall size for the receiver benefiting from the noise wall. The table shows the allowable costs for each receiver based on the predicted Build Alternative noise levels or sound level increases. Higher noise levels, or larger sound level increases, are allowed more money for abatement.

The cost evaluation used to determine WSDOT planning-level cost estimates for a standard noise wall includes the following:

- 1) Noise barrier construction labor and materials, including clearing and grubbing and the acquisition of property needed for the noise barrier;
- 2) Traffic management measures, as necessary only for the barrier construction;
- 3) A percent of the total project’s workforce mobilization costs; and
- 4) Sales tax.

<b>Table 5. Reasonableness Allowances</b>			
<b>Column A</b>	<b>Column B</b>	<b>Column C</b>	<b>Column D</b>
<b>Design Year Traffic Sound Decibel Level (dBA)</b>	<b>Noise level increase as a result of the Project (dBA)<sup>2</sup></b>	<b>Allowed Wall Surface Area Per Qualified Residence or Residential Equivalent</b>	<b>Allowed Cost Per Qualified Residence or Residential Equivalent<sup>1</sup></b>
66		700 Sq. Feet	\$36,127
67		768 Sq. Feet	\$39,636
68		836 Sq. Feet	\$43,146
69		904 Sq. Feet	\$46,655
70		972 Sq. Feet	\$50,165
71	10 (substantial, step 1) <sup>3</sup>	1,040 Sq. Feet	\$53,674
72	11 (substantial, step 1)	1,108 Sq. Feet	\$57,184
73	12 (substantial, step 1)	1,176 Sq. Feet	\$60,693
74	13 (substantial, step 1)	1,244 Sq. Feet	\$64,203
75	14 (substantial, step 1)	1,312 Sq. Feet	\$67,712
76	15 (substantial, step 2) <sup>4</sup>	1,380 Sq. Feet	\$71,222
<p>Notes:</p> <ol style="list-style-type: none"> <li>1. Current costs based on \$51.61 per square foot constructed cost developed in 2020.</li> <li>2. If the noise level increases 10 dBA or more as the result of the project (Column B), follow the allowed wall surface and cost for the level of increase in Column C in lieu of the total design year sound decibel level in Column A. For total highway related sound levels at 76 or more dBA or the project results in an increase of 15 or more decibels, continue increasing the allowance at the rate provided in this table unless circumstances determined on a case-by-case basis require an alternative methodology for determining allowance.</li> <li>3. Step 1 is when the noise levels are 10 to 14 dBA over existing conditions traffic noise as a result of the transportation project.</li> <li>4. Step 2 is when the noise levels are 15 or more dBA over existing conditions traffic noise as a result of the transportation project (or total highway related noise levels are between 76 and 79 decibels). Additional consideration for abatement may be considered under these circumstances.</li> <li>5. Sq. Feet = square feet.</li> </ol>			

**13.1.4. Design Goal Achievement**

The minimum design goal for abatement is at least 7 dBA of reduction for one receiver. Noise walls cannot be recommended if they do not achieve the design goal. In addition to the design goal requirement, WSDOT will make a reasonable effort to achieve a 10 dBA or greater insertion loss (noise reduction) at the first row of receivers for all projects where abatement is recommended.

**13.1.5. Other Considerations**

A larger noise barrier than the minimum feasible and reasonable size shall be constructed when a barrier is highly cost-effective. A barrier is considered highly cost-effective when it reduces noise levels behind the barrier by 10 dBA, or more, for the majority of first row receivers at less than 75 percent of the maximum reasonable cost allowed for abatement.

### 13.1.6. Summary of Abatement Requirements

In summary, in order to be recommended for construction, noise abatement must meet the three criteria:

- 1) **Feasibility:** At least three first row receivers with noise impacts must have an insertion loss (noise reduction) of 5 dB or more.
- 2) **Reasonableness:** The total allowable cost or square footage (SF) for benefited receivers (using the allowable cost or SF from Table 5), must equal or exceed the costs or SF of the noise abatement measure (noise barrier).
- 3) **Design Goal (falls under the Reasonableness criteria):** At least one receiver must have a noise reduction of 7 dB (insertion loss of 7 dB or more).

For any considered noise abatement, these three criteria are reviewed, in order. If, for example, the Feasibility Criteria cannot be met, there will be no comparison of the Reasonability or Design Goal criteria.

## 13.2. Noise Abatement Measures

Noise abatement was not modeled for receivers R-1 through R-3, R-7, R-15, R-41, R-60 through R-62, R-67 through R-70, R-125, R-127, and R-132. WSDOT policy requires at least three first row receivers in an area with noise impacts before a wall can be considered or where receivers are not separated by driveways. Therefore, abatement in these areas would not meet the feasibility requirement since there would only be groups of 1 or 2 receivers or receivers separated by driveways for any potential noise wall.

### 13.2.1. 188th Wall

Under WSDOT policy, project noise impacts within the study area must be considered for noise abatement even if they are outside the project construction limits. For this project this would include receivers along 188th Street that are approximately 185 feet from the construction limits. Because there are impacts, noise abatement must be considered and continued with logical termini for the abatement, which is the next intersection or where there are no additional impacts.

Noise impacts were identified at three receivers (R-82a, R-82b, and R-82c) representing three residences along 188th Street NE and east of Smokey Point Boulevard. A noise wall was modeled R-82a through R-82c, which are all first row receivers. Figure 8 shows the location of the wall on an aerial photo with the proposed roadway improvements and nearby receiver locations. The wall location on Figure 8, which follows the fence line, is approximate and provided for informational purposes only.

The noise wall has a total length of approximately 157 feet and has panel heights of 7 to 8-feet. Using the standard cost from WSDOT of \$51.61 per square foot, the cost of the wall is \$57,752, with an available capital of \$118,908, making the wall cost effective. The wall would also meet WSDOT requirements for feasible noise abatement by reducing noise levels by 5 to 7 dB at the three impacted first row residences, meeting the necessary insertion loss

requirement of at least 5 dB at three residences and the required 7 dB insertion loss for at least one receiver. Therefore, the wall is both reasonable and feasible under WSDOT criteria.

A summary of the noise wall performance is provided in Table 6. The table provides the receiver numbers, units represented, future noise levels, future noise levels with the noise wall, noise reduction, and receivers benefited. The noise wall length and heights may be revised during final design. During final design additional elevations for the base of the wall will be provided and the updated elevations could result in a slight change in the noise wall heights.

<b>Table 6. 188th Wall: Receivers R-82a, R-82b, and R-82c</b>								
<b>Receiver Information</b>			<b>Abatement Noise Levels (dBA Leq) and Benefit</b>				<b>Wall Sq Ft and Cost</b>	
<b>Rec#<sup>1</sup></b>	<b>Units<sup>2</sup></b>	<b>First Row<sup>3</sup></b>	<b>Future Build<sup>4</sup></b>	<b>Build with Wall<sup>5</sup></b>	<b>Insertion Loss<sup>6</sup></b>	<b>Benefited (&gt;5 dB)<sup>7</sup></b>	<b>Allowed \$<sup>8</sup></b>	<b>Allowed Sq Ft<sup>9</sup></b>
R-82a	1	Y	67	62	5	Yes	\$39,636	768
R-82b	1	Y	67	62	5	Yes	\$39,636	768
R-82c	1	Y	67	60	7	Yes	\$39,636	768
<b>Criteria Verification Noise Abatement Measure</b>								
<b>Requirement for at least three first row impacts &gt;5dB<sup>10</sup></b>							<b>3 of 3</b>	<b>Yes</b>
<b>Requirement for reasonable noise abatement cost (Sq.-Ft)<sup>11</sup></b>				<b>Available Capital (Sq Ft) (from benefited receivers)</b>			<b>\$118,908</b>	<b>2,304</b>
				<b>Wall Cost (Sq Ft)</b>			<b>\$57,752</b>	<b>1,119</b>
				<b>Available minus Cost &gt; 0: Yes</b>			<b>\$61,156</b>	<b>1,185</b>
<b>Max insertion loss from abatement<sup>12</sup></b>							<b>&gt;=7</b>	<b>Yes (7 dB)</b>
<b>Notes:</b> <ol style="list-style-type: none"> <li>Receivers shown in Figure 8 with the noise wall evaluated.</li> <li>Number of units with the same noise level.</li> <li>First row receivers are directly adjacent to the project roadway.</li> <li>Future Build Noise levels from TNM.</li> <li>Future Build noise levels with the noise wall evaluated from TNM.</li> <li>Insertion loss, in decibels, of the noise wall evaluated.</li> <li>Identifies receivers that are considered benefited under WSDOT policy (5 dB or more insertion loss).</li> <li>Allowable cost per qualified residence from Table 5.</li> <li>Allowable wall surface area per qualified residence from Table 5.</li> <li>Insertion loss for three first row receivers with impacts must be 5 dB or more.</li> <li>Comparison of the allowable cost/sq. ft. to the actual cost/sq. ft. must be a positive number to meet the criteria.</li> <li>Maximum insertion loss, must be 7 dB or more.</li> </ol>								



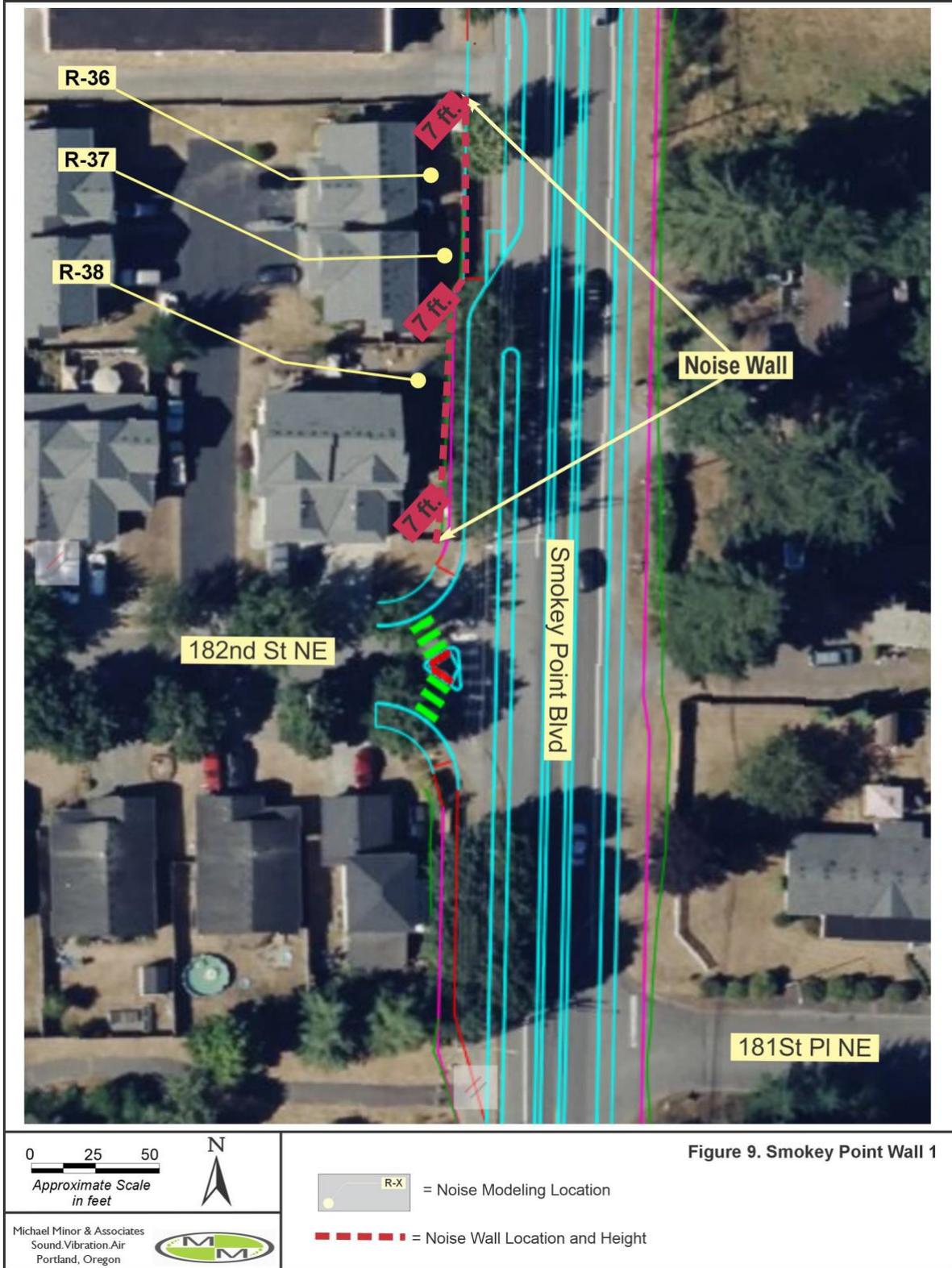
### 13.2.2. Smokey Point Wall 1

Noise impacts were identified at three receivers (R-36, R-37, and R-38) representing four residences along the west side of Smokey Point Boulevard and north of 182nd Street NE. A noise wall was modeled for R-36 through R-38, which are all first row receivers. Figure 9 shows the location of the wall on an aerial photo with the proposed roadway improvements and nearby receiver locations. The wall location on Figure 9, which follows the back of the proposed sidewalk, is approximate and provided for informational purposes only.

The noise wall has a total length of approximately 159 feet and has panel heights of 7-feet throughout. Using the standard cost from WSDOT of \$51.61 per square foot, the cost of the wall is \$57,597, with an available capital of \$176,093, making the wall cost effective. The wall would also meet WSDOT requirements for feasible noise abatement by reducing noise levels by 7 dB at all three impacted first row residences, meeting the necessary insertion loss requirement of at least 5 dB at three residences and the required 7 dB insertion loss for at least one receiver. Therefore, the wall is both reasonable and feasible under WSDOT criteria.

A summary of the noise wall performance is provided in Table 7. The table provides the receiver numbers, units represented, future noise levels, future noise levels with the noise wall, noise reduction, and receivers benefited. The noise wall length and heights may be revised during final design. During final design additional elevations for the base of the wall will be provided and the updated elevations could result in slight changes in the noise wall heights.

<b>Table 7. Smokey Point Wall 1: Receivers R-36 through R-38</b>								
<b>Receiver Information</b>			<b>Abatement Noise Levels (dBA Leq) and Benefit</b>				<b>Wall Sq Ft and Cost</b>	
<b>Rec#<sup>1</sup></b>	<b>Units<sup>2</sup></b>	<b>First Row<sup>3</sup></b>	<b>Future Build<sup>4</sup></b>	<b>Build with Wall<sup>5</sup></b>	<b>Insertion Loss<sup>6</sup></b>	<b>Benefited (&gt;5 dB)<sup>7</sup></b>	<b>Allowed \$<sup>8</sup></b>	<b>Allowed Sq Ft<sup>9</sup></b>
R-36	1	Y	69	62	7	Yes	\$46,655	904
R-37	1	Y	68	61	7	Yes	\$43,146	836
R-38	2	Y	68	61	7	Yes	\$86,292	1,672
<b>Criteria Verification Noise Abatement Measure</b>								
<b>Requirement for at least three first row impacts &gt;5dB<sup>10</sup></b>							<b>4 of 4</b>	<b>Yes</b>
<b>Requirement for reasonable noise abatement cost (Sq.-Ft)<sup>11</sup></b>				<b>Available Capital (Sq Ft) (from benefited receivers)</b>			<b>\$176,093</b>	<b>3,412</b>
				<b>Wall Cost (Sq Ft)</b>			<b>\$57,597</b>	<b>1,116</b>
				<b>Available minus Cost &gt; 0: Yes</b>			<b>\$118,496</b>	<b>2,296</b>
<b>Max insertion loss from abatement<sup>12</sup></b>							<b>&gt;=7</b>	<b>Yes (7 dB)</b>
<b>Notes:</b> <ol style="list-style-type: none"> <li>1. Receivers shown in Figure 9 with the noise wall evaluated.</li> <li>2. Number of units with the same noise level.</li> <li>3. First row receivers are directly adjacent to the project roadway.</li> <li>4. Future Build Noise levels from TNM.</li> <li>5. Future Build noise levels with the noise wall evaluated from TNM.</li> <li>6. Insertion loss, in decibels, of the noise wall evaluated.</li> <li>7. Identifies receivers that are considered benefited under WSDOT policy (5 dB or more insertion loss).</li> <li>8. Allowable cost per qualified residence from Table 5.</li> <li>9. Allowable wall surface area per qualified residence from Table 5.</li> <li>10. Insertion loss for three first row receivers with impacts must be 5 dB or more.</li> <li>11. Comparison of the allowable cost/sq. ft. to the actual cost/sq. ft. must be a positive number to meet the criteria.</li> <li>12. Maximum insertion loss, must be 7 dB or more.</li> </ol>								



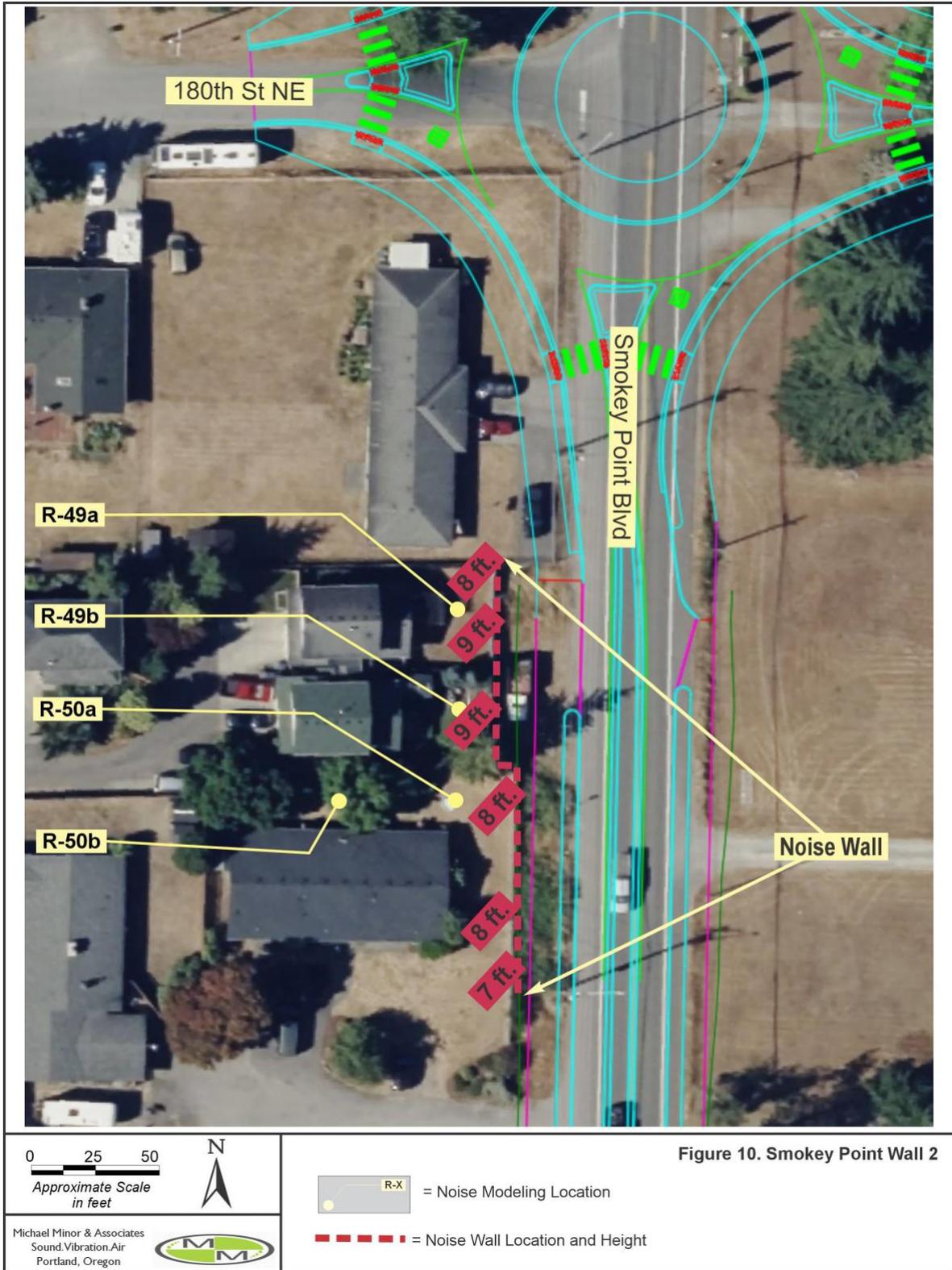
### 13.2.3. Smokey Point Wall 2

Noise impacts were identified at three receivers (R-49a, R-49b, and R-50a) representing three residences along the west side of Smokey Point Boulevard and south of 180th Street NE. A wall was modeled for R-49a, R-49b, R-50a, and R-50b, all but R-50b are first row receivers. For this analysis the wall was located along the existing fence line, however, during final design the actual location of the wall may change due to right-of-way requirements and property lines. Modification to the wall location is not expected to affect the overall effectiveness or cost of the wall. Figure 10 shows the location of the wall on an aerial photo with the proposed roadway improvements and nearby receiver locations. The wall location on Figure 10 is approximate and provided for informational purposes only.

The noise wall has a total length of approximately 155 feet and has panel heights of 6- to 9-feet. Using the standard cost from WSDOT of \$51.61 per square foot, the cost of the wall is \$65,338, with an available capital of \$118,908, making the wall cost effective. The wall would also meet WSDOT requirements for feasible noise abatement by reducing noise levels by 5 to 7 dB at all impacted first row residences, meeting the necessary insertion loss requirement of at least 5 dB at three residences and the required 7 dB insertion loss for at least one receiver. Therefore, the wall is both reasonable and feasible under WSDOT criteria.

A summary of the noise wall performance is provided in Table 8. The table provides the receiver numbers, units represented, future noise levels, future noise levels with the noise wall, noise reduction, and receivers benefited. The noise wall length and heights may be revised during final design. During final design additional elevations for the base of the wall will be provided and the updated elevations could result in slight changes in the noise wall location and heights.

<b>Table 8. Smokey Point Wall 2: Receivers R-49a, R-49b, R-50a, and R-50b</b>								
<b>Receiver Information</b>			<b>Abatement Noise Levels (dBA Leq) and Benefit</b>				<b>Wall Sq Ft and Cost</b>	
<b>Rec#<sup>1</sup></b>	<b>Units<sup>2</sup></b>	<b>First Row<sup>3</sup></b>	<b>Future Build<sup>4</sup></b>	<b>Build with Wall<sup>5</sup></b>	<b>Insertion Loss<sup>6</sup></b>	<b>Benefited (&gt;5 dB)<sup>7</sup></b>	<b>Allowed \$<sup>8</sup></b>	<b>Allowed Sq Ft<sup>9</sup></b>
R-49a	1	Y	67	62	5	Yes	\$39,636	768
R-49b	1	Y	67	60	7	Yes	\$39,636	768
R-50a	1	Y	67	62	5	Yes	\$39,636	768
R-50b	2	N	63	59	4	No	\$0	0
<b>Criteria Verification Noise Abatement Measure</b>								
<b>Requirement for at least three first row impacts &gt;5dB<sup>10</sup></b>							<b>3 of 3</b>	<b>Yes</b>
<b>Requirement for reasonable noise abatement cost (Sq.-Ft)<sup>11</sup></b>				<b>Available Capital (Sq Ft) (from benefited receivers)</b>			<b>\$118,908</b>	<b>2,304</b>
				<b>Wall Cost (Sq Ft)</b>			<b>\$65,338</b>	<b>1,266</b>
				<b>Available minus Cost &gt; 0: Yes</b>			<b>\$53,570</b>	<b>1,038</b>
<b>Max insertion loss from abatement<sup>12</sup></b>							<b>&gt;=7</b>	<b>Yes (7 dB)</b>
<b>Notes:</b> <ol style="list-style-type: none"> <li>Receivers shown in Figure 10 with the noise wall evaluated.</li> <li>Number of units with the same noise level.</li> <li>First row receivers are directly adjacent to the project roadway.</li> <li>Future Build Noise levels from TNM.</li> <li>Future Build noise levels with the noise wall evaluated from TNM.</li> <li>Insertion loss, in decibels, of the noise wall evaluated.</li> <li>Identifies receivers that are considered benefited under WSDOT policy (5 dB or more insertion loss).</li> <li>Allowable cost per qualified residence from Table 5.</li> <li>Allowable wall surface area per qualified residence from Table 5.</li> <li>Insertion loss for three first row receivers with impacts must be 5 dB or more.</li> <li>Comparison of the allowable cost/sq. ft. to the actual cost/sq. ft. must be a positive number to meet the criteria.</li> <li>Maximum insertion loss, must be 7 dB or more.</li> </ol>								



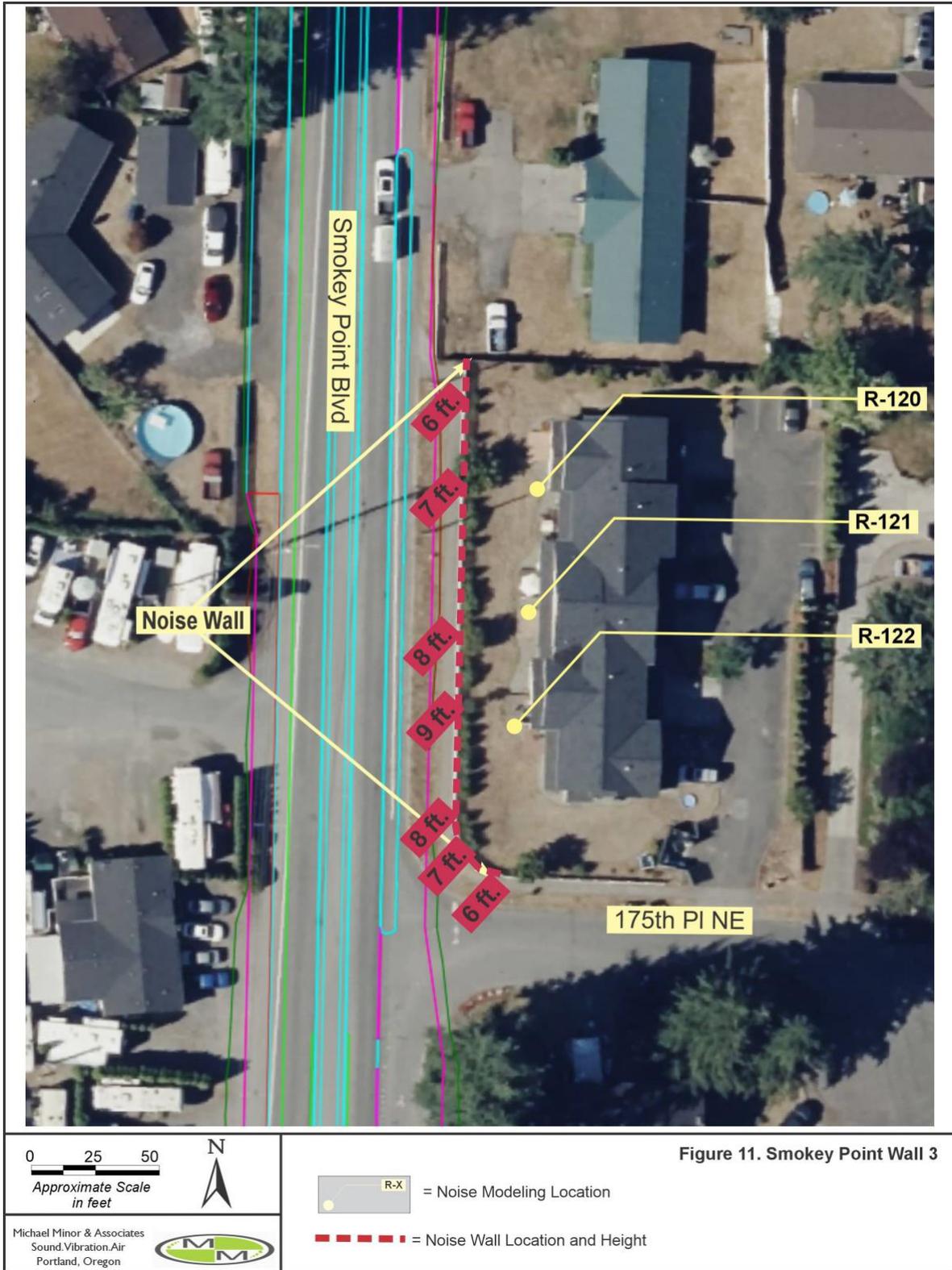
### 13.2.4. Smokey Point Wall 3

Noise impacts were identified at three receivers (R-120 through R-122) representing six residences along the east side of Smokey Point Boulevard and north of 175th Place NE. A wall was modeled for R-120 through R-122, all are first row receivers. Figure 11 shows the location of the wall on an aerial photo with the proposed roadway improvements and nearby receiver locations. The wall location on Figure 11, which follows the fence line, is approximate and provided for informational purposes only.

The noise wall has a total length of approximately 186 feet and has panel heights of 6- to 9-feet. Using the standard cost from WSDOT of \$51.61 per square foot, the cost of the wall is \$72,615, with an available capital of \$216,762, making the wall cost effective. The wall would also meet WSDOT requirements for feasible noise abatement by reducing noise levels by 5 to 7 dB at all impacted first row residences, meeting the necessary insertion loss requirement of at least 5 dB at three residences and the required 7 dB insertion loss for at least one receiver. Therefore, the wall is both reasonable and feasible under WSDOT criteria.

A summary of the noise wall performance is provided in Table 9. The table provides the receiver numbers, units represented, future noise levels, future noise levels with the noise wall, noise reduction, and receivers benefited. The noise wall length and heights may be revised during final design. During final design additional elevations for the base of the wall will be provided and the updated elevations could result in a slight change in the noise wall heights.

<b>Table 9. Smokey Point Wall 3: Receivers R-120 through R-122</b>								
<b>Receiver Information</b>			<b>Abatement Noise Levels (dBA Leq) and Benefit</b>				<b>Wall Sq Ft and Cost</b>	
<b>Rec#<sup>1</sup></b>	<b>Units<sup>2</sup></b>	<b>First Row<sup>3</sup></b>	<b>Future Build<sup>4</sup></b>	<b>Build with Wall<sup>5</sup></b>	<b>Insertion Loss<sup>6</sup></b>	<b>Benefited (&gt;5 dB)<sup>7</sup></b>	<b>Allowed \$<sup>8</sup></b>	<b>Allowed Sq Ft<sup>9</sup></b>
R-120	2	Y	66	61	5	Yes	\$72,254	1,400
R-121	2	Y	66	60	6	Yes	\$72,254	1,400
R-122	2	Y	66	59	7	Yes	\$72,254	1,400
<b>Criteria Verification Noise Abatement Measure</b>								
<b>Requirement for at least three first row impacts &gt;5dB<sup>10</sup></b>							<b>3 of 3</b>	<b>Yes</b>
<b>Requirement for reasonable noise abatement cost (Sq.-Ft)<sup>11</sup></b>				<b>Available Capital (Sq Ft) (from benefited receivers)</b>			<b>\$216,762</b>	<b>4,200</b>
				<b>Wall Cost (Sq Ft)</b>			<b>\$72,615</b>	<b>1,407</b>
				<b>Available minus Cost &gt; 0: Yes</b>			<b>\$144,147</b>	<b>2,793</b>
<b>Max insertion loss from abatement<sup>12</sup></b>							<b>&gt;=7</b>	<b>Yes (7 dB)</b>
<b>Notes:</b> <ol style="list-style-type: none"> <li>1. Receivers shown in Figure 11 with the noise wall evaluated.</li> <li>2. Number of units with the same noise level.</li> <li>3. First row receivers are directly adjacent to the project roadway.</li> <li>4. Future Build Noise levels from TNM.</li> <li>5. Future Build noise levels with the noise wall evaluated from TNM.</li> <li>6. Insertion loss, in decibels, of the noise wall evaluated.</li> <li>7. Identifies receivers that are considered benefited under WSDOT policy (5 dB or more insertion loss).</li> <li>8. Allowable cost per qualified residence from Table 5.</li> <li>9. Allowable wall surface area per qualified residence from Table 5.</li> <li>10. Insertion loss for three first row receivers with impacts must be 5 dB or more.</li> <li>11. Comparison of the allowable cost/sq. ft. to the actual cost/sq. ft. must be a positive number to meet the criteria.</li> <li>12. Maximum insertion loss, must be 7 dB or more.</li> </ol>								



## 14. CONSTRUCTION NOISE ANALYSIS

Construction noise levels for the proposed Project improvements would result from normal construction activities. Noise levels for construction activities can be expected to range from 70 to 90 dBA at sites 50 feet from the activities. Table 10 lists equipment typically used for constructing this type of Project, the activities for which the equipment would be used, and the corresponding maximum noise levels under normal use measured at 50 feet.

<b>Table 10. Construction Equipment List, Use, and Reference Maximum Noise Levels</b>		
<b>Equipment</b>	<b>Typical Expected Project Use</b>	<b>Lmax<sup>a</sup></b>
Air Compressor	Used for pneumatic tools and general maintenance	78-80
Backhoe	General construction and yard work	78-80
Compactor	Roadway surfacing	80-83
Concrete Pump	Pumping concrete	81-82
Concrete Saw	Concrete removal, utilities access	90
Crane	Materials handling, removal, and replacement	81-85
Excavator	General construction and materials handling	81-85
Haul Truck	Materials handling, general hauling	76-84
Jackhammer	Pavement removal	85-89
Loader	General construction and materials handling	79-80
Paving	Roadway paving	77-85
Power Plant	General construction use, nighttime work	70-73
Pump	General construction use, water removal	77-81
Pneumatic Tools	Miscellaneous construction work	85
Service Truck	Repair and maintenance of equipment	55-75
Tractor Trailer	Material removal and delivery	74-84
Welder	General project work	76
Source: FHWA RCNM User's Guide		

### 14.1. Construction Noise Levels

Major noise-producing equipment in use during initial site preparation would include saw cutters, concrete pumps, cranes, excavators, haul trucks, loaders, tractor-trailers, and vibratory equipment. Maximum noise levels could reach 82 to 90 dBA at the nearest noise sensitive areas (i.e., within 50 to 100 feet) for normal construction activities during this phase. Other less notable noise-producing equipment expected to be used during this phase would be backhoes, air compressors, forklifts, pumps, power plants, service trucks and utility trucks.

Following heavy construction, general construction would still be required, such as installation of signage as well as other miscellaneous activities such as roadway stripping. These less intensive activities are not expected to produce noise levels above 80 dBA at 50 feet except during rare occasions. Even then, noise levels from these activities would exceed 80 dBA at 50 feet only for short periods of time, during which combined maximum noise levels could reach 86 dBA Lmax at 50 feet.

## 14.2. Construction Noise Mitigation Measures

These noise levels, although temporary in nature, can be annoying. The following is a list of potential construction noise mitigation measures that could be included in the contract specifications:

- Require all engine-powered equipment to have mufflers that were installed according to the manufacturer's specifications.
- Require all equipment to comply with pertinent Environmental Protection Agency (EPA) equipment noise standards.
- Any nighttime work would require a noise variance from the city of Arlington. The contractor would be required to follow all procedures and requirements provided in any noise variance if received from the city.
- Minimize noise by regular inspection and replacement of defective mufflers and parts that do not meet the manufacturer's specifications.
- All truck tailgates shall be secured to prevent excessive noise from banging.
- Install temporary or portable acoustic barriers around stationary construction noise sources and along the sides of the temporary bridge structures, where feasible.
- Locate stationary construction equipment as far from nearby noise-sensitive properties as possible.
- Shut off idling equipment.
- Reschedule construction operations to avoid periods of noise annoyance identified in complaints.
- Notify nearby residents whenever extremely noisy work would be occurring.
- Use non-pure tone back-up alarms or restrict the use of back-up beepers during evening and nighttime hours and use spotters. In all areas, Occupational Safety and Health Administration (OSHA) will require back-up warning devices and spotters for haul vehicles.
- Additional noise mitigation measures might be implemented as more details on the actual construction processes are identified.

## Appendix A: References

- American National Standards Institute. Quantities and Procedures for Description and Measurement of Environmental Sound - Part 1: Basic Quantities and Definitions. Ansi/ASA S12.9-2013/Part1. February 27, 2013.
- City of Arlington. Municipal Code Chapter 7.05 – Nuisances. 2023
- Institute of Noise Control Engineering. Noise and Vibration Control Revised Edition. Beranek, Leo L., 1988 Edition, Cambridge, MA.
- Washington State. Administrative Code Section 173-60-050(3)(a) – Maximum Environmental Noise Levels – Exemptions. 2023.
- Washington State Department of Transportation. 2020 Traffic Noise Policy and Procedures. WSDOT. March 2020.
- US Code of Federal Regulations (CFR) Part 772 (23 CFR Part 772), July 2010.
- US Department of Transportation. FHWA Roadway Construction Noise Model User Guide. Federal Highway Administration, Washington, D.C. June 2017.
- U.S. Department of Transportation. FHWA Highway Traffic Noise Model User’s Guide (Version 2.5 Addendum) Final Report. Federal Highway Administration, Washington, D.C. April 2004.

## Appendix B: Introduction to Acoustics

Sound is defined as any pressure variation that the human ear can detect, from barely perceptible sounds to sound levels that can cause hearing damage. The magnitude of the variations of the air pressure from the static air pressure is a measure of the sound level. The number of cyclic pressure variations per second is the frequency of sound. When sounds are unpleasant, unwanted, or disturbingly loud, we tend to classify them as noise.

Compared with the static air pressure, the audible sound pressure variations range from the threshold of hearing, a very small 20  $\mu\text{Pa}$  ( $20 \times 10^{-6}$  Pascal), to 100 Pa, a level so loud it is referred to as the threshold of pain. Because the ratio between these numbers is more than a million to one, using Pascal to describe sound levels can be awkward. The "dB" measurement is a logarithmic conversion of air pressure level variations from Pascal to a unit of measure with a more convenient numbering system. This conversion not only allows for a more convenient scale, but is also a more accurate representation of how the human ear reacts to variations in air pressure. Measurements made using the decibel scale will be denoted dB.

The smallest noise level change that can be detected by the human ear is approximately 3 dB. A doubling in the static air pressure amounts to a change of 6 dB, and an increase of 10 dB is roughly equivalent to a doubling in the perceived sound level. Under free-field conditions, where there are no reflections or additional attenuation, sound is known to decrease at a rate of 6 dB for each doubling of distance. This is commonly known as the inverse square law. For example, a sound level of 70 dB at a distance of 100 feet would decrease to 64 dB at 200 feet, or 58 dB at 400 feet. The mathematical definition of sound pressure level in dB is listed below.

**$L_p$  (sound pressure level).** The sound pressure in dB is 20 times the log of the ratio of the measured pressure,  $p$ , to the static pressure,  $p_o$ , where  $p_o$  is 20  $\mu\text{Pa}$ .

$$L_{pa} = 20 \text{Log}_{10} \left( \frac{p}{p_o} \right) \text{dB} \quad (\text{re } 20 \mu\text{Pa})$$

In acoustic measurements where the primary concern is the effect on humans, the sound readings are sometimes compensated by an "A"-weighted filter. The A-weighted filter accounts for people's limited hearing response in the upper and lower frequency bands. Sound pressure level measurements made using the A-weighted filter are denoted dBA.

### General Measurement Descriptors

- **$L_{eq}$  (equivalent continuous sound level).** The constant sound level in dBA that, lasting for a time "T," would have produced the same energy in the same time period "T" as an actual A-weighted noise event.

$$L_{eq} = 20 \text{Log}_{10} \frac{1}{T} \int_T^0 \left( \frac{p(t)}{p_o} \right)^2 dt$$

- **MaxPeak (maximum A-weighted sound level).** The greatest continuous sound level, in dBA, measured during the preset measurement period.
- **Lmax (maximum A-weighted RMS sound level).** The greatest RMS (root-mean square) sound level, in dBA, measured during the preset measurement period.
- **Lmin (minimum A-weighted RMS sound level).** The lowest RMS (root-mean square) sound level, in dBA, measured during the preset measurement period.

### Statistical Noise Level Descriptors

Public response to sound depends greatly upon the range that the sound varies in a given environment. For example, people generally find a moderately high, constant sound level more tolerable than a quiet background level interrupted by high-level noise intrusions. In light of this subjective response, it is often useful to look at a statistical distribution of sound levels over a given time period. Such distributions identify the sound level exceeded and the percentage of time exceeded. Therefore, it allows for a more complete description of the range of sound levels during the given measurement period.

The sound level descriptor  $L_{xx}$  is defined as the sound level exceeded XX percent of the time. Some of the more common versions of this descriptor and their corresponding definitions are listed below:

- **L01** The sound level is exceeded 1 percent of the time. This is a measure of the loudest sound levels during the measurement period. Example: During a 1-hour measurement, an L01 of 95 dBA means the sound level was at or above 95 dBA for 36 seconds.
- **L50** The sound level is exceeded 50 percent of the time. This level corresponds to the median sound level. Example: During a 1-hour measurement, an L50 of 67 dBA means the sound level was at or above 67 dBA for 30 minutes.
- **L90** The sound level is exceeded 90 percent of the time. This is a measure of the nominal background level. Example: During a 1-hour measurement, an L90 of 50 dBA means the sound level was at or above 50 dBA for 54 minutes.

Other commonly used  $L_{xx}$  values include  $L_{2.5}$ ,  $L_{8.3}$ , and  $L_{25}$ . These correspond to the 5-, 10-, and 15-minute time levels for a 1-hour measurement period, respectively.

### Typical Sound Levels

Table B-1 contains some common noise sources, their nominal maximum sound level in dBA, and the usual public response. The levels in this graph are comparable to the Lmax noise level descriptor. This graph would be useful when comparing the loudest noise produced with other familiar noise sources a person may have experienced. Noise levels in the table are derived from information found in *Noise and Vibration Control Revised Edition*,

Institute of Noise Control Engineering, Beranek, Leo L., 1988 Edition, Cambridge, MA and over 30 years of measured data performed by Michael Minor & Associates, Inc.

**Table B-1. Typical Maximum Sound Levels**

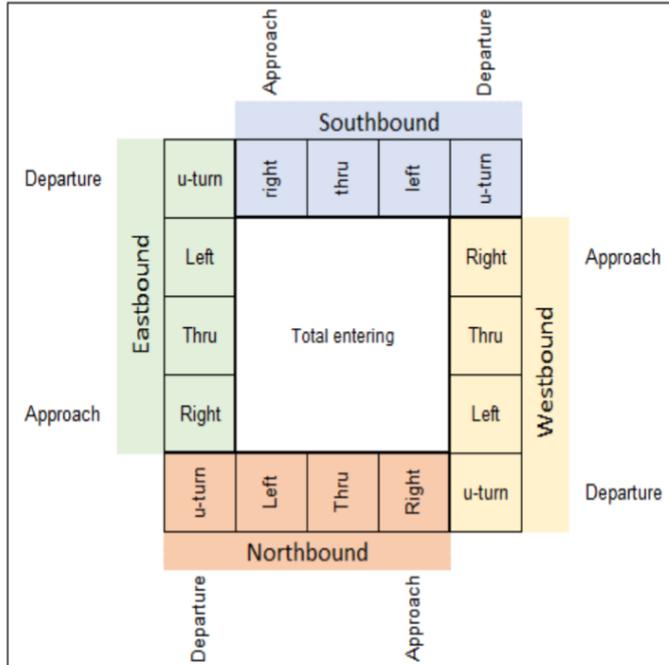
Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 feet)	140	Threshold of pain	64 times as loud
50-horse power siren (100 feet)	130		32 times as loud
Loud rock concert near stage, Jet takeoff (200 feet)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 feet)	110		8 times as loud
Jet takeoff (2,000 feet)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 feet)	90		2 times as loud
Garbage disposal, food blender (2 feet), Pneumatic drill (50 feet)	80	Moderately loud	Reference loudness
Vacuum cleaner (10 feet), Passenger car at 65 mph (25 feet)	70		1/2 as loud
Large store air-conditioning unit (20 feet)	60		1/4 as loud
Light auto traffic (100 feet)	50	Quiet	1/8 as loud
Bedroom or quiet living room Bird calls	40		1/16 as loud
Quiet library, soft whisper (15 feet)	30	Very quiet	
High quality recording studio	20		
Acoustic Test Chamber	10	Just audible	
	0	Threshold of hearing	

Sources: Derived from Beranek (1988) and noise measurements by Michael Minor & Associates, Inc.

## Appendix C: Traffic Data

**LEGEND**

#	N-S Roadway
	E-W Roadway



2020 Existing PM Peak Traffic Volumes

1		Smokey Point Blvd 200th St NE				
		NB+SB		EB+WB		
		224			292	
70	0	40	184	0	0	0
	23	574			0	
	0				0	
51	28	269			0	0
	0				30	
		212			299	

1				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	97%	0%	3%	35
Southbound	95%	0%	5%	35

2		Smokey Point Blvd 188th St NE				
		NB+SB		EB+WB		
		250			348	
32	0	7	202	41	0	228
	8	1,036			49	
	7				5	
38	23	291			174	257
	0				20	
		399			520	

2				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	91%	0%	9%	35/25*
Westbound	96%	0%	4%	35/25*
Northbound	98%	0%	2%	35
Southbound	100%	0%	0%	35

\* Speed limit is 35 MPH along the east leg of 188th Street NE and 25 MPH along the west leg of 188th Street NE.

3		Smokey Point Blvd 183rd Pl NE				
		NB+SB		EB+WB		
		464			607	
0	0	0	458	6	0	8
	0	1,084			3	
	0				0	
0	0	604			5	14
	0				0	
		463			612	

3				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	98%	0%	2%	35
Southbound	98%	0%	2%	35

Traffic data provided by the city of Arlington.

2020 Existing PM Peak Traffic Volumes

4		NB+SB		Smokey Point Bld				
		EB+WB		180th PI NE				
		479			625			
36		0	7	472	0	0	0	
		11	1,163			0		
		0				0		
41		30				0	0	
		0	29	614	0	0		
		502			643			

4				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	98%	0%	2%	35
Southbound	98%	0%	2%	35

5		NB+SB		Smokey Point Bld				
		EB+WB		174th PI NE				
		597			855			
177		0	46	549	2	0	16	
		58	1,712			6		
		0				0		
154		96				10	25	
		0	131	791	23	0		
		655			945			

5				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	95%	0%	5%	25
Westbound	100%	0%	0%	25
Northbound	98%	0%	2%	35
Southbound	97%	0%	3%	35

Traffic data provided by the city of Arlington.

2040 No-Build PM Peak Traffic Volumes

1		Smokey Point Blvd 200th St NE				
		NB+SB		EB+WB		
		269			351	
84	0	48	221	0	0	0
	28	690			0	
62	0					
	34				0	
	0	36	323	0	0	
		255			359	

1				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	97%	0%	3%	35
Southbound	95%	0%	5%	35

2		Smokey Point Blvd 188th St NE				
		NB+SB		EB+WB		
		299			418	
38	0	8	242	49	0	274
	10	1,243			59	
46	8					
	28				209	
	0	24	349	251	0	
		479			624	

2				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	91%	0%	9%	35/25*
Westbound	96%	0%	4%	35/25*
Northbound	98%	0%	2%	35
Southbound	100%	0%	0%	35

\* Speed limit is 35 MPH along the east leg of 188th Street NE and 25 MPH along the west leg of 188th Street NE.

3		Smokey Point Blvd 183rd Pl NE				
		NB+SB		EB+WB		
		557			729	
0	0	0	550	7	0	10
	0	1,302			4	
0	0					
	0				6	
	0	0	725	10	0	
		556			735	

3				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	98%	0%	2%	35
Southbound	98%	0%	2%	35

Traffic data provided by Perteet, Inc.

2040 No-Build PM Peak Traffic Volumes

4		Smokey Point Bld 180th Pl NE				
		NB+SB		EB+WB		
		574			750	
43	0	8	566	0	0	0
	13	1,395			0	
	0				0	
49	36	737			0	0
	0				35	
		602			772	

4					Vehicle Class Percentage	
					Vehicle Speeds	
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds		
Eastbound	98%	0%	2%	25		
Westbound	98%	0%	2%	25		
Northbound	98%	0%	2%	35		
Southbound	98%	0%	2%	35		

5		Smokey Point Bld 174th Pl NE				
		NB+SB		EB+WB		
		716			1,026	
212	0	55	659	2	0	19
	70	2,054			7	
	0				0	
185	115	949			12	30
	0				157	
		786			1,134	

5					Vehicle Class Percentage	
					Vehicle Speeds	
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds		
Eastbound	95%	0%	5%	25		
Westbound	100%	0%	0%	25		
Northbound	98%	0%	2%	35		
Southbound	97%	0%	3%	35		

Traffic data provided by Perteet, Inc.

2040 Future Build Peak Traffic Volumes

1		NB+SB		Smokey Point Blvd					
		EB+WB		200th St NE					
		627			1,093				
100	0	98	529	0	0			0	
	40	1,835			0				
153	0				0			0	
	113				0				
	0	2	1,053	0	0				
		642			1,055				

1		Vehicle Class Percentage			
		Vehicle Speeds			
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds	
Eastbound	97%	0%	3%	25	
Westbound	97%	0%	3%	25	
Northbound	97%	0%	3%	35	
Southbound	97%	0%	3%	35	

2		NB+SB		Smokey Point Blvd					
		EB+WB		188th St NE					
		446			928				
391	0	49	299	98	0			608	
	37	2,124			228				
179	89				228			301	
	53				152				
	0	114	663	114	0				
		504			891				

2		Vehicle Class Percentage			
		Vehicle Speeds			
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds	
Eastbound	97%	0%	3%	35/25	
Westbound	97%	0%	3%	35/25	
Northbound	97%	0%	3%	35	
Southbound	97%	0%	3%	35	

3		NB+SB		Smokey Point Blvd					
		EB+WB		183rd Pl NE					
		538			962				
0	0	0	462	76	0			538	
	0	1,907			310				
0	0				0			255	
	0				228				
	0	0	652	179	0				
		690			831				

3		Vehicle Class Percentage			
		Vehicle Speeds			
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds	
Eastbound	97%	0%	3%	25	
Westbound	97%	0%	3%	25	
Northbound	97%	0%	3%	35	
Southbound	97%	0%	3%	35	

Traffic data provided by Transpo Group.

2040 Future Build Peak Traffic Volumes

4		Smokey Point Bld				
NB+SB		180th Pl NE				
EB+WB						
		646			989	
93	0	5	630	11	0	327
	11				163	
	1	2,034			1	
45	33				163	126
	0	87	815	114	0	
		826			1,016	

4				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	98%	0%	2%	35
Southbound	98%	0%	2%	35

5		Smokey Point Bld				
NB+SB		174th Pl NE				
EB+WB						
		885			945	
610	0	75	770	40	0	310
	80				50	
	55	2,660			220	
295	160				40	135
	0	315	815	40	0	
		970			1,170	

5				
Vehicle Class Percentage				
Vehicle Speeds				
Movement Direction	Passenger Vehicles	Medium Trucks	Heavy Trucks	Speeds
Eastbound	98%	0%	2%	25
Westbound	98%	0%	2%	25
Northbound	98%	0%	2%	35
Southbound	98%	0%	2%	35

Traffic data provided by Transpo Group.

## Appendix D: Noise Monitoring Sites and Traffic Count



Photo 1: Aerial View



Photo 2: Looking Southeast



Photo 3: Looking Northeast



Photo 4: Looking West

Monitoring Location M-1  
Southwest corner of Smokey Point Blvd  
and 193rd St NE



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Sound, Vibration, Air  
Portland, Oregon

Detailed Noise Monitoring Site Photos  
Smokey Point Boulevard Project



Photo 1: Aerial View



Photo 2: Looking West



Photo 3: Looking East



Photo 4: Looking Southeast

Monitoring Location M-2  
Northeast corner of Smokey Point Blvd  
and 188th St NE



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Portland, Oregon

Detailed Noise Monitoring Site Photos  
Smokey Point Boulevard Project



Photo 1: Aerial View



Photo 2: Looking West



Photo 3: Looking East



Photo 4: Looking Southwest

Monitoring Location M-3  
Northeast corner of Smokey Point Blvd  
and 183rd PI NE



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Portland, Oregon

Detailed Noise Monitoring Site Photos  
Smokey Point Boulevard Project



Photo 1: Aerial View



Photo 2: Looking West



Photo 3: Looking Northeast



Photo 4: Looking Northwest

Monitoring Location M-4  
 Northeast corner of Smokey Point Blvd  
 and 178th PI NE



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 Portland, Oregon

Detailed Noise Monitoring Site Photos  
 Smokey Point Boulevard Project



Photo 1: Aerial View



Photo 2: Looking West



Photo 3: Looking East



Photo 4: Looking Northeast

Monitoring Location M-5  
Northeast corner of Smokey Point Blvd  
and 175th Pl NE



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Detailed Noise Monitoring Site Photos  
Smokey Point Boulevard Project



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Traffic Noise Monitoring Information Sheet

Project Name: \_\_\_\_\_ Date: 11-17-23 Site Number: M-1

Monitoring Location: 193rd & Smokey Point Meter: 2238 Color: BLUE

Start Time: 13:12:10 End Time: 13:27:9 Last 1-Second Leq: \_\_\_\_\_ Overall Leq: FILE - 2

Temp: 52 Cloud Cover: NONE Wind: Ø Precipitation: Ø

Traffic Counts:

Roadway Name: Smokey Point N Cars 106 MedTrucks 1 HvyTrucks Ø Speeds: 50+

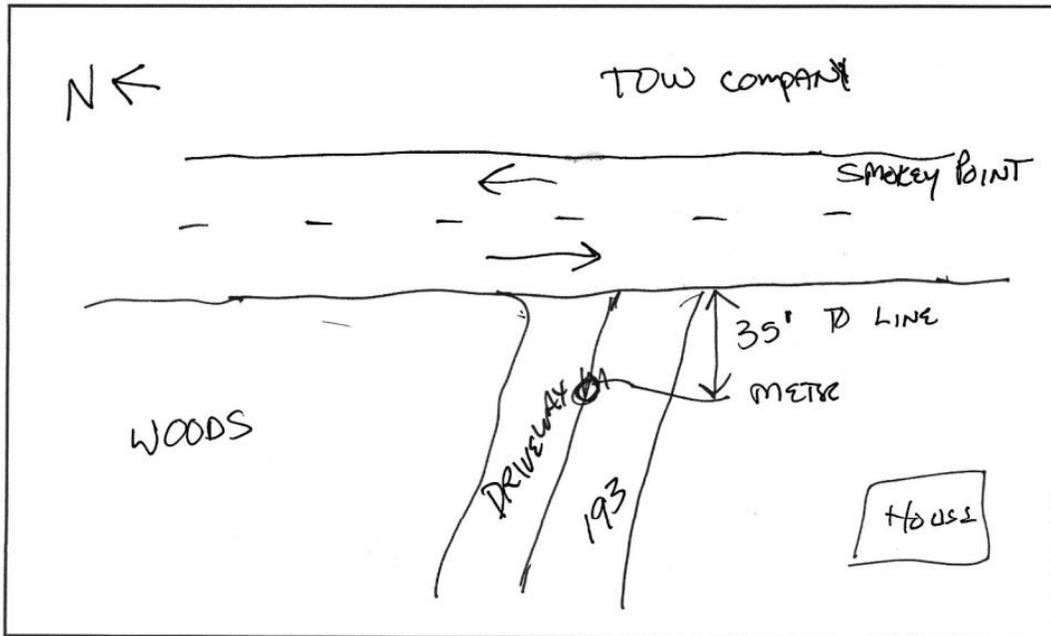
Roadway Name: Smokey Point S Cars 76 MedTrucks 4 HvyTrucks 1 Speeds: 50+

Roadway Name: \_\_\_\_\_ Cars \_\_\_\_\_ MedTrucks \_\_\_\_\_ HvyTrucks \_\_\_\_\_ Speeds: \_\_\_\_\_

Roadway Name: \_\_\_\_\_ Cars \_\_\_\_\_ MedTrucks \_\_\_\_\_ HvyTrucks \_\_\_\_\_ Speeds: \_\_\_\_\_

Area Observations: \_\_\_\_\_

Site Sketch





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 Portland, Oregon 97202  
 503.220.0495 ~ fax 866.847.0495

Traffic Noise Monitoring Information Sheet

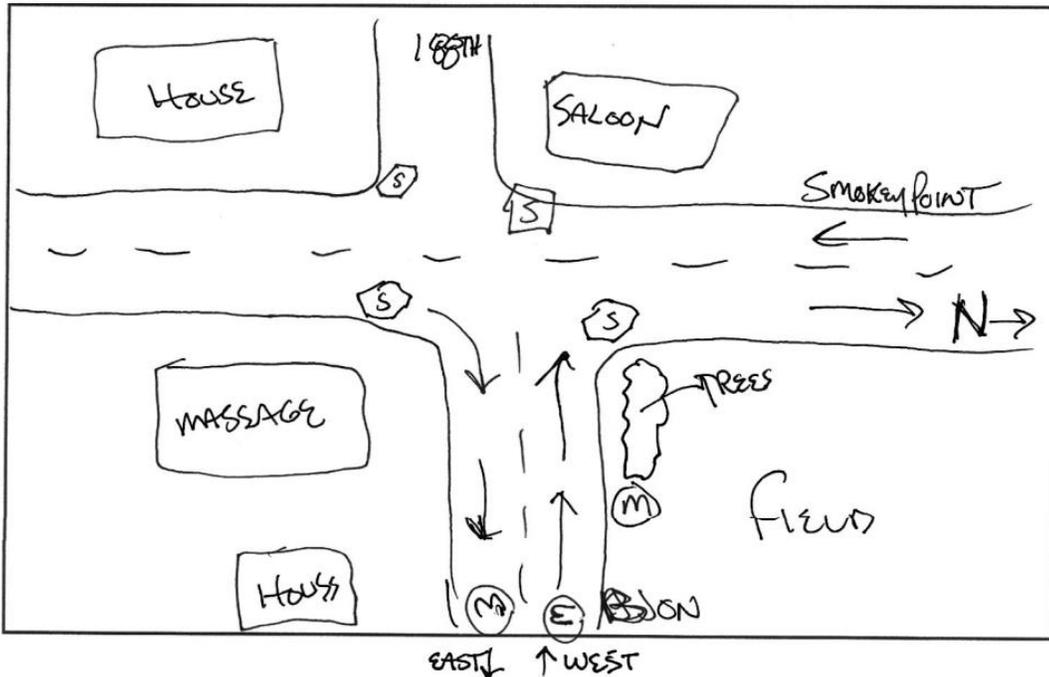
Project Name: ~~Smoky Point & Bion Rd~~ Date: 11-17-23 Site Number: M-2  
 Monitoring Location: Smoky Point & Bion Rd. Meter: 2238 Color: BLUE  
 Start Time: 13:46:30 End Time: 14:01:07 Last 1-Second Leq: Overall Leq: File-3  
 Temp: 52 Cloud Cover: NONE Wind: Ø Precipitation: Ø

Traffic Counts:

Roadway Name: Smoky Point N Cars 39 MedTrucks 2 HvyTrucks 1 Speeds: 0-35  
 Roadway Name: Smoky Point S Cars 42 MedTrucks 2 HvyTrucks 4 Speeds: 35-0  
 Roadway Name: Bion E Cars 52 MedTrucks 0 HvyTrucks 2 Speeds: 30-0  
 Roadway Name: ~~W Bion~~ W Bion Cars 55 MedTrucks 1 HvyTrucks 1 Speeds: 20-30

Area Observations: 4 way stop  
 1 BUS  
 (POSTED 35 MPH)

Site Sketch





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Traffic Noise Monitoring Information Sheet

Project Name: \_\_\_\_\_ Date: 11-17-23 Site Number: M-3  
 Monitoring Location: SMOKEY POINT Meter: 2238 Color: BLUE  
 Start Time: 14:20:00 End Time: 14:35:03 Last 1-Second Leq: \_\_\_\_\_ Overall Leq: FIL-4  
 Temp: 52 Cloud Cover: NONE Wind: ∅ Precipitation: ∅

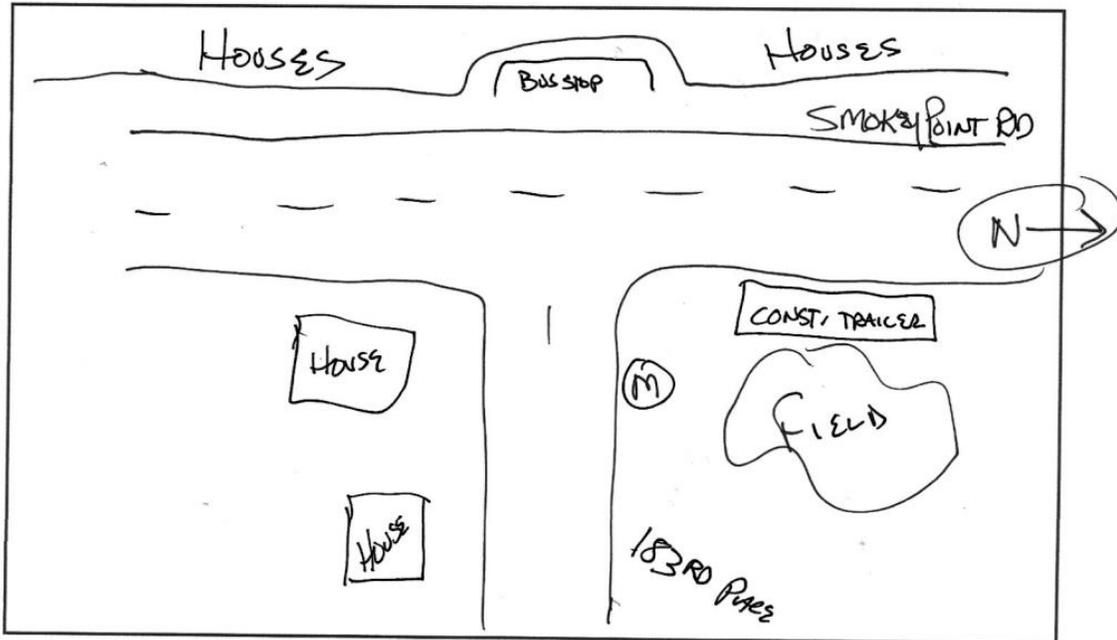
Traffic Counts:

Roadway Name: SMOKEY POINT N Cars 123 MedTrucks 3 HvyTrucks 2 Speeds: 50+/-  
 Roadway Name: SMOKEY POINT S Cars 108 MedTrucks 2 HvyTrucks 0 Speeds: 50+/-  
 Roadway Name: 183RD E Cars 1 MedTrucks 0 HvyTrucks 0 Speeds: 20  
 Roadway Name: 183RD W Cars N/A MedTrucks \_\_\_\_\_ HvyTrucks \_\_\_\_\_ Speeds: \_\_\_\_\_

Area Observations:

FREQUENT SMALL PLANE FLYOVERS

Site Sketch





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**Traffic Noise Monitoring Information Sheet**

Project Name: \_\_\_\_\_ Date: 11-17-23 Site Number: M-4

Monitoring Location: 178th Pl. & Smokey Point Meter: 2238 Color: BLUE

Start Time: 14:50:30 End Time: 15:05:34 Last 1-Second Leq: \_\_\_\_\_ Overall Leq: FILE-5

Temp: 50 Cloud Cover: NONE Wind: ∅ Precipitation: ∅

Traffic Counts:

Roadway Name: SMOKEY POINT N Cars 151 MedTrucks 0 HvyTrucks 1 Speeds: 50+

Roadway Name: SMOKEY POINT S Cars 120 MedTrucks 5 HvyTrucks 1 Speeds: 50+

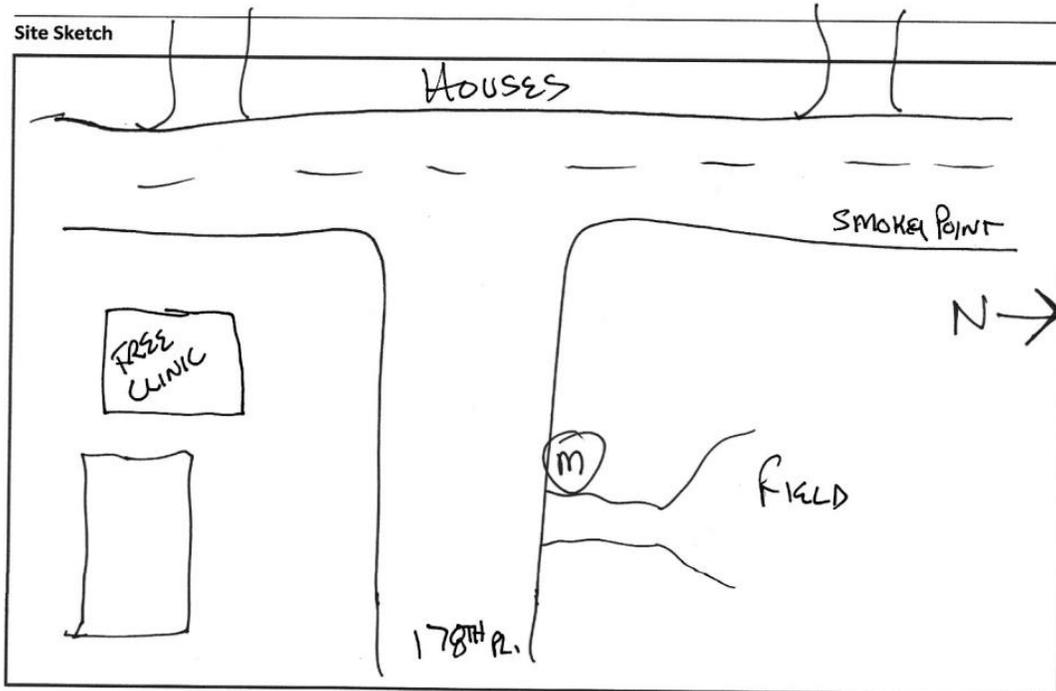
Roadway Name: 178th E Cars 3 MedTrucks 0 HvyTrucks 0 Speeds: 0-20

Roadway Name: \_\_\_\_\_ Cars \_\_\_\_\_ MedTrucks \_\_\_\_\_ HvyTrucks \_\_\_\_\_ Speeds: \_\_\_\_\_

Area Observations: \_\_\_\_\_

FREQUENT SMALL PLANES

Site Sketch





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 Portland, Oregon 97202  
 503.220.0495 ~ fax 866.847.0495

Traffic Noise Monitoring Information Sheet

Project Name: \_\_\_\_\_ Date: 11-17-23 Site Number: M-5

Monitoring Location: 175th Pl & Smokey Point Meter: 2238 Color: BLUE

Start Time: 15:21:20 End Time: 15:36:22 Last 1-Second Leq: \_\_\_\_\_ Overall Leq: FILE-6

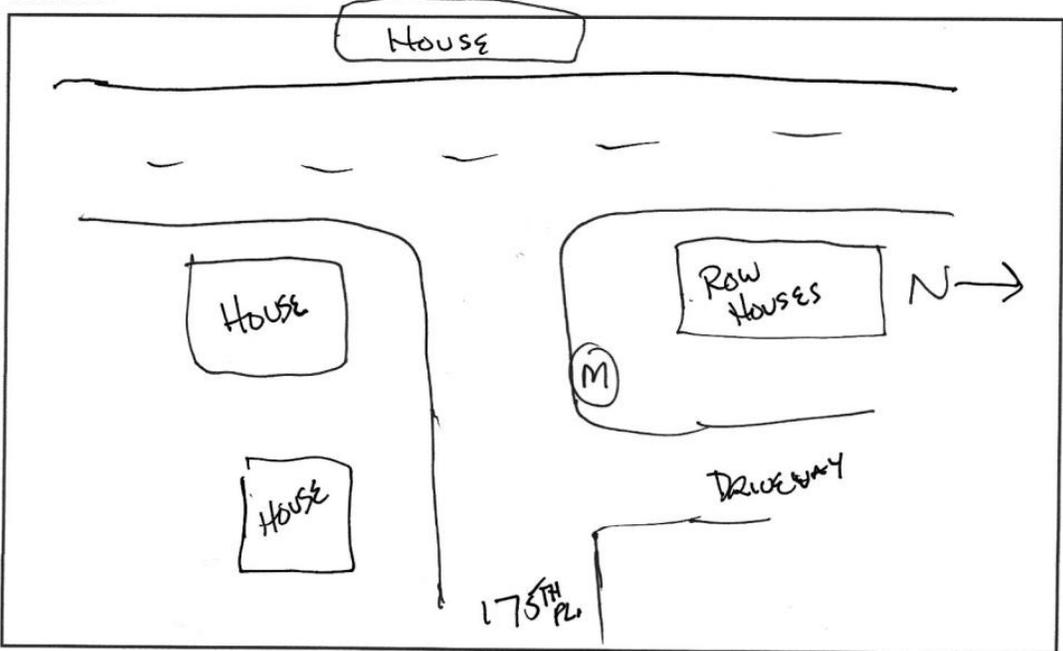
Temp: 50 Cloud Cover: NONE Wind: Ø Precipitation: Ø

**Traffic Counts:**

Roadway Name: <u>8 Smokey Point N</u>	Cars <u>105</u>	Med Trucks <u>6</u>	Hvy Trucks <u>4</u>	Speeds: <u>50+</u>
Roadway Name: <u>Smokey Point S</u>	Cars <u>117</u>	Med Trucks <u>3</u>	Hvy Trucks <u>2</u>	Speeds: <u>50+</u>
Roadway Name: <u>175th Pl E</u>	Cars <u>4</u>	Med Trucks <u>0</u>	Hvy Trucks <u>0</u>	Speeds: <u>0-20</u>
Roadway Name: <u>175th Pl W</u>	Cars <u>0</u>	Med Trucks <u>0</u>	Hvy Trucks <u>0</u>	Speeds: _____

Area Observations: \_\_\_\_\_  
 \_\_\_\_\_ small Planes

Site Sketch



Federal Aid Project Number: <b>ARL-17; ARL-17A; ARL-17B</b>		NEPA Start Date: <b>Feb 23 2023</b>	Intent of Submittal: <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Final <input type="checkbox"/> Re-Evaluate
Agency: <b>City of Arlington</b>		Project Title: <b>Smokey Point Blvd</b>	
County: Snohomish			
Beginning terminus: 74th St Ending terminus: 200th St Miles: 2.1		Township(s): 31N Range(s): 5E Section(s):	

**Part 1 - Project Description (Attach Vicinity Map)**

**Description (BASED ON DESIGN):**

The Smokey Point Blvd Corridor project is a significant transportation improvement initiative undertaken by the City of Arlington, designed to enhance safety, connectivity, and multimodal transportation options along a key stretch of Smokey Point Blvd. The project spans from 174th St NE to 200th St NE, upgrading the existing two-lane rural roadway to meet the City's Complete Streets standards and support future growth in this rapidly developing area.

**Purpose and Need:**

The purpose of the project is to improve safety and accommodate the increasing transportation needs associated with the nearby Cascade Industrial Center and future residential and commercial developments. The current roadway lacks essential infrastructure, including sidewalks, adequate lighting, ADA accessibility, intersection controls, and stormwater drainage systems. The corridor has experienced several vehicle accidents, including two fatalities in the past decade, underscoring the urgent need for safety upgrades. Additionally, the project will support the City's Transit-Oriented Development (TOD) goals by improving access to the future Gold Line Bus Rapid Transit (BRT) system and the Smokey Point Transit Center, which will serve as a key transportation hub for the area. The upgrades will also align with regional strategies to promote multimodal transportation and enhance pedestrian and cyclist safety.

**Project Scope:**

The Smokey Point Blvd Corridor project will consist of the following major improvements:

- **Roundabouts:** Construction of four roundabouts at 174th St, 180th St, and 188th St intersections to improve traffic flow and safety. Subsequent phases include the 183<sup>rd</sup> St roundabout and roadway segments between the roundabouts. Construction timelines dependent on future funding.
- **Pedestrian and Bicycle Facilities:** Addition of sidewalks, dedicated bike lanes, and pedestrian crossings with Rectangular Rapid Flashing Beacons (RRFBs) to facilitate safe non-motorized transportation.
- **Stormwater Management:** Installation of a modern stormwater system with infiltration discharge, addressing drainage issues and meeting environmental standards.
- **Lighting and Utilities:** New street and pedestrian lighting will be installed, along with utility modifications, to improve visibility and safety throughout the corridor.
- **Complete Streets Enhancements:** The project will include landscaping, public art, and other street amenities that contribute to the overall aesthetic and usability of the corridor.

**Environmental and Social Considerations:**

The project is being phased to minimize disruption to the local community, and efforts have been made to mitigate any potential environmental impacts, particularly related to noise, stormwater management, and right-of-way acquisitions. Noise mitigation measures, including potential noise walls and landscaping, are being evaluated in consultation with affected property owners. The project will require limited right-of-way acquisitions, with ongoing communication with property owners to minimize impacts.

**Construction Phasing:**

The project will be constructed in phases, with the roundabouts serving as the initial focus:

- **188th St Roundabout:** Construction scheduled for 2025.
- **180th St Roundabout:** Planned for 2026.
- **174th St Roundabout:** Planned for 2028.

Subsequent phases will address the roadway segments between the roundabouts, with construction timelines dependent on future funding.

**ARL-17 Description:**

The scope of this project includes the planning, design, engineering, preliminary right-of-way (ROW) research, and public outreach necessary to transform the current two-lane rural corridor into an urban corridor in line with Arlington’s Horizontal Mixed-Use planning model. The project will feature two general-purpose travel lanes, dedicated bike lanes, a center median, sidewalks, and upgraded bus stops. Additionally, the work will involve identifying and mapping existing water and sewer utilities, as well as designing low-impact development (LID) drainage systems. Community outreach will play a crucial role, as feedback from residents is essential to ensure this is not just a corridor project, but a project that truly reflects the needs of the Smokey Point neighborhood. As the project progresses, ROW requirements and property valuations will be determined through independent analysis. The final deliverable will include an estimate for ROW acquisition and a complete set of construction-ready documents, positioning the project for funding and bidding.

**ARL-17A Description:**

This project aims to construct a roundabout at the intersection of Smokey Point Blvd and 188th St. The scope of work includes building the roundabout and its approaches, along with installing sidewalks, a multi-use trail/bike lanes, site drainage systems, and water, sewer, and relocation of electrical/communication utilities. Additionally, the project will feature upgraded lighting, a transit stop, local artwork, and landscaping to enhance the area. The preliminary engineering (PE) phase for this project was completed under project ARL-17.

**ARL-17B Description:**

The 180th Street Roundabout project involves the construction of a single-lane roundabout along with its approaches. The project will also include the installation of sidewalks, a multi-use trail/bike lanes, site drainage, water, sewer, and relocation of electrical/communication utilities, as well as upgraded lighting, transit stops, local artwork, and landscaping to enhance the area. The preliminary engineering (PE) phase for this project was completed under project ARL-17.

**Part 2 – Categorical Exclusion & STIP**

- Identify one CE from 23 CFR 771.117 (CE Guidebook - Appendix A) that fits the entire project: d(13)
- Per 23 CFR Part 452(l) identify the subsequent project phase identified on the STIP?  ROW  Construction
- Attach a copy of the STIP page to the CE documentation form.

**NEPA Approval Signatures**

	<u>10/07/2024</u>	_____	_____
Local Agency Approving Authority	Date	Local Programs Environmental Engineer	Date
	Mehrdad Moini,	Digitally signed by Mehrdad Moini, PE	
PE	PE	Date: 2024.11.12 09:28:34 -08'00'	
Regional Local Programs Engineer	Date	Federal Highway Administration	Date

Completed by (Print Official’s Name): <b>Jason Walker, Consultant, Perteet</b>	Telephone (include area code): <b>425.252.7700</b>	E-mail address: <b>jason.walker@perteet.com</b>
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**Part 3 - Permits, Approvals & Right of Way (ROW)**

Yes	No	Permit or Approval	Yes	No	Permit or Approval
-----	----	--------------------	-----	----	--------------------

<input type="checkbox"/> <input checked="" type="checkbox"/> Corps of Engineers <input type="checkbox"/> Sec. 10 <input type="checkbox"/> Sec. 404 <input type="checkbox"/> Nationwide Type _____ <input type="checkbox"/> Individual Permit No. _____ <input type="checkbox"/> <input checked="" type="checkbox"/> Coastal Zone Management Certification <input type="checkbox"/> <input checked="" type="checkbox"/> Critical Areas Ordinance (CAO) Permit <input type="checkbox"/> <input checked="" type="checkbox"/> Forest Practices Act Permit <input type="checkbox"/> <input checked="" type="checkbox"/> Hydraulic Project Approval <input type="checkbox"/> <input checked="" type="checkbox"/> Local Building or Site Development Permits <input type="checkbox"/> <input checked="" type="checkbox"/> Local Clearing and Grading Permit <input type="checkbox"/> <input checked="" type="checkbox"/> National Pollutant Discharge Elimination System (NPDES) Baseline General for Construction <input type="checkbox"/> <input checked="" type="checkbox"/> Shoreline Permit <input type="checkbox"/> <input checked="" type="checkbox"/> State Waste Discharge Permit <input type="checkbox"/> <input checked="" type="checkbox"/> Water Rights Permit	<input type="checkbox"/> <input checked="" type="checkbox"/> Water Quality Certification – Section 401 Issued by _____ <input type="checkbox"/> <input checked="" type="checkbox"/> Tribal Permit(s) (if any) _____ <input checked="" type="checkbox"/> <input type="checkbox"/> Other Permits (List) Arlington Grading / SEPA <input checked="" type="checkbox"/> <input type="checkbox"/> Is permanent ROW acquisition needed? If yes, amount needed: <b>58,677 sf</b> <input checked="" type="checkbox"/> <input type="checkbox"/> Is any temporary ROW needed? <input checked="" type="checkbox"/> <input type="checkbox"/> Is relocation required? <input type="checkbox"/> <input checked="" type="checkbox"/> Has ROW (property and/or property interests) been acquired <u>for this project</u> prior to the NEPA start date? If yes, documentation demonstrating compliance with 23 CFR 710.501 may be required. <input type="checkbox"/> <input checked="" type="checkbox"/> Is a detour required? If yes, please attach detour information.
--	--

**U.S. Coast Guard Permitting**

a. Does the project propose any new or modify **any** existing bridges or culverts crossing a waterway?     Yes     No

b. If Yes, attach a copy of the jurisdictional determination email or letter from the U.S. Coast Guard.

**Other Federal Agencies** - Does the project involve any federal properties, approvals or funding from other/additional federal agencies?     Yes     No    If Yes, please describe.

**Part 4 - Environmental Considerations**

**Will the project involve work in or affect any of the following? Identify proposed mitigation. Attach additional pages or supplemental information if necessary.**

**1. Air Quality** - Identify any anticipated air quality issues.

Is the project exempt from Air Quality conformity requirements?     Yes     No

a. If Yes, identify exemption – please refer to Appendix G in the CE Guidebook for a list of exemptions.

b. Is the project located in an Air Quality Non-Attainment Area or Maintenance Area for carbon monoxide, ozone or PM 10 or PM 2.5?     Yes     No

**2. Critical and Sensitive Areas**

a. Is this project within a sole source aquifer     Yes     No  
 If located within a sole source aquifer, is the project exempt from EPA approval?  
 If Yes, please list exemption: \_\_\_\_\_  
 If No, date of EPA approval: \_\_\_\_\_

b. Will this project impact Species/Habitat other than ESA listed species?     Yes     No    Explain your answer.

c. Is this project within one mile of a Bald Eagle nesting territory, winter concentration area or communal roost?  
 Yes     No    If Yes, the local agency must go to the US Fish & Website (<https://www.fws.gov/story/do-i-need-eagle-take-permit>) and review the information under *When is a permit recommended?*. **Please explain why a permit is or is not needed:**

Please attach a copy of the permit if needed.

d. Are wetlands present within the project area?     Yes     No    If Yes, estimate the impact in acres: \_\_\_\_\_  
 Please attach a copy of the proposed mitigation plan.

**3. Cultural Resources/Historic Structures** – Identify any historic, archaeological or cultural resources present within the project’s Area of Potential Effects.

Does the project fit into any of the exempt types of projects listed in Appendix J of the CE Guidebook?

Yes  No If Yes, note exemptions below.

If No: Date of DAHP concurrence: 4/10/24

Date of Tribal consultation(s) (if applicable): 8/31/23

Adverse effects on cultural/historic resources?  Yes  No

If Yes, date of approved Section 106 MOA: \_\_\_\_\_

**4. Floodplains and Floodways**

- a. Is the project located in a 100-year floodplain?  Yes  No
- b. If Yes, is the project located within a 100-year floodway?  Yes  No
- c. Will the project impact a 100-year floodplain?  Yes  No If Yes, describe impacts.

**5. Hazardous and Problem Waste** – Identify potential sources and type(s).

- a. Does the project require excavation below the existing ground surface?  Yes  No
- b. Will groundwater be encountered?  Yes  No
- c. Will any properties be acquired as part of this project?  Yes  No
- d. Is this site located in an undeveloped area (i.e. no buildings, parking, storage areas or agriculture)?  Yes  No
- e. Is the project located within a one-mile radius of a known Superfund Site?  Yes  No
- f. Is this project located within a ½-mile radius of a site or sites listed on any of the following Department of Ecology databases?  Yes  No If Yes, check the appropriate boxes below.
- Voluntary Cleanup Program (VCP), State Cleanup Site (SCS), or Independent Cleanup Program (ICP)
- Underground Storage Tank (UST)
- Leaking Underground Storage Tank (LUST)
- Confirmed and Suspected Contaminated Sites List (CSCSL)
- g. Has site reconnaissance (windshield survey) been performed?  Yes  No (Please identify any properties not identified in the Ecology or ERS database search as an attachment -- name, address and property use).
- h. Based on the information above and project specific activities, is there a potential for the project to generate, acquire or encounter contaminated soils, groundwater or surface water?  Yes  No

**Please explain:**

**Geotechnical report (HWA 2021)** HWA installed groundwater monitoring wells in four of the borings (BH-1, BH-2, BH-4, and BH-6). Groundwater levels varied over time. The wells to the south are at significantly higher elevation than those at the north. In general, the groundwater depths ranged from approximately 8.1 feet bgs to a depth of 24.4 feet bgs. As such, groundwater should be considered to be as shallow as 8 feet bgs.

**Potential hazardous materials conditions identified in Hazmat Report (HWA 2023):**

- Poeschel & Schultz Inc. Property (PSI): Soil contamination above regulatory cleanup levels approximately 150 feet from the Project Area. Risk of contamination being encountered considered to be moderate.

- **178th Pl & Smokey Point Blvd (178th/SPB):** 178th/SPB identified on Ecology SPILLS database for a 2006 a motor vehicle accident that occurred at the intersection of 178th Place NE and Smokey Point Boulevard and resulted in a spill of approximately 75 to 100 gallons of diesel fuel. Moderate risk of contamination being encountered at intersection.
- **Historic Land Uses:** In addition to the PSI property, historic land use adjacent to the Project Area included commercial and automotive uses. Unanticipated contaminated soil or groundwater may be encountered along the project alignment.
- **Longhorn Saloon:** During reconnaissance of the Project Area, HWA observed several drums on the west (back) side of the Longhorn Saloon building addressed at 18802 Smokey Point Boulevard, Snohomish County tax parcel 31051700402900. Parcel has been identified as a property that the City intends to acquire. Based on the drums, significant staining, and distressed vegetation observed, acquisition of this property was considered high risk with potential environmental liability for the City.

Recommended mitigation measures include:

- Perform appropriate due diligence for any property purchases, including Phase I or II ESAs, as needed;
- Field screen soils and groundwater during excavation activities for indications of contamination. If suspect soils and/or groundwater are encountered during construction, or in areas of known contamination, perform sampling and laboratory analysis to characterize the materials for proper management, handling, and disposal, including appropriate health and safety measures and compliance with applicable local, state and federal regulations;
- Develop protocol and select areas for field screening, sampling, and laboratory analysis based on the evaluation of adjoining known contaminated sites presented herein.
- Utilize best management practices for stormwater and erosion control;
- Follow Ecology UST reporting and removal regulations if abandoned or unreported regulated USTs are encountered during construction;
- Apply appropriate health and safety measures;
- Develop a CMMP and project specifications which outline proper testing, handling and disposal of any contaminated soil or water encountered during project construction. Project specifications may include GSPs or special provisions (project specific specifications) if needed. Typically, GSPs are added to the construction contract when contamination is predicted but not known. Special Provisions are used for known contamination. These specifications inform the Contractor of known or potential contaminants and any reports available for the Contractor’s review.

If you responded **Yes** to any of these questions above (5A – 5F or 5H), contact your Region LPE for assistance as a “Right-Sized” HazMat Analysis Report/Memorandum most likely will be required.

#### Part 4 - Environmental Considerations (continued)

**6. Noise**

- a. Does the project involve constructing a new roadway?  Yes  No
- b. Is there a change in the vertical or horizontal alignment of the existing roadway?  Yes  No
- c. Does the project increase the number of through traffic lanes on an existing roadway?  Yes  No
- d. Is there a change in the topography?  Yes  No
- e. Are there auxiliary lanes extending 1-½ miles or longer being constructed as part of this project?  
 Yes  No
- f. If you answered Yes to any of the preceding questions, identify and describe any potential noise receptors within the project area and subsequent impacts to those noise receptors. Please attach a copy of the noise analysis if required.

**Noise Study provided, mitigation measures described**

If impacts are identified, describe proposed mitigation measures.

**7. 4(f)/6(f) Resources: parks, recreation areas, wildlife refuges, historic properties, wild & scenic rivers, scenic byways**

- a. Please identify any 4(f) properties within the project limits and the areas of impacts.

**None**

- b. Please identify any properties within the project limits that used funds from the Land & Water Conservation Fund Act.

**None**

- c. Please list any Wild and Scenic Rivers and Scenic Byways within the project limits.

**None**

**8. Agricultural Lands –**

- a. Are there agricultural lands within 300 feet of the project limits?  Yes  No If Yes, describe impacts:
- b. Are impacted lands considered to be unique and prime farmland?  Yes  No  
If Yes, date of project review by Natural Resource Conservation Service (NRCS): \_\_\_\_\_

**9. Rivers, Streams (continuous or intermittent) or Tidal Waters**

- a. Identify all waterbodies within 300 feet of the project limits or that will otherwise be impacted.

**None**

- b. Identify stream crossing structures by type.

**None**

**Part 4 - Environmental Considerations (continued)**

- 10. Tribal Lands –** Identify whether the project will occur within any Tribal lands, including reservation, trust and fee lands. Please do not list usual and accustomed area.

**11. Water Quality/Stormwater**

a. Will this project’s proposed stormwater treatment facility be consistent with the guidelines provided by either WSDOT’s HRM, DOE’s stormwater management manual for eastern/western Washington or a local agency equivalent manual?  Yes  No

Explain proposed water quality/quantity treatment for the new and any existing pollution generating impervious surface associated with the proposed project. **All infiltration.**

- b. Amount of existing pollution generating impervious surface within the project limits: **412,753 sf**
- c. Net new pollution generating impervious surface to be created as a result of this project: **848,293 sf**
- d. Amount of proposed post-project untreated pollution generating impervious surface: **0 sf**

**12. Previous Environmental Commitments**

Describe previous environmental commitments that may affect or be affected by the project – if any.  
**None**

**13. Environmental Justice** - Does the project meet any of the exemptions noted in Appendix L of the CE Documentation Guidebook?

If Yes, please note the exemption and appropriate justification in the space below.

If No, attach Appendix M and supporting documentation as required per the decision matrix. This will include at least two demographic information sources and possibly a description of anticipated project impacts.

Please refer to the CE Guidebook for more information.

**EJ Memo Provided**

**Part 5 - Biological Assessments and EFH Evaluations**

1. **Do any listed species potentially occur in the project’s action area and/or is any designated critical habitat present within the project’s action area?**  Yes  No Attach species listings.

Affected ESA Listed Species	2. Will any construction work occur within 0.25 mile of any of the following?	3. Does the project involve blasting, pile driving, concrete sawing, rock-drilling or rock-scaling activity within one mile of any of the following?
Oregon Spotted Frog proposed critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Yellow-billed Cuckoo suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Spotted Owl management areas, designated critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Marbled Murrelet nest or occupied stand, designated critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Western Snowy Plover designated critical habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Is the project within 0.25 mile of marine waters? If Yes explain potential effects on Killer Whales and on Marbled Murrelet foraging areas.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Killer Whale designated critical habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Grizzly Bear suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Gray Wolf suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Canada Lynx habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Columbia White-tailed Deer suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Woodland Caribou habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Streaked Horned Lark designated critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Taylor's Checkerspot designated critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Mazama Pocket Gopher designated critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Eulachon designated critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Rockfish proposed critical habitat or suitable habitat?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
A mature coniferous or mixed forest stand?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
4. Will the project involve any in-water work?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
5. Will any construction work occur within 300 feet of any perennial or intermittent waterbody that either supports or drains to waterbody supporting listed fish?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
6. Will any construction work occur within 300 feet of any wetland, pond or lake that is connected to any permanent or intermittent waterbody?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
7. Does the action have the potential to directly or indirectly impact designated critical habitat for salmonids (including adjacent riparian zones)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
8. Will the project discharge treated or untreated stormwater runoff or utilize water from a waterbody that supports or drains into a listed-fish supporting waterbody?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
9. Will construction occur outside the existing pavement? If Yes go to 9a.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
9a. Will construction activities occurring outside the existing pavement involve clearing, grading, filling or modification of vegetation or tree-cutting?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
10. Are there any Federally listed Threatened or Endangered plant species located within the project limits? If Yes, please attach a list of these plant species within the action area.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
11. Does a mature coniferous or mixed forest stand occur within 200' of the project site?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>Analysis for No Effects Determination</b> – If there are any Yes answers to questions in Part 5, additional analysis is required. Attach additional sheets if needed.		
<b>ESA Effects avoided. No work in or near water. All stormwater will be infiltrated. Stormwater Report provided.</b>		

**Analysis for RRMP ESA 4(d) determination for NMFS – A local agency must be certified by the Regional Road Maintenance Forum to utilize 4(d).**

**Maintenance Category** (check all that apply)

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> 1. Roadway Surface                    | <input type="checkbox"/> 6 Stream Crossings         | <input type="checkbox"/> 11. Emergency Slide/Washout Repair |
| <input type="checkbox"/> 2. Enclosed Drainage Systems          | <input type="checkbox"/> 7. Gravel Shoulders        | <input type="checkbox"/> 12. Concrete                       |
| <input type="checkbox"/> 3. Cleaning Enclosed Drainage Systems | <input type="checkbox"/> 8. Street Surface Cleaning | <input type="checkbox"/> 13. Sewer Systems                  |
| <input type="checkbox"/> 4. Open Drainage Systems              | <input type="checkbox"/> 9. Bridge Maintenance      | <input type="checkbox"/> 14. Water Systems                  |
| <input type="checkbox"/> 5. Watercourses and Streams           | <input type="checkbox"/> 10. Snow and Ice Control   | <input type="checkbox"/> 15. Vegetation                     |

**Describe how the project fits in the RRMP 4(d) Program:**

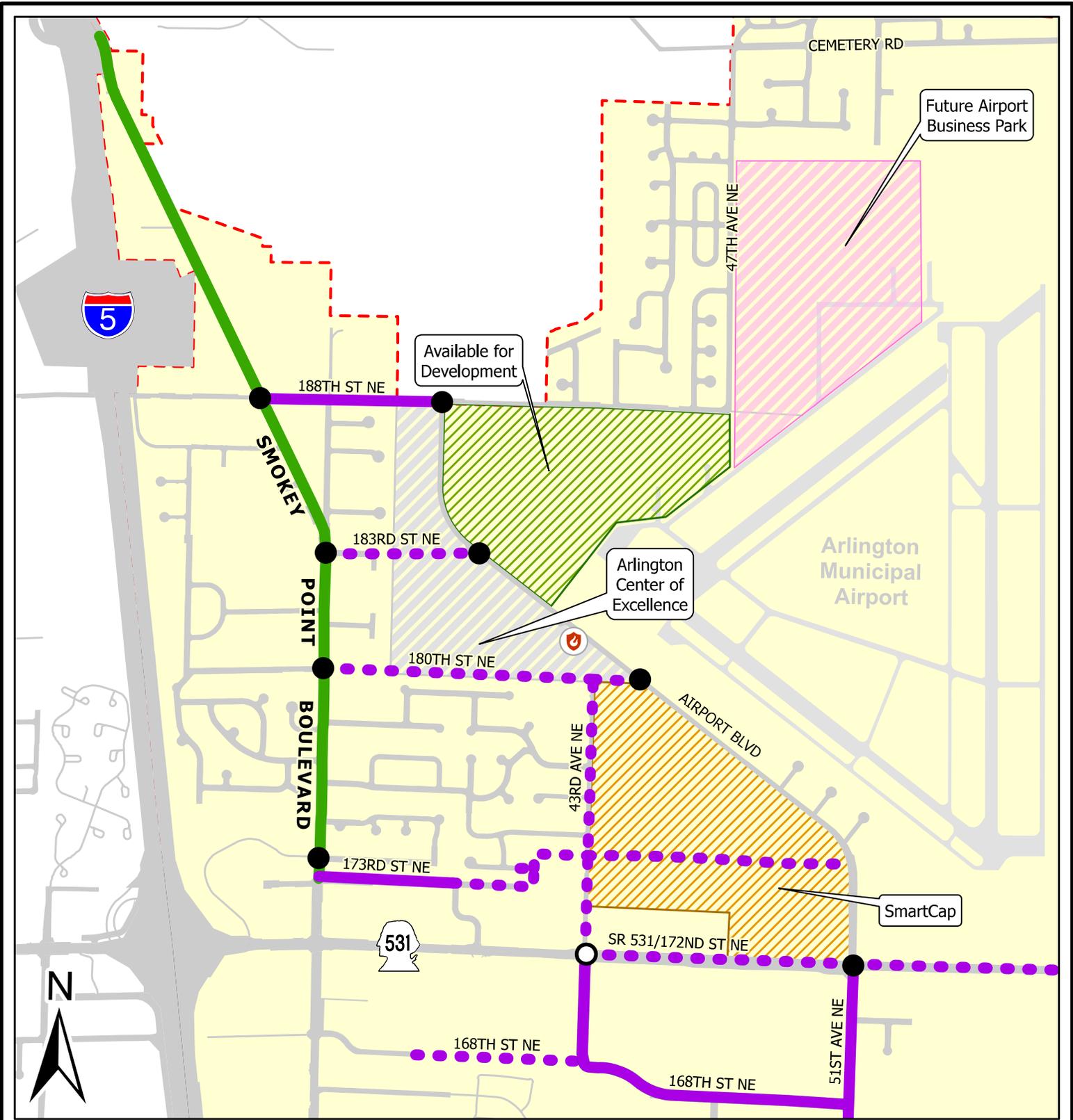
**Effect Determinations for ESA and EFH**

If each of the questions in the preceding section resulted in a “No” response or if any of the questions were checked “Yes,” but adequate justification can be provided to support a “no effect” determination, then check “No Effect” below. If this checklist cannot be used for Section 7 compliance (i.e., adequate justification cannot be provided or a “may effect” determination is anticipated), a separate biological assessment document is required.

**NE OK per HP**

	NMFS	USFWS	EFH Determination
<input checked="" type="checkbox"/> No Effect	<u>7/16/24</u>	<u>7/16/24</u>	<input checked="" type="checkbox"/> No Adverse Effect
<input type="checkbox"/> NLTAA - Date of Concurrence _____			<input type="checkbox"/> Adverse Effect – Date of NMFS concurrence _____
<input type="checkbox"/> LTAA – Date BO Issued _____			<input type="checkbox"/> Not Applicable
<input type="checkbox"/> RRMP 4(d) _____			

**Part 6 - FHWA Comments**



- Legend**
- Transportation Improvement
  - Constructed
  - Pending
  - Smokey Point Blvd
  - Constructed Roundabout
  - Proposed Roundabout
  - Fire Station
  - City Limits

*City of Arlington*  
**Smokey Point**  
**Transportation Improvements**

Scale: 1 inch = 1,292 ft  
 File: 2024TransportationGraphics/SPTransImproveLayout8.5x11\_2024

Date: 8/30/2024  
 Cartographer: lhb

This data is provided 'as is' without warranty of any kind. The entire risk as to the results and performance of the data is assumed by you. Should the data prove defective, you assume the entire cost of all necessary servicing, repair, or correction. These data and corresponding attributes are not to be used for design purposes. Further, the City of Arlington does not warrant, guarantee, or make any representations regarding the use of, or results from the use of the data in terms of correctness, accuracy, reliability, currentness, or otherwise; and you rely on the data and results solely at your own risk. There are known gaps and inaccuracies in the current data set and the provided information should be considered a draft and in-progress work. Washington State Law, Ch. 42.56 RCW, prohibits state and local agencies from providing access to lists of individuals intended for use for commercial purposes and thus, no commercial use may be made of any Data comprising lists of individuals contained herein.

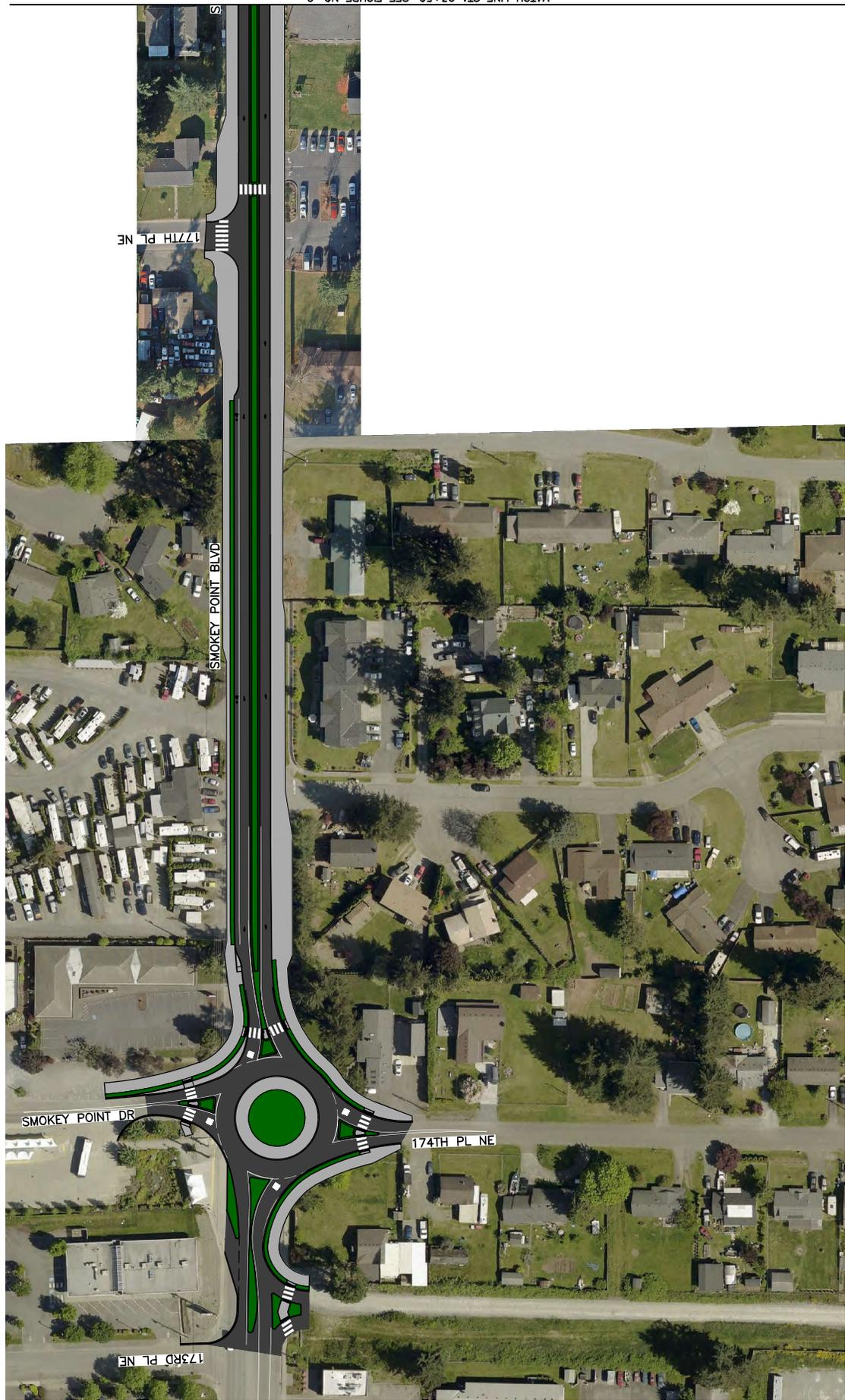
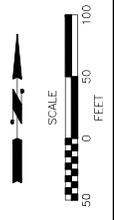
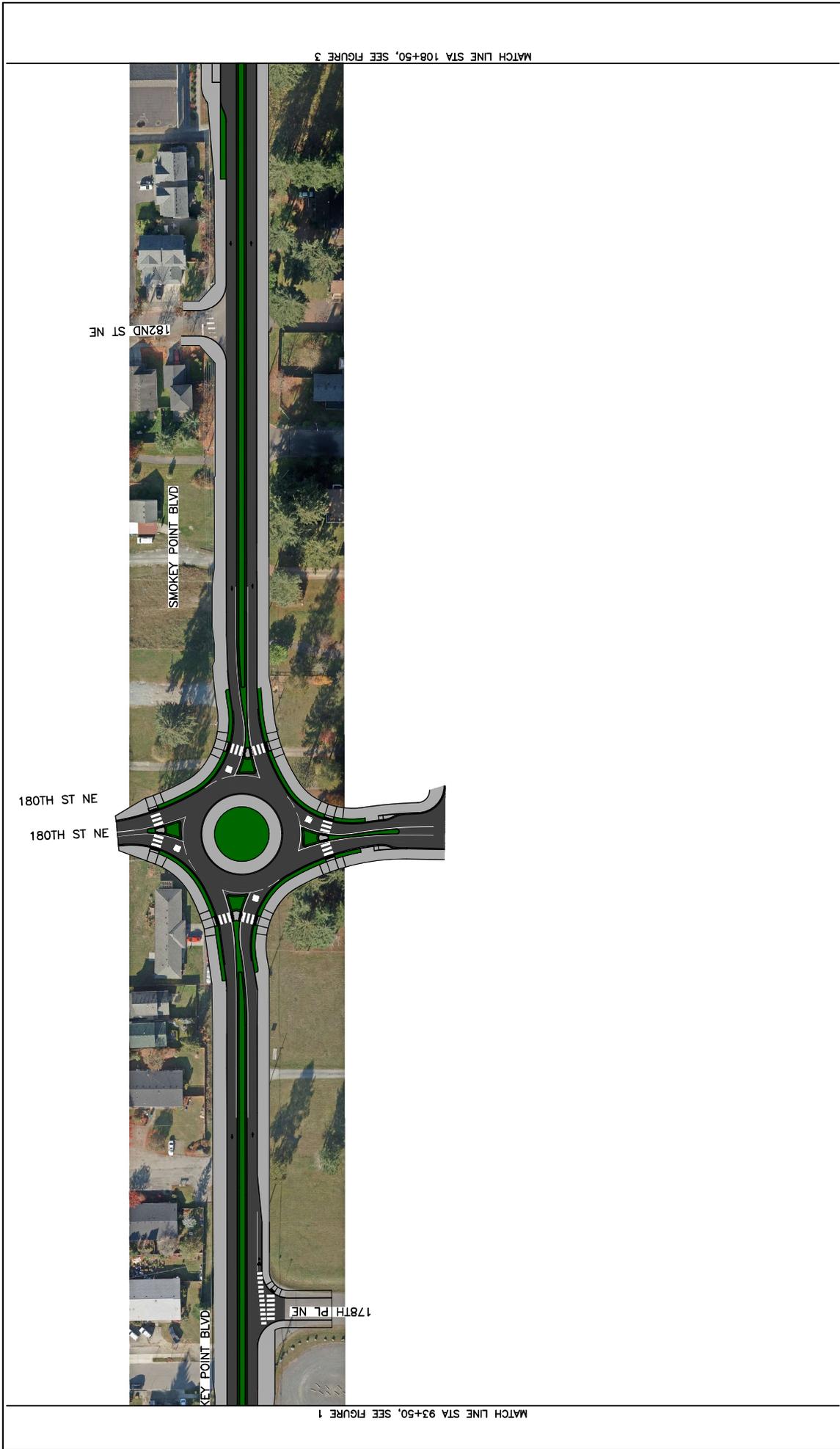


FIGURE 1

SMOKEY POINT BLVD  
PROJECT LIMITS MAP

**PERTEET**  
2707 COLBY AVENUE, SUITE 900  
EVERETT, WA 98201  
425.227.7700 | 800.855.9900





MATCH LINE STA 108+50, SEE FIGURE 3

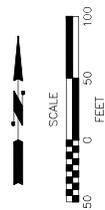
MATCH LINE STA 93+50, SEE FIGURE 1

FIGURE 2

SMOKEY POINT BLVD  
PROJECT LIMITS MAP

**PERTEET**  
2707 COLBY AVENUE, SUITE 900  
EVERETT, WA 98201  
425.227.7700 | 800.955.9900





**PERTEET**  
 2707 COLBY AVENUE, SUITE 900  
 EVERETT, WA 98201  
 425.227.7700 | 800.855.9900

SMOKEY POINT BLVD  
 PROJECT LIMITS MAP

FIGURE  
 3

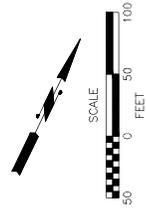
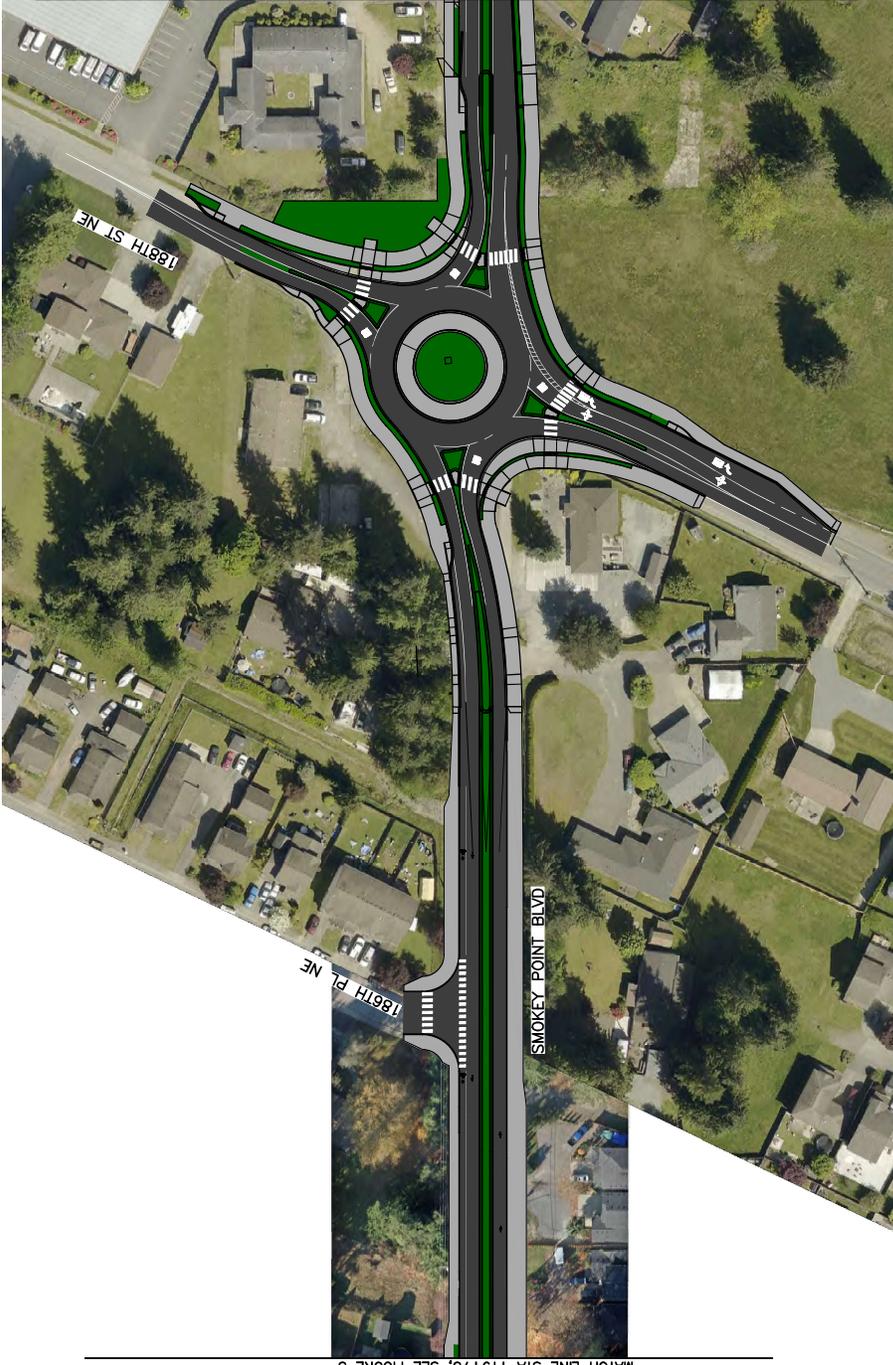


FIGURE  
4

SMOKEY POINT BLVD  
PROJECT LIMITS MAP

**PERTEET**  
 2707 COLBY AVENUE, SUITE 900  
 EVERETT, WA 98201  
 425.227.7700 | 800.855.9900

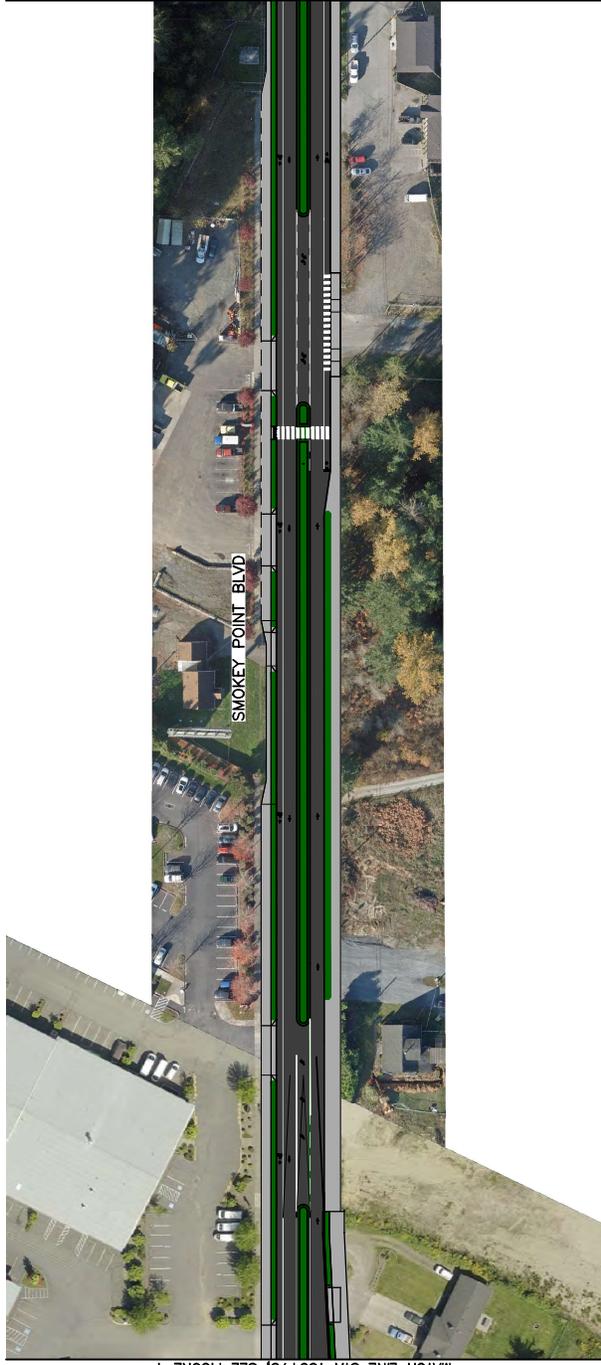
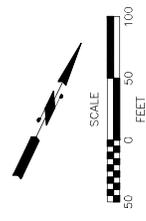
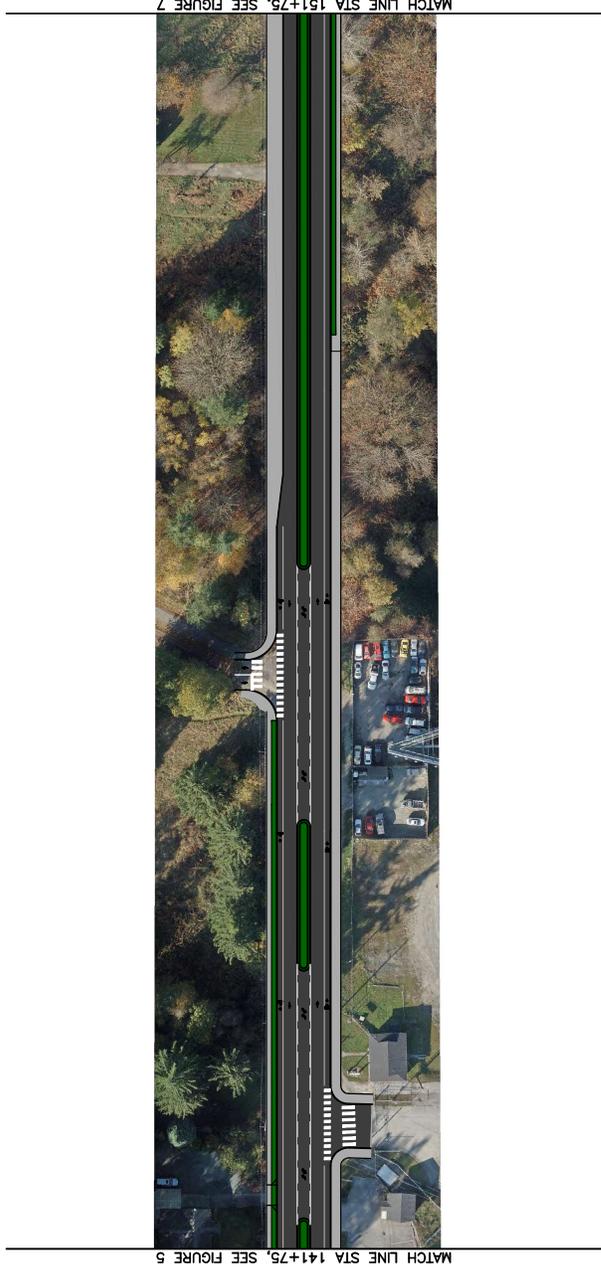


FIGURE 5

SMOKEY POINT BLVD  
PROJECT LIMITS MAP

**PERTEET**  
 2707 COLBY AVENUE, SUITE 900  
 EVERETT, WA 98201  
 425.227.7700 | 800.855.9900



**PERTEET**  
2707 COLBY AVENUE, SUITE 900  
EVERETT, WA 98201  
425.227.7700 | 800.855.9900

FIGURE  
6

SMOKEY POINT BLVD  
PROJECT LIMITS MAP



MATCH LINE STA 151+75, SEE FIGURE 6

FIGURE 7

SMOKEY POINT BLVD  
PROJECT LIMITS MAP

**PERTEET**  
 2707 COLBY AVENUE, SUITE 900  
 EVERETT, WA 98201  
 425.227.7700 | 800.855.9900

# Arlington 211th Place NE

City of Arlington  
Arlington, Washington

**Prepared For:**

City of Arlington

**Prepared By:**

SCJ Alliance  
David Hall, PE  
25 N Wenatchee Ave, Suite 238  
Wenatchee, WA 98801  
509.886.3265

January 2024



**Project Information**

Project: **211<sup>th</sup> Place NE**

Prepared for: City of Arlington 238  
North Olympic Avenue  
Arlington, WA 98223  
Phone: 360-403-3421

**Reviewing Agency**

Jurisdiction: **City of Arlington**

**Project Representative**

Prepared by: **SCJ Alliance**  
25 N Wenatchee Ave, Suite 238  
Wenatchee, WA 98801  
509.886.3265  
scjalliance.com

Contact: Dan Ireland, PE

Project Reference: SCJ # 22-000884

N:\Projects\0698 City of Arlington\22-000884 Arlington 211th  
NE-67th Ave\Design\Storm\Drainage Report

## PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Stormwater Report for the City of Arlington 211<sup>th</sup> Place NE project has been prepared by me or under my supervision and meets the minimum standards of the City of Arlington and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.



---

Prepared by David Hall, PE

---

Approved by Dan Ireland, PE

## Table of Contents

Project Overview.....	4
Project Description.....	4
Project Location .....	4
Existing Conditions.....	5
Proposed Conditions.....	6
Minimum Requirements.....	6
MR1-Preparation of Stormwater Site Plans.....	7
MR2 – Construction Stormwater Pollution Prevention Plan (SWPPP) .....	7
MR3 – Source Control of Pollution .....	8
MR4 – Preservation of Natural Drainage Systems and Outfalls .....	8
MR5 – On-Site Stormwater Management .....	8
MR6 – Runoff Treatment .....	8
MR7 – Flow Control .....	9
MR8 – Wetlands Protection.....	9
MR9 – Operation and Maintenance .....	9
Offsite Analysis.....	9
Offsite Conveyance Sizing .....	9
Onsite Permanent Stormwater Control Plan.....	9
Offsite Permanent Stormwater Control Plan.....	10

## **LIST OF APPENDICES**

Appendix 1: Site Vicinity Map

Appendix 2: Subbasin Exhibits

Appendix 3A: Minimum Requirements Flow Chart

Appendix 3B: MGS Flood Model Output

Appendix 3C: Conveyance Calculations

Appendix 4: Soils Map & Geotechnical Report

Appendix 5: FEMA Flood Insurance Rate Map

Appendix 6: Downstream Map

Appendix 7: Manufacture's Water Quality and Infiltration Chamber Facility Specifications

## Project Overview

### Project Description

The City of Arlington is designing improvements for 211 Place NE between 67th Avenue State Road and SR-530. These improvements will include a resurfaced roadway, improved drainage, utility improvements, multiuse trail, street/pedestrian lights, and street amenities.

The new roadway alignment will be shifted 2-feet to the south to allow for a 2-foot shoulder along the northern edge of the roadway. An extruded curb will be installed on the northern edge of the roadway in areas in which the roadway cross slope sheet flows water to the north. New catch basins will be installed at the low points along the northern extruded curb to bring water south to proposed infiltration facilities.

The southern portion of the roadway will have a new 2-foot shoulder, extruded curb & gutter, 5-foot landscaped buffer strip, and a 12-foot shared used path. This project will require stormwater collection and conveyance that keeps runoff away from the critical slopes on the north side of the roadway. The road also has many varying super-elevated slopes that result in larger concentrations of stormwater and ponding. A new stormwater conveyance main will be installed along the southern curb & gutter with new catch basins. Three proposed infiltration facilities will be installed along the southern edge of the roadway to detain and infiltrate stormwater runoff.

Private land acquisition will be necessary from some parcels along the southern edge of the roadway to increase the ROW to accommodate the new shared use path and channelization.

This stormwater design is designed to meet the standards of the 2019 Ecology Stormwater Management Manual for Western Washington (SWMMWW) and the City of Arlington standards.

### Project Location

The proposed project is located along the entirety of 211<sup>th</sup> Place NE between State Road 530 on the west end and 67<sup>th</sup> Avenue NE on the east end of the project. The project is approximately 1.4 miles to the southwest of downtown Arlington Washington.



Vicinity Map

## Existing Conditions

Runoff from the project site generally is either conveyed to existing underground infiltration systems or sheet flows off the roadway and is comprised of two Tributary Discharge Areas (TDA) as described below.

### TDA 1

This TDA consists of 211<sup>th</sup> Pl NE, between the west end of the project and STA 28+70, and portions of running Road and 67<sup>th</sup> Dr NE. 211<sup>th</sup> Place NE is a narrow curving roadway with no shoulder on either side. An extruded curb and asphalt path existing on the southern edge of the roadway from 67<sup>th</sup> Avenue NE to Ronning Road. Except for several private parcels along the northeast portion of the site, the entire northern edge of the roadway has steep slopes almost immediately off the shoulder. The slope is heavily vegetated with dense grasses and large diameter trees. A marshy floodplain with an unnamed small creek exists at the base of the slope from the roadway.

The south side of 211<sup>th</sup> Place NE has houses in which driveways directly access the roadway. Two residential roads intersect 211<sup>th</sup> Place NE at the south which provide access to subdivisions. The existing grade on the south side of 211<sup>th</sup> Place NE slopes from the south to north but is not considered steep.

Stormwater from TDA 1 generally flows to the west, sheet flows off the side of the roadway into grass lined ditches or down the grass lined slopes and flows to the base of the hill. Portions of Ronning Road and 211<sup>th</sup> are collected by two existing catch basins and discharged off the edge of the slope to the immediate north and flows to the base of the hill.

### TDA 2

Stormwater from this basin includes the eastern portion of 211<sup>th</sup> Place NE from STA 28+70 to the eastern end of the project and is collected by existing catch basins. Per City of Arlington as-builts for

67<sup>th</sup> Ave NE stormwater from this TDA is conveyed to a treatment structure on the east side of 67<sup>th</sup> Ave NE and discharged into underground infiltration facilities.

## Critical Areas

Steep slopes exist almost immediately off the northern shoulder of the roadway for the entirety of the project length.

## Proposed Conditions

### TDA 1

The proposed conditions include curb and gutter on both the north and south sides of the roadway, along with a shared use path for the entire length of the project on the south side of the roadway. Stormwater runoff is collected by new catch basins and conveyed underground to the west to the base of the hill. At the base of the hill the stormwater enters an Oldcastle Biopod treatment structure prior to discharging into an infiltration pond on the south side of 211<sup>th</sup> Place NE. The conveyance system is designed to handle the 25-year event per City of Arlington standards. The infiltration pond is designed to convey and infiltrate 100% of the 50-year event. For storms above the 50-year event a primary design overflow structure is provided to convey additional runoff above the 50-year event to the northwest through an underground conveyance system and is discharged into an existing grassy swale which then flows underneath highway 530 to the north, and eventually discharges into March Creek. A secondary emergency overflow weir at the southern end of the pond is designed to overflow the 100-year event.

### TDA 2

The proposed conditions include new curb and gutter on both the north and south sides of the roadway and a shared-use path on the south side. Stormwater runoff is collected by new structures and conveyed to the existing storm system, and eventually discharged into the existing underground storm system.

A proposed basin map can be found in Appendix 2

## Minimum Requirements

Per the SWMMWW Minimum Requirements are assessed on the project level, then the TDA level.

### Project Level:

This project will add a total of 19,242 sf of new sidewalk (new hard surface), 3,300 SF of new roadway (new hard surface), and 69,247 sf of replaced road surface (replaced hard surface). Per Figure I-3.2 of the SWMMWW, assessing the Project Thresholds Minimum Requirements #1 through #5 apply to the new and replaced hard surfaces, and Minimum Requirements #1 through #9 apply to new hard surfaces and converted vegetation areas.

**TDA Level:**

The project site consists of two TDA's. Per the SWMMWW thresholds for Minimum Requirements #6 Runoff Treatment and Minimum Requirements #7 Flow Control are assessed at the TDA Level considering only new hard surfaces as required by the Project Thresholds.

TDA 1 exceeds the threshold of 10,000 square feet of new hard surface and therefore Minimum Requirement #6 Runoff Treatment and Minimum Requirement #7 Flow Control is required.

TDA 2 does not exceed the 5,000 SF threshold of new hard surface, therefore Minimum Requirement #6 and Runoff Treatment and Minimum Requirement #7 Flow Control is not required.

A TDA map can be found in Appendix A-2.

Below is the summary of the areas:

Table 2.3 Existing TDA Summary

Subbasin	1	2	TOTAL
Existing PGIS Area (AC)	1.65	0.20	1.85
Existing Sidewalk (AC)	0.01	0.04	0.05
Pervious Area (AC)	1.21	0.05	1.26
<b>Total Area (AC)</b>	<b>2.87</b>	<b>0.29</b>	<b>3.16</b>

Table 2.4 Proposed TDA Summary

TDA	1	2	TOTAL
Replaced PGIS (AC)	1.43	0.20	1.63
New PGIS (AC)	0.07	0.00	0.07
New NPGIS (AC)	0.40	0.05	0.45
Replaced NPGIS (AC)	0.10	0.01	0.11
Pervious Area (AC)	0.84	0.02	0.86
Off-site Flow (AC)	0.04	0.00	0.04
<b>Total Area (AC)</b>	<b>2.88</b>	<b>0.28</b>	<b>3.16</b>

## MR1-Preparation of Stormwater Site Plans

Stormwater site plans are required and will be prepared as part of this project.

## MR2 – Construction Stormwater Pollution Prevention Plan (SWPPP)

The SWPPP is required for this project and will be provided under a separate cover.

## MR3 – Source Control of Pollution

There are no known illicit discharges to the storm sewer system on the site. All runoff from the new pollutant generating surfaces within the project site will receive treatment prior to being infiltrated on site.

## MR4 – Preservation of Natural Drainage Systems and Outfalls

Natural drainage patterns will be maintained to the maximum extent practicable and discharges from the project site will occur as close to their natural location as possible.

### TDA 1

In the existing conditions, runoff from 211<sup>th</sup> PI NE sheet flows off the north side of the road or flows to a ditch on the south side of the road, infiltrating on site, or flows to the base of the hill. Stormwater runoff from Ronning Road is collected by catch basins and discharged over the hill north of the road. In the proposed conditions stormwater will continue to flow to the base of the hill and infiltrate on site.

### TDA 2

In the existing conditions runoff from the east end of the project on 211<sup>th</sup> PL NE is collected by catch basins and infiltrated in underground facilities located on 67<sup>th</sup> Ave NE. In the proposed conditions stormwater runoff will continue to be conveyed to the same existing underground infiltration facilities.

## MR5 – On-Site Stormwater Management

This project will employ stormwater management BMPs in accordance with the thresholds, standards, and lists to infiltrate, disperse, and retain stormwater runoff on site that are stated in the Department of SWMMWW to the maximum extent feasible without causing flooding or erosion impacts. This is described in more detail in the Onsite Permanent Stormwater Control Plan section of this report.

## MR6 – Runoff Treatment

### TDA 1

Water quality treatment is achieved through the use of Oldcastle Precast BioPod's. Per the Department of Ecology General Use Level Designation (GULD), BioPod's are approved to provide basic treatment at a rate of 0.00356 cfs per square foot of treatment media. The BioPod system contains a built-in weir as a bypass allowing for the unit to treat runoff as an off-line system. A BPU-816IB Biopod provides a total treatment surface of 112 SF and will treat 0.398 cfs, sufficient to treat the off-line rate of 0.2927 CFS.

### TDA 2

TDA 2 is exempt from flow control requirements for this project, however per City of Arlington As-builts, the existing infiltration facilities provide treatment for stormwater runoff from this basin.

## MR7 – Flow Control

For TDA 1, flow control is required for this project. Stormwater runoff from TDA 1 is conveyed to an infiltration pond to infiltrate the 50-year 24hr storm per Department of Ecology standards, meeting the requirements for flow control.

TDA 2 is exempt from flow control requirements for this project, however the existing infiltration facilities will provide flow control.

## MR8 – Wetlands Protection

Wetlands are located to the north of the project site. All runoff from the project site and the offsite areas flowing from the project site infiltrate in this basin in the existing conditions and will continue to infiltrate on site in the proposed conditions.

## MR9 – Operation and Maintenance

An Operation and Maintenance Manual is required for the construction of this project. An O & M manual will be provided at final submittal under a separate cover.

## Offsite Analysis

Offsite flows for the properties listed below have been considered and included in the analysis of this project. Drainage reports for the properties were reviewed in preparation for this report and the discharges from each site as stated in the reports are also listed below.

Stormwater runoff from TDA 2 on 211<sup>th</sup> PL NE, per City of Arlington provided as-builts, currently flow to the existing underground infiltration infrastructure beneath 211<sup>th</sup> PL NE. The proposed conditions will continue to convey a similar amount of area to these infiltration systems.

Off-site stormwater runoff from approximately 230 feet of Ronning Road currently flows onto the project site and is collected by catch basins and conveyed to the north and discharged over the hillside. In the proposed conditions the stormwater runoff will be collected and conveyed to treatment and infiltration facilities at the base of the hill.

## Offsite Conveyance Sizing

Storm and Sanitary Analysis (2022) was used to size conveyance on this project. All offsite flows to the project site are conveyed to the proposed infiltration facilities.

## Onsite Permanent Stormwater Control Plan

Catch basins are proposed along the south or north curb line of the new roadway to capture all surface runoff from the proposed improvements. The new roadway, shared-use path are all sloping towards one side of the road gutter depending on the location to capture all stormwater runoff and conveyed to existing or proposed treatment and infiltration facilities. |

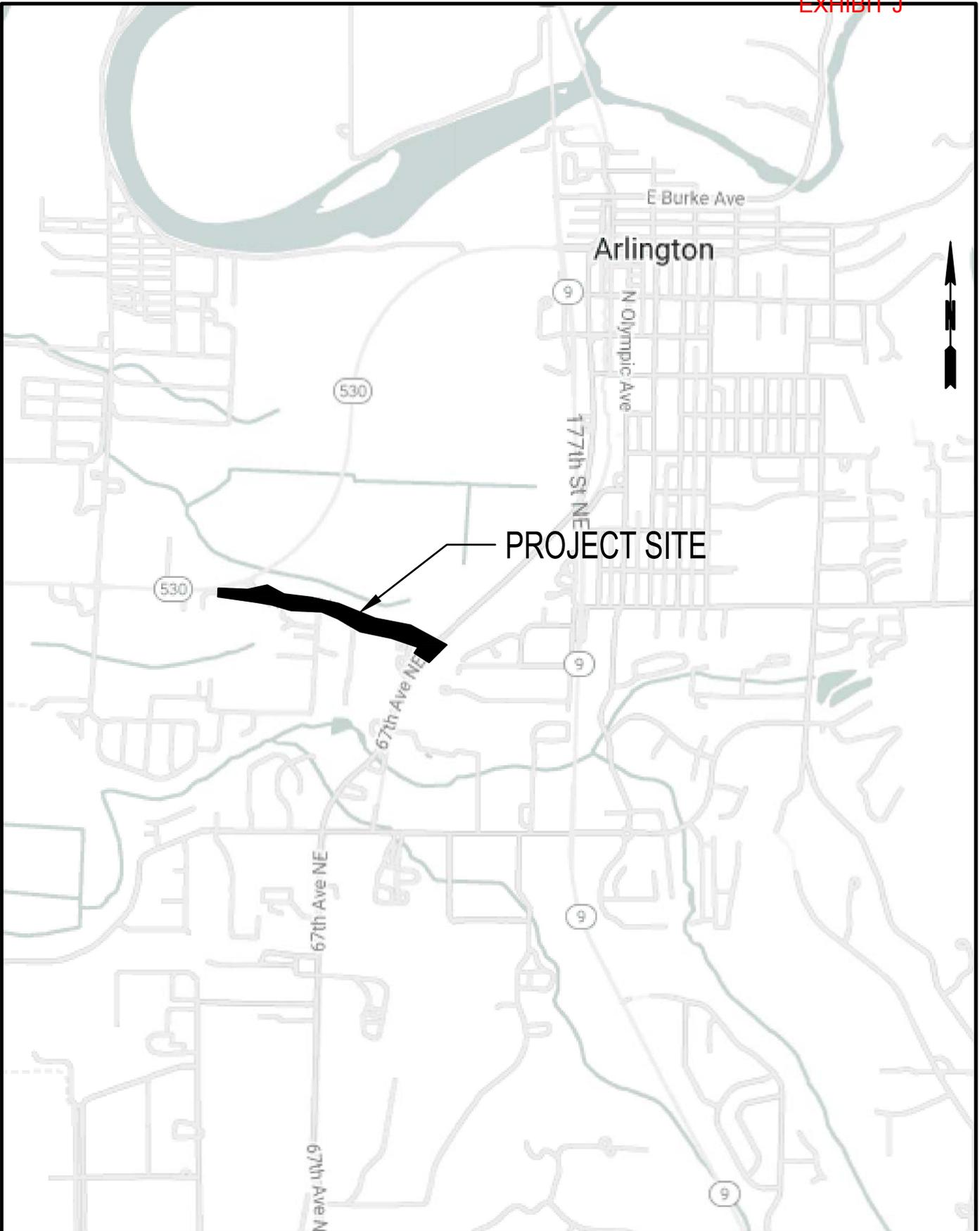
## Offsite Permanent Stormwater Control Plan

All offsite stormwater entering the project site will be routed to the new conveyance system. Ultimately, the design flows will be infiltrated on site, and any additional flows will be routed to the bottom of the hill and eventually to March Creek through existing stormwater conveyance systems.

# **APPENDIX 1**

## **SITE VICINITY MAP**

Oct 04, 2023 3:08:13pm - User david.hall  
N:\PROJECTS\0698 CITY OF ARLINGTON\22-000884 ARLINGTON 211TH NE-67TH AVE\CADD\EXHIBITS\2023-0915\_60% STORMWATER EXHIBITS\22-000884\_VICINITY MAP.DWG



8730 TALLON LANE NE, SUITE 200, LACEY, WA 98516  
P: 360.352.1465 F: 360.352.1509  
SCJALLIANCE.COM

HORIZONTAL SCALE:  
NTS  
DATE:  
OCTOBER 2023  
JOB No.:  
22-000884  
DRAWING FILE No.:

211TH PLACE CORRIDOR IMPROVEMENT PROJECT

VICINITY MAP

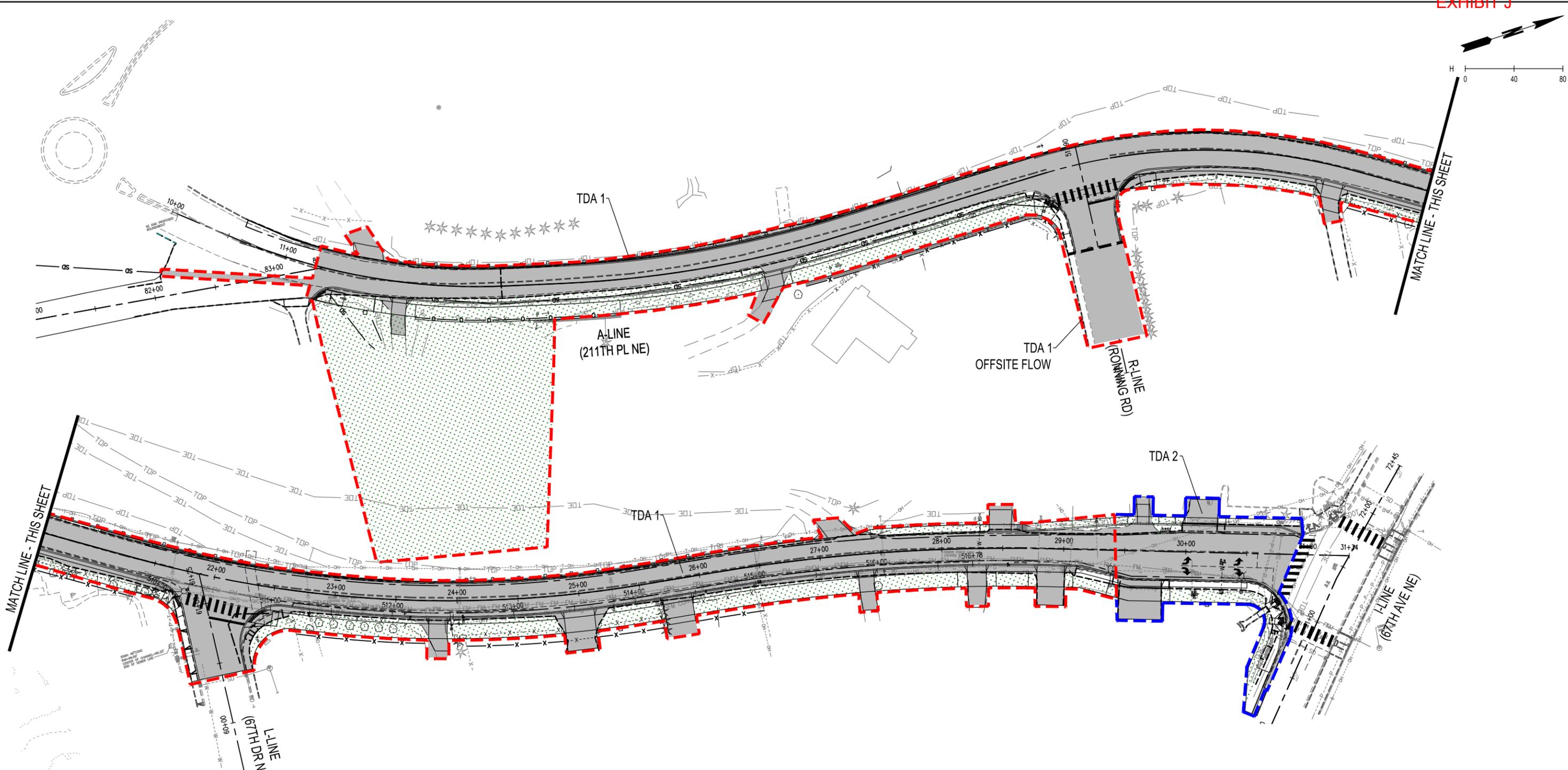
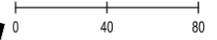
EXHIBIT No:

EX-01

SHEET No:

1

**APPENDIX 2**  
**SUB-BASIN EXHIBITS**



LEGEND				
	TDA 1	TDA 2	TOTAL	
	1.65	0.20	1.85	
	0.01	0.04	0.05	
	1.21	0.05	1.26	
	2.87	0.29	3.16	

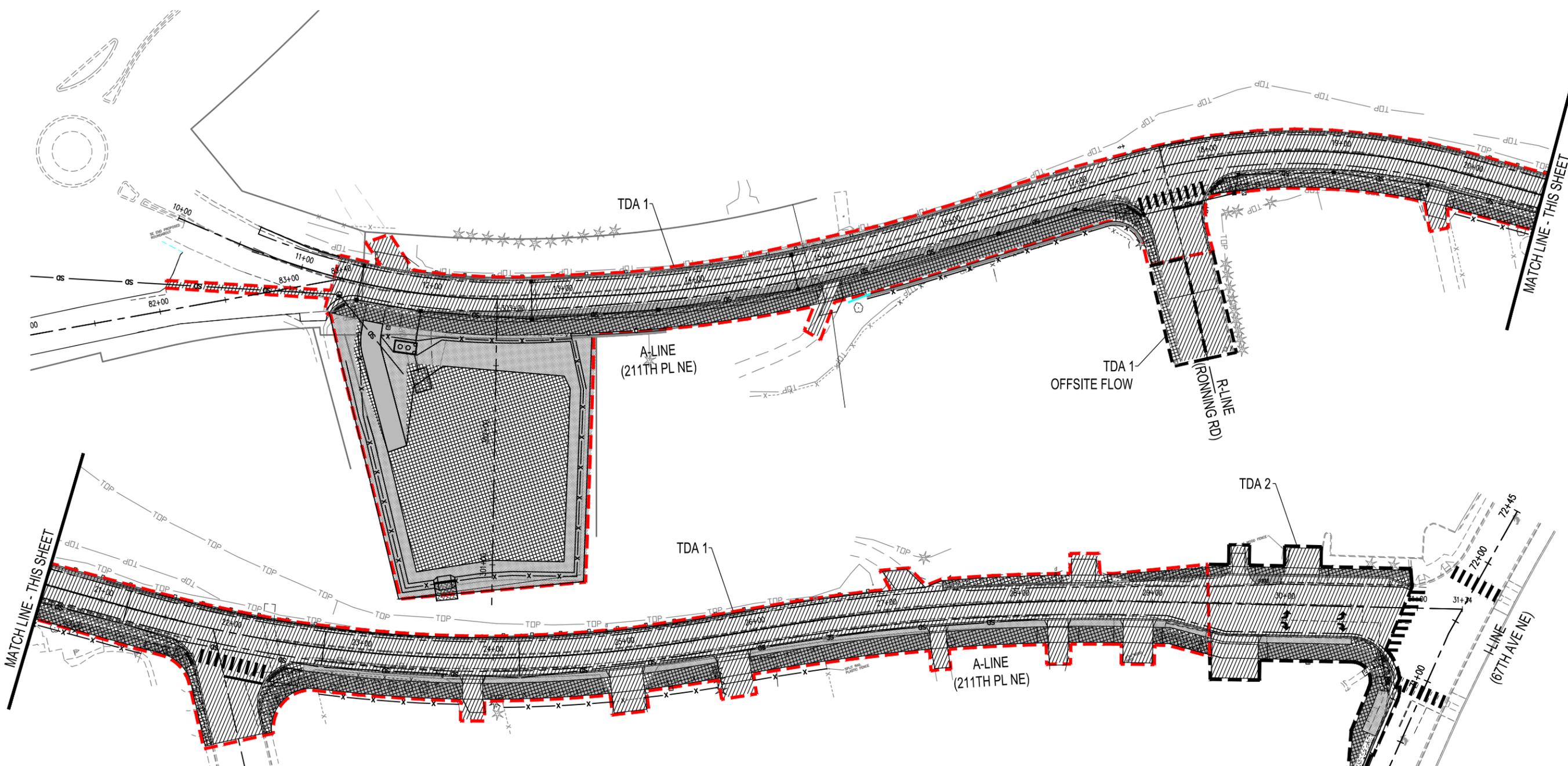
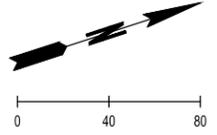
Job No. 22-000884 - 15' x 10' 0" Plan - Use for field only  
 PROJECTS DEPT. OF PUBLIC WORKS - 211TH NE - 67TH AVE (ADD) EXHIBITS 2024-0115\_90X STORM EXHIBITS\_22-000884\_EXH-EV-15X10CONDITONS.DWG

  
**SCJ ALLIANCE**  
 CONSULTING SERVICES  
 8730 TALLON LANE NE, SUITE 200, LACEY, WA 98516  
 P: 360.352.1465  
 SCJALLIANCE.COM

HORIZONTAL SCALE:  
 AS SHOWN  
 DATE:  
 JANUARY 2024  
 JOB No.:  
 22-000884  
 DRAWING FILE No.:

EXISTING CONDITIONS MAP  
 211TH PLACE CORRIDOR IMPROVEMENT PROJECT

EXHIBIT No:  
**EX-01**  
 SHEET No:  
**1 OF 2**



LEGEND			
BASIN AREA	TDA 1	TDA 2	TOTAL
REPLACED PGIS (AC)	1.44	0.20	1.64
NEW PGIS (AC)	0.39	0.00	0.39
REPLACED NPGIS (AC)	0.10	0.01	0.11
NEW NPGIS (AC)	0.40	0.05	0.45
PERVIOUS AREA (AC)	0.51	0.03	0.53
OFFSITE FLOW (AC)	0.04	0.00	0.04
TOTAL AREA (AC)	2.87	0.29	3.16

Job: 19\_0024\_0\_26\_50pm - User: kmichalski  
 PL PROJECTS\0699 CITY OF BURLINGTON\22-000884 - BURLINGTON 211TH NE-67TH AVE (ADD) EXHIBITS\2024-0115\_90X STORM EXHIBITS\22-000884\_EXH\_PROPOSED CONDITIONS.DWG

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 CONSULTING SERVICES  
 8730 TALLON LANE NE, SUITE 200, LACEY, WA 98516  
 P: 360.352.1465  
 SCJALLIANCE.COM

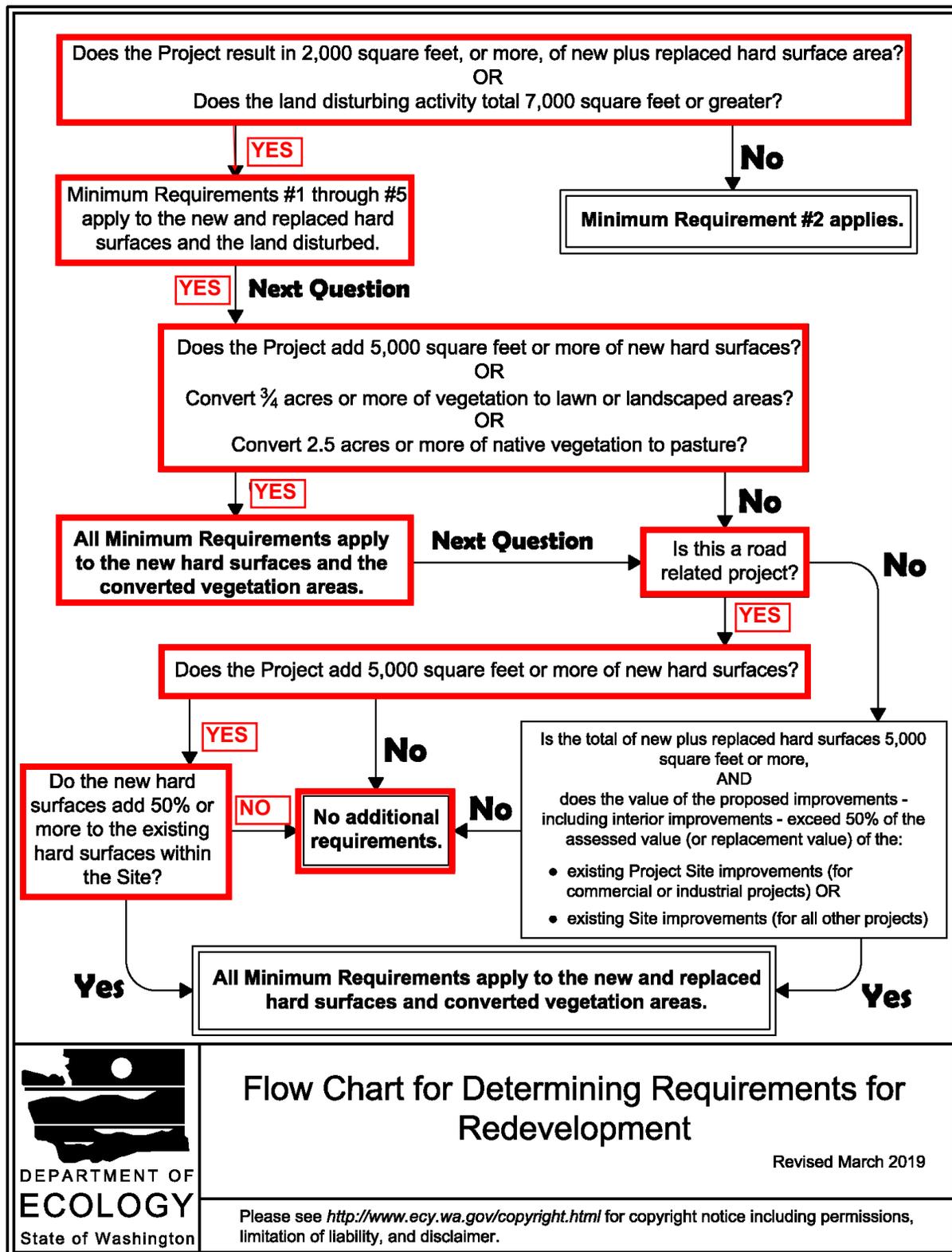
HORIZONTAL SCALE:  
 AS SHOWN  
 DATE:  
 JANUARY 2024  
 JOB No.:  
 22-000884  
 DRAWING FILE No.:

PROPOSED CONDITIONS MAP  
 211TH PLACE CORRIDOR IMPROVEMENT PROJECT

# **APPENDIX 3A**

## **MINIMUM REQUIREMENTS FLOW CHART**

**Figure I-3.2: Flow Chart for Determining Requirements for Redevelopment**



# **APPENDIX 3B**

## **WWHM MODEL OUTPUT**

**WWHM2012**  
**PROJECT REPORT**

## General Model Information

Project Name: 211th Arlington\_Pond  
Site Name: 211th PI NE  
Site Address:  
City: Arlington  
Report Date: 1/18/2024  
Gage: Everett  
Data Start: 1948/10/01  
Data End: 2009/09/30  
Timestep: 15 Minute  
Precip Scale: 1.200  
Version Date: 2021/08/18  
Version: 4.2.18

## POC Thresholds

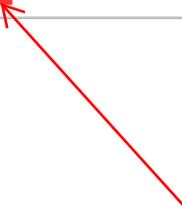
---

Low Flow Threshold for POC1: 50 Percent of the 2 Year

High Flow Threshold for POC1: 50 Year

---

POND DESIGN YEAR



## Landuse Basin Data

### Predeveloped Land Use

#### Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use A B, Forest, Mod	acre 2.88
Pervious Total	2.88
Impervious Land Use	acre
Impervious Total	0
Basin Total	2.88

Element Flows To:  
Surface                      Interflow                      Groundwater

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*Mitigated Land Use*

**Basin 1**

Bypass:	No
GroundWater:	No
Pervious Land Use A B, Pasture, Mod	acre 0.381
Pervious Total	0.381
Impervious Land Use ROADS MOD SIDEWALKS MOD	acre 1.989 0.51
Impervious Total	2.499
Basin Total	2.88

Element Flows To:		
Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

DRAFT

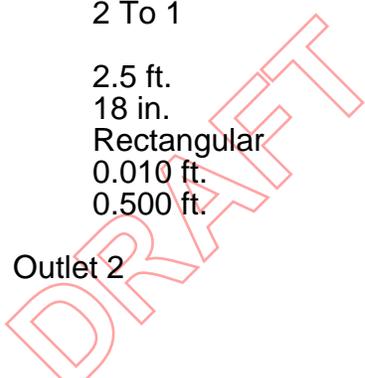
*Routing Elements*  
*Predeveloped Routing*

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Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 135.00 ft.  
 Bottom Width: 130.00 ft.  
 Depth: 3.5 ft.  
 Volume at riser head: 1.0981 acre-feet.  
 Infiltration On  
 Infiltration rate: 0.3  
 Infiltration safety factor: 1  
 Wetted surface area On  
 Total Volume Infiltrated (ac-ft.): 491.933  
 Total Volume Through Riser (ac-ft.): 0.001  
 Total Volume Through Facility (ac-ft.): 491.934  
 Percent Infiltrated: 100  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
 Side slope 1: 2 To 1  
 Side slope 2: 2 To 1  
 Side slope 3: 2 To 1  
 Side slope 4: 2 To 1  
 Discharge Structure  
 Riser Height: 2.5 ft.  
 Riser Diameter: 18 in.  
 Notch Type: Rectangular  
 Notch Width: 0.010 ft.  
 Notch Height: 0.500 ft.  
 Element Flows To:  
 Outlet 1                      Outlet 2



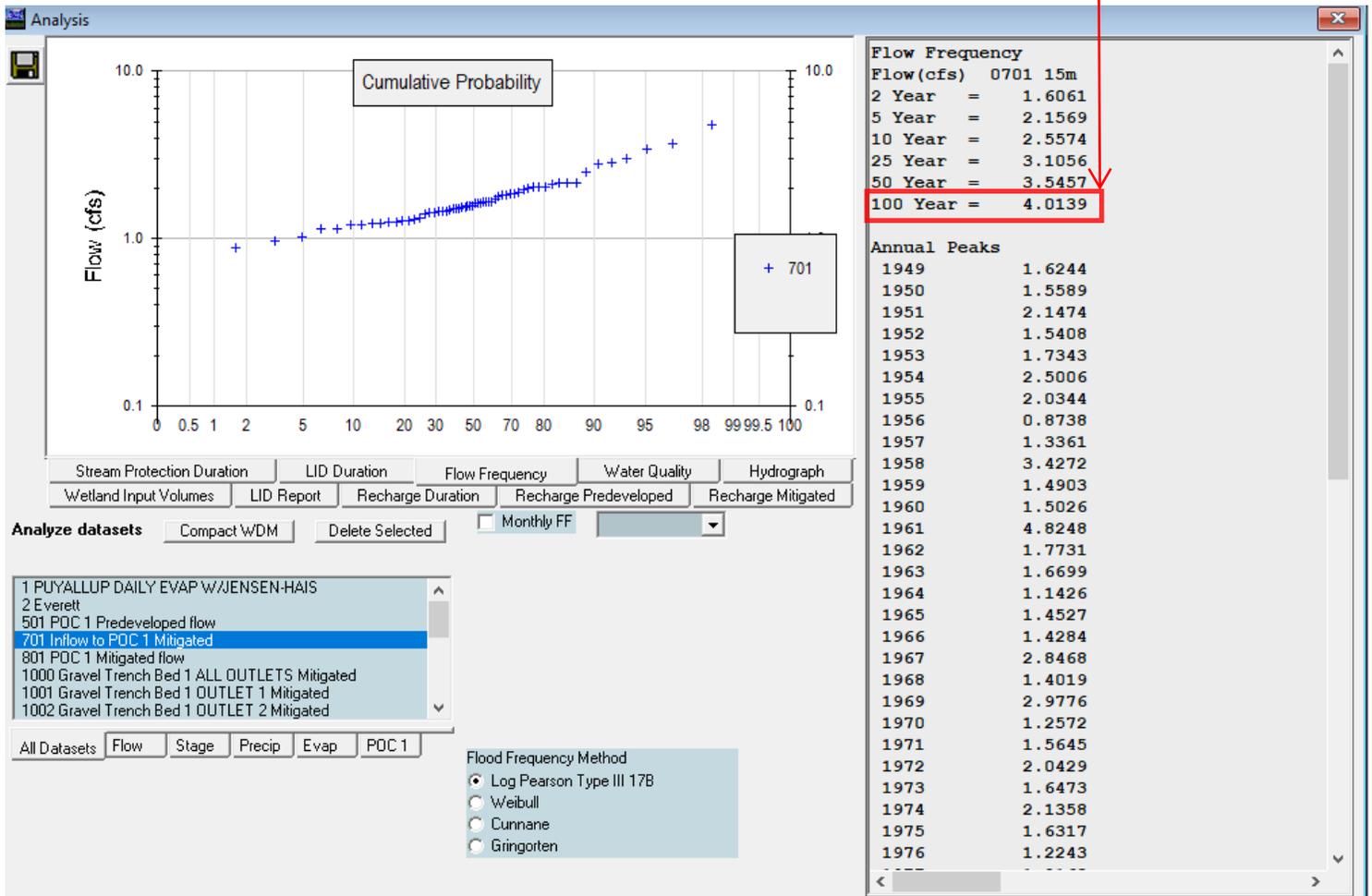
Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.402	0.000	0.000	0.000
0.0389	0.403	0.015	0.000	0.122
0.0778	0.404	0.031	0.000	0.122
0.1167	0.405	0.047	0.000	0.122
0.1556	0.406	0.063	0.000	0.123
0.1944	0.407	0.078	0.000	0.123
0.2333	0.408	0.094	0.000	0.123
0.2722	0.409	0.110	0.000	0.123
0.3111	0.410	0.126	0.000	0.124
0.3500	0.411	0.142	0.000	0.124
0.3889	0.412	0.158	0.000	0.124
0.4278	0.413	0.174	0.000	0.125
0.4667	0.414	0.190	0.000	0.125
0.5056	0.415	0.206	0.000	0.125
0.5444	0.416	0.223	0.000	0.125
0.5833	0.417	0.239	0.000	0.126
0.6222	0.418	0.255	0.000	0.126
0.6611	0.419	0.271	0.000	0.126
0.7000	0.420	0.288	0.000	0.127
0.7389	0.421	0.304	0.000	0.127
0.7778	0.422	0.320	0.000	0.127
0.8167	0.423	0.337	0.000	0.128
0.8556	0.424	0.353	0.000	0.128

0.8944	0.425	0.370	0.000	0.128
0.9333	0.425	0.386	0.000	0.128
0.9722	0.426	0.403	0.000	0.129
1.0111	0.427	0.419	0.000	0.129
1.0500	0.428	0.436	0.000	0.129
1.0889	0.429	0.453	0.000	0.130
1.1278	0.430	0.470	0.000	0.130
1.1667	0.431	0.486	0.000	0.130
1.2056	0.432	0.503	0.000	0.130
1.2444	0.433	0.520	0.000	0.131
1.2833	0.434	0.537	0.000	0.131
1.3222	0.435	0.554	0.000	0.131
1.3611	0.436	0.571	0.000	0.132
1.4000	0.437	0.588	0.000	0.132
1.4389	0.438	0.605	0.000	0.132
1.4778	0.439	0.622	0.000	0.133
1.5167	0.440	0.639	0.000	0.133
1.5556	0.441	0.656	0.000	0.133
1.5944	0.442	0.673	0.000	0.133
1.6333	0.443	0.691	0.000	0.134
1.6722	0.444	0.708	0.000	0.134
1.7111	0.445	0.725	0.000	0.134
1.7500	0.446	0.743	0.000	0.135
1.7889	0.447	0.760	0.000	0.135
1.8278	0.448	0.777	0.000	0.135
1.8667	0.449	0.795	0.000	0.136
1.9056	0.450	0.812	0.000	0.136
1.9444	0.451	0.830	0.000	0.136
1.9833	0.452	0.847	0.000	0.136
2.0222	0.453	0.865	0.000	0.137
2.0611	0.454	0.883	0.000	0.137
2.1000	0.455	0.900	0.001	0.137
2.1389	0.456	0.918	0.001	0.138
2.1778	0.457	0.936	0.002	0.138
2.2167	0.458	0.954	0.003	0.138
2.2556	0.459	0.972	0.004	0.139
2.2944	0.460	0.989	0.005	0.139
2.3333	0.461	1.007	0.006	0.139
2.3722	0.462	1.025	0.007	0.140
2.4111	0.463	1.043	0.008	0.140
2.4500	0.464	1.061	0.009	0.140
2.4889	0.465	1.080	0.010	0.140
2.5278	0.466	1.098	0.084	0.141
2.5667	0.467	1.116	0.284	0.141
2.6056	0.468	1.134	0.555	0.141
2.6444	0.469	1.152	0.879	0.142
2.6833	0.470	1.171	1.246	0.142
2.7222	0.471	1.189	1.647	0.142
2.7611	0.472	1.207	2.072	0.143
2.8000	0.473	1.226	2.511	0.143
2.8389	0.474	1.244	2.956	0.143
2.8778	0.476	1.263	3.396	0.144
2.9167	0.477	1.281	3.823	0.144
2.9556	0.478	1.300	4.226	0.144
2.9944	0.479	1.318	4.599	0.144
3.0333	0.480	1.337	4.934	0.145
3.0722	0.481	1.356	5.228	0.145
3.1111	0.482	1.374	5.478	0.145

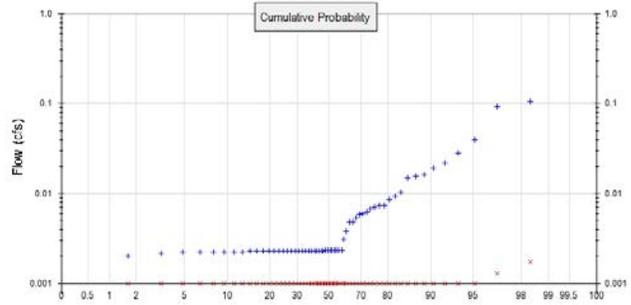
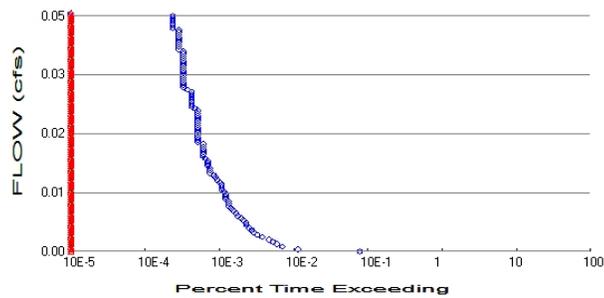
3.1500	0.483	1.393	5.687	0.146
3.1889	0.484	1.412	5.859	0.146
3.2278	0.485	1.431	6.005	0.146
3.2667	0.486	1.450	6.215	0.147
3.3056	0.487	1.469	6.371	0.147
3.3444	0.488	1.488	6.522	0.147
3.3833	0.489	1.507	6.671	0.148
3.4222	0.490	1.526	6.816	0.148
3.4611	0.491	1.545	6.958	0.148
3.5000	0.492	1.564	7.097	0.149
3.5389	0.493	1.583	7.233	0.149

EMERGENCY  
OVERFLOW RATE



# Analysis Results

## POC 1



+ Predeveloped    x Mitigated

### Predeveloped Landuse Totals for POC #1

Total Pervious Area: 2.88  
 Total Impervious Area: 0

### Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.381  
 Total Impervious Area: 2.499

Flow Frequency Method: Log Pearson Type III 17B

### Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.003709
5 year	0.009017
10 year	0.015507
25 year	0.029402
50 year	0.046021
100 year	0.070516

### Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

## Annual Peaks

### Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.002	0.000
1950	0.009	0.000
1951	0.007	0.000
1952	0.002	0.000
1953	0.002	0.000
1954	0.022	0.000
1955	0.016	0.000
1956	0.002	0.000
1957	0.002	0.000
1958	0.002	0.000

1959	0.007	0.000
1960	0.006	0.000
1961	0.015	0.000
1962	0.002	0.000
1963	0.002	0.000
1964	0.010	0.000
1965	0.002	0.000
1966	0.002	0.000
1967	0.006	0.000
1968	0.002	0.000
1969	0.002	0.000
1970	0.002	0.000
1971	0.016	0.000
1972	0.002	0.000
1973	0.002	0.000
1974	0.009	0.000
1975	0.002	0.000
1976	0.007	0.000
1977	0.002	0.000
1978	0.003	0.000
1979	0.007	0.000
1980	0.002	0.000
1981	0.002	0.000
1982	0.005	0.000
1983	0.002	0.000
1984	0.002	0.000
1985	0.005	0.000
1986	0.028	0.000
1987	0.019	0.000
1988	0.002	0.000
1989	0.002	0.000
1990	0.002	0.000
1991	0.002	0.000
1992	0.002	0.000
1993	0.002	0.000
1994	0.002	0.000
1995	0.004	0.000
1996	0.040	0.000
1997	0.092	0.002
1998	0.002	0.000
1999	0.002	0.000
2000	0.006	0.000
2001	0.002	0.000
2002	0.002	0.000
2003	0.002	0.000
2004	0.002	0.000
2005	0.002	0.000
2006	0.106	0.000
2007	0.002	0.000
2008	0.005	0.001
2009	0.002	0.000

### Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1057	0.0017
2	0.0925	0.0013
3	0.0395	0.0000

4	0.0282	0.0000
5	0.0220	0.0000
6	0.0191	0.0000
7	0.0163	0.0000
8	0.0156	0.0000
9	0.0148	0.0000
10	0.0103	0.0000
11	0.0094	0.0000
12	0.0086	0.0000
13	0.0073	0.0000
14	0.0073	0.0000
15	0.0071	0.0000
16	0.0067	0.0000
17	0.0063	0.0000
18	0.0060	0.0000
19	0.0059	0.0000
20	0.0054	0.0000
21	0.0049	0.0000
22	0.0048	0.0000
23	0.0038	0.0000
24	0.0031	0.0000
25	0.0023	0.0000
26	0.0023	0.0000
27	0.0023	0.0000
28	0.0023	0.0000
29	0.0023	0.0000
30	0.0023	0.0000
31	0.0023	0.0000
32	0.0023	0.0000
33	0.0023	0.0000
34	0.0023	0.0000
35	0.0023	0.0000
36	0.0023	0.0000
37	0.0023	0.0000
38	0.0023	0.0000
39	0.0023	0.0000
40	0.0023	0.0000
41	0.0023	0.0000
42	0.0023	0.0000
43	0.0023	0.0000
44	0.0023	0.0000
45	0.0023	0.0000
46	0.0023	0.0000
47	0.0023	0.0000
48	0.0023	0.0000
49	0.0023	0.0000
50	0.0023	0.0000
51	0.0023	0.0000
52	0.0023	0.0000
53	0.0023	0.0000
54	0.0023	0.0000
55	0.0022	0.0000
56	0.0022	0.0000
57	0.0022	0.0000
58	0.0022	0.0000
59	0.0021	0.0000
60	0.0020	0.0000
61	0.0016	0.0000

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## Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0019	1654	0	0	Pass
0.0023	242	0	0	Pass
0.0027	151	0	0	Pass
0.0032	128	0	0	Pass
0.0036	112	0	0	Pass
0.0041	99	0	0	Pass
0.0045	81	0	0	Pass
0.0050	69	0	0	Pass
0.0054	61	0	0	Pass
0.0059	58	0	0	Pass
0.0063	53	0	0	Pass
0.0068	50	0	0	Pass
0.0072	49	0	0	Pass
0.0077	45	0	0	Pass
0.0081	42	0	0	Pass
0.0085	38	0	0	Pass
0.0090	36	0	0	Pass
0.0094	33	0	0	Pass
0.0099	31	0	0	Pass
0.0103	29	0	0	Pass
0.0108	29	0	0	Pass
0.0112	29	0	0	Pass
0.0117	26	0	0	Pass
0.0121	26	0	0	Pass
0.0126	26	0	0	Pass
0.0130	25	0	0	Pass
0.0135	23	0	0	Pass
0.0139	23	0	0	Pass
0.0143	23	0	0	Pass
0.0148	22	0	0	Pass
0.0152	20	0	0	Pass
0.0157	19	0	0	Pass
0.0161	18	0	0	Pass
0.0166	16	0	0	Pass
0.0170	16	0	0	Pass
0.0175	16	0	0	Pass
0.0179	15	0	0	Pass
0.0184	15	0	0	Pass
0.0188	15	0	0	Pass
0.0193	14	0	0	Pass
0.0197	13	0	0	Pass
0.0201	13	0	0	Pass
0.0206	13	0	0	Pass
0.0210	13	0	0	Pass
0.0215	13	0	0	Pass
0.0219	13	0	0	Pass
0.0224	11	0	0	Pass
0.0228	11	0	0	Pass
0.0233	11	0	0	Pass
0.0237	11	0	0	Pass
0.0242	11	0	0	Pass
0.0246	11	0	0	Pass
0.0251	11	0	0	Pass

0.0255	11	0	0	Pass
0.0259	11	0	0	Pass
0.0264	11	0	0	Pass
0.0268	11	0	0	Pass
0.0273	11	0	0	Pass
0.0277	11	0	0	Pass
0.0282	11	0	0	Pass
0.0286	10	0	0	Pass
0.0291	9	0	0	Pass
0.0295	9	0	0	Pass
0.0300	9	0	0	Pass
0.0304	9	0	0	Pass
0.0309	9	0	0	Pass
0.0313	9	0	0	Pass
0.0317	9	0	0	Pass
0.0322	8	0	0	Pass
0.0326	7	0	0	Pass
0.0331	7	0	0	Pass
0.0335	7	0	0	Pass
0.0340	7	0	0	Pass
0.0344	7	0	0	Pass
0.0349	7	0	0	Pass
0.0353	7	0	0	Pass
0.0358	7	0	0	Pass
0.0362	7	0	0	Pass
0.0367	7	0	0	Pass
0.0371	7	0	0	Pass
0.0375	7	0	0	Pass
0.0380	7	0	0	Pass
0.0384	7	0	0	Pass
0.0389	7	0	0	Pass
0.0393	7	0	0	Pass
0.0398	6	0	0	Pass
0.0402	6	0	0	Pass
0.0407	6	0	0	Pass
0.0411	6	0	0	Pass
0.0416	6	0	0	Pass
0.0420	6	0	0	Pass
0.0425	6	0	0	Pass
0.0429	6	0	0	Pass
0.0433	6	0	0	Pass
0.0438	5	0	0	Pass
0.0442	5	0	0	Pass
0.0447	5	0	0	Pass
0.0451	5	0	0	Pass
0.0456	5	0	0	Pass
0.0460	5	0	0	Pass

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## Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0.2878 acre-feet

On-line facility target flow: 0.5172 cfs.

Adjusted for 15 min: 0.5172 cfs.

Off-line facility target flow: 0.2927 cfs.

Adjusted for 15 min: 0.2927 cfs.

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LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	<input type="checkbox"/>	447.61			<input type="checkbox"/>	100.00			
Total Volume Infiltrated		447.61	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

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## *Model Default Modifications*

Total of 0 changes have been made.

### *PERLND Changes*

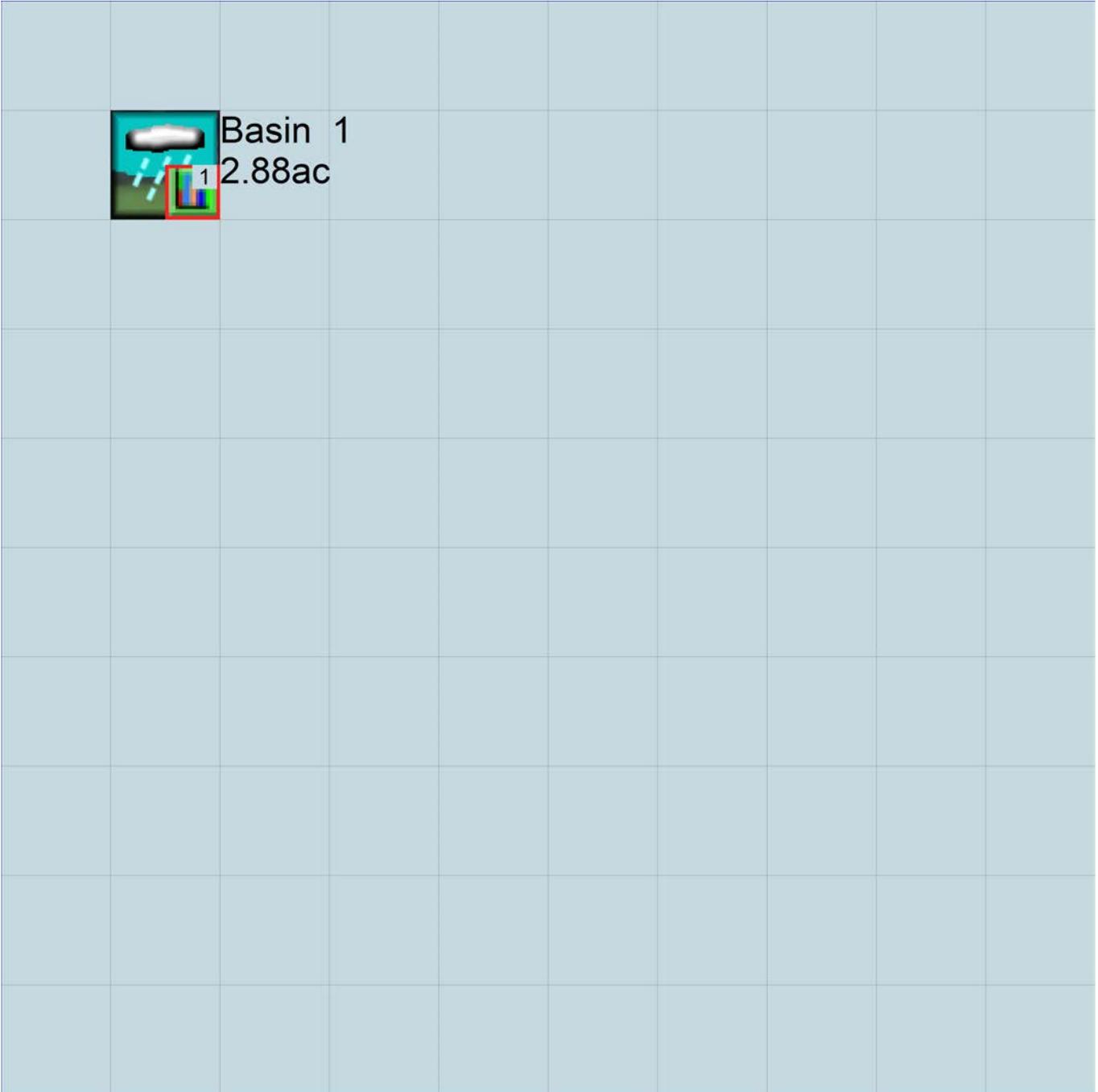
No PERLND changes have been made.

### *IMPLND Changes*

No IMPLND changes have been made.

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Appendix  
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

RUN

```
GLOBAL
  WWHM4 model simulation
  START      1948 10 01      END      2009 09 30
  RUN INTERP OUTPUT LEVEL   3      0
  RESUME     0 RUN          1
  UNIT SYSTEM                1
END GLOBAL
```

```
FILES
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26      211th Arlington_Pond.wdm
MESSU    25      Pre211th Arlington_Pond.MES
          27      Pre211th Arlington_Pond.L61
          28      Pre211th Arlington_Pond.L62
          30      POC211th Arlington_Pond1.dat
END FILES
```

```
OPN SEQUENCE
  INGRP                INDELT 00:15
  PERLND              2
  COPY                501
  DISPLY              1
  END INGRP
END OPN SEQUENCE
```

```
DISPLY
  DISPLY-INFO1
  # - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
  1      Basin 1      MAX      1      2      30      9
  END DISPLY-INFO1
END DISPLY
```

```
COPY
  TIMESERIES
  # - # NPT NMN ***
  1      1      1
  501    1      1
  END TIMESERIES
END COPY
```

```
GENER
  OPCODE
  #      # OPCD ***
  END OPCODE
  PARM
  #      #      K ***
  END PARM
END GENER
```

```
PERLND
  GEN-INFO
  <PLS ><-----Name----->NBLKS Unit-systems Printer ***
  # - # User t-series Engl Metr ***
  # - # in out ***
  2      A/B, Forest, Mod      1      1      1      1      27      0
  END GEN-INFO
  *** Section PWATER***
```

```
ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
  2      0      0      1      0      0      0      0      0      0      0      0      0
  END ACTIVITY
```

```
PRINT-INFO
  <PLS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
  2      0      0      4      0      0      0      0      0      0      0      0      0      1      9
  END PRINT-INFO
```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
2 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LRSUR SLSUR KVARY AGWRC
2 0 5 2 400 0.1 0.3 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
2 0 0 2 2 0 0 0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
2 0.2 0.5 0.35 0 0.7 0.7
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
2 0 0 0 0 3 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

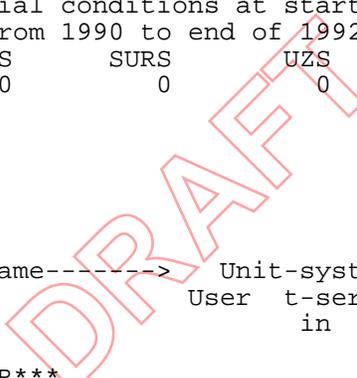
IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LRSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
END IWAT-STATE1

```





WDM 1 EVAP ENGL 0.76 PERLND 1 999 EXTNL PETINP  
 WDM 1 EVAP ENGL 0.76 IMPLND 1 999 EXTNL PETINP

END EXT SOURCES

EXT TARGETS

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd \*\*\*  
 <Name> # <Name> # #<-factor->strg <Name> # <Name> tem strg strg\*\*\*  
 COPY 501 OUTPUT MEAN 1 1 48.4 WDM 501 FLOW ENGL REPL  
 END EXT TARGETS

MASS-LINK

<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->\*\*\*  
 <Name> <Name> # #<-factor-> <Name> <Name> # #\*\*\*  
 MASS-LINK 12  
 PERLND PWATER SURO 0.083333 COPY INPUT MEAN  
 END MASS-LINK 12

MASS-LINK 13  
 PERLND PWATER IFWO 0.083333 COPY INPUT MEAN  
 END MASS-LINK 13

END MASS-LINK

END RUN

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Mitigated UCI File

RUN

```
GLOBAL
  WWHM4 model simulation
  START      1948 10 01      END      2009 09 30
  RUN INTERP OUTPUT LEVEL    3      0
  RESUME     0 RUN          1
  UNIT SYSTEM                1
END GLOBAL
```

```
FILES
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26    211th Arlington_Pond.wdm
MESSU    25    Mit211th Arlington_Pond.MES
          27    Mit211th Arlington_Pond.L61
          28    Mit211th Arlington_Pond.L62
          30    POC211th Arlington_Pond1.dat
END FILES
```

```
OPN SEQUENCE
  INGRP          INDELT 00:15
  PERLND         5
  IMPLND         2
  IMPLND         9
  RCHRES         1
  COPY           1
  COPY           501
  DISPLY         1
  END INGRP
END OPN SEQUENCE
```

```
DISPLY
  DISPLY-INFO1
  # - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
  1   1   Trapezoidal Pond 1   MAX           1   2   30   9
  END DISPLY-INFO1
END DISPLY
```

```
COPY
  TIMESERIES
  # - # NPT NMN ***
  1   1   1   1
  501 1   1   1
  END TIMESERIES
```

```
END COPY
GENER
  OPCODE
  #   # OPCD ***
  END OPCODE
  PARM
  #   #           K ***
  END PARM
END GENER
```

```
PERLND
  GEN-INFO
  <PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
  # - #                               User  t-series  Engl Metr ***
                               in  out
  5   A/B, Pasture, Mod           1   1   1   1   27   0
  END GEN-INFO
  *** Section PWATER***
```

```
ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC ***
  5   0   0   1   0   0   0   0   0   0   0   0   0
  END ACTIVITY
```

```
PRINT-INFO
  <PLS > ***** Print-flags ***** PIVL  PYR
```



```

2          400      0.05      0.1      0.08
9          400      0.05      0.1      0.08
END IWAT-PARM2

```

```

IWAT-PARM3
<PLS >      IWATER input info: Part 3      ***
# - # ***PETMAX      PETMIN
2          0          0
9          0          0
END IWAT-PARM3

```

```

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS      SURS
2          0          0
9          0          0
END IWAT-STATE1

```

END IMPLND

```

SCHEMATIC
<-Source->      <--Area-->      <-Target->      MBLK      ***
<Name> #      <-factor->      <Name> #      Tbl#      ***
Basin 1***
PERLND 5          0.381      RCHRES 1      2
PERLND 5          0.381      RCHRES 1      3
IMPLND 2          1.989      RCHRES 1      5
IMPLND 9          0.51       RCHRES 1      5

```

```

*****Routing*****
PERLND 5          0.381      COPY 1      12
IMPLND 2          1.989      COPY 1      15
IMPLND 9          0.51       COPY 1      15
PERLND 5          0.381      COPY 1      13
RCHRES 1          1          COPY 501     17
END SCHEMATIC

```

```

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
COPY 501 OUTPUT MEAN 1 1 48.4      DISPLY 1      INPUT TIMSER 1

```

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> #      <Name> # #<-factor->strg <Name> # #      <Name> # #      ***
END NETWORK

```

```

RCHRES
GEN-INFO
RCHRES      Name      Nexits      Unit Systems      Printer      ***
# - #<-----><----> User T-series      Engl Metr LKFG      ***
in out      ***
1      Trapezoidal Pond-020      2      1      1      1      28      0      1
END GEN-INFO
*** Section RCHRES***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUGF PKFG PHFG ***
1      1      0      0      0      0      0      0      0      0
END ACTIVITY

```

```

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL      PYR
# - # HYDR ADCA CONS HEAT      SED      GQL      OXRX NUTR PLNK PHCB PIVL      PYR      *****
1      4      0      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO

```

HYDR-PARM1

```

RCHRES  Flags for each HYDR Section                                     ***
# - #   VC A1 A2 A3  ODFVFG for each *** ODGTFG for each  FUNCT  for each
        FG FG FG FG  possible exit *** possible exit  possible exit
        * * * *   * * * *   * * * *   * * * *
1       0 1  0  0   4 5  0  0  0   0  0  0  0  0   2  2  2  2  2
END HYDR-PARM1

```

```

HYDR-PARM2
# - #   FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><-----><----->
1       1          0.03      0.0       0.0       0.5      0.0       ***
END HYDR-PARM2

```

```

HYDR-INIT
RCHRES  Initial conditions for each HYDR section                       ***
# - #   *** VOL      Initial value of COLIND  Initial value of OUTDGT
        *** ac-ft   for each possible exit  for each possible exit
<-----><-----> <-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
1       0          4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
END HYDR-INIT
END RCHRES

```

SPEC-ACTIONS  
END SPEC-ACTIONS

FTABLES

FTABLE	1	91	5	Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.432736	0.000000	0.000000	0.000000	0.000000					
0.038889	0.433719	0.016848	0.000000	0.131200						
0.077778	0.434703	0.033734	0.000000	0.131498						
0.116667	0.435688	0.050658	0.000000	0.131795						
0.155556	0.436674	0.067621	0.000000	0.132094						
0.194444	0.437661	0.084621	0.000000	0.132392						
0.233333	0.438649	0.101661	0.000000	0.132691						
0.272222	0.439638	0.118739	0.000000	0.132990						
0.311111	0.440628	0.135855	0.000000	0.133290						
0.350000	0.441620	0.153010	0.000000	0.133590						
0.388889	0.442612	0.170203	0.000000	0.133890						
0.427778	0.443606	0.187435	0.000000	0.134191						
0.466667	0.444601	0.204706	0.000000	0.134492						
0.505556	0.445597	0.222015	0.000000	0.134793						
0.544444	0.446594	0.239363	0.000000	0.135095						
0.583333	0.447592	0.256750	0.000000	0.135397						
0.622222	0.448591	0.274176	0.000000	0.135699						
0.661111	0.449592	0.291641	0.000000	0.136001						
0.700000	0.450593	0.309144	0.000000	0.136304						
0.738889	0.451596	0.326687	0.000000	0.136608						
0.777778	0.452600	0.344269	0.000000	0.136911						
0.816667	0.453604	0.361889	0.000000	0.137215						
0.855556	0.454610	0.379549	0.000000	0.137520						
0.894444	0.455617	0.397248	0.000000	0.137824						
0.933333	0.456625	0.414986	0.000000	0.138129						
0.972222	0.457635	0.432763	0.000000	0.138434						
1.011111	0.458645	0.450580	0.000000	0.138740						
1.050000	0.459657	0.468436	0.000000	0.139046						
1.088889	0.460669	0.486331	0.000000	0.139352						
1.127778	0.461683	0.504265	0.000000	0.139659						
1.166667	0.462698	0.522239	0.000000	0.139966						
1.205556	0.463714	0.540253	0.000000	0.140273						
1.244444	0.464731	0.558306	0.000000	0.140581						
1.283333	0.465749	0.576399	0.000000	0.140889						
1.322222	0.466768	0.594531	0.000000	0.141197						
1.361111	0.467788	0.612703	0.000000	0.141506						
1.400000	0.468810	0.630915	0.000000	0.141815						
1.438889	0.469833	0.649166	0.000000	0.142124						
1.477778	0.470856	0.667457	0.000000	0.142434						
1.516667	0.471881	0.685788	0.000000	0.142744						
1.555556	0.472907	0.704159	0.000000	0.143054						
1.594444	0.473934	0.722570	0.000000	0.143365						

```

1.633333 0.474962 0.741021 0.000000 0.143676
1.672222 0.475991 0.759511 0.000000 0.143987
1.711111 0.477022 0.778042 0.000000 0.144299
1.750000 0.478053 0.796613 0.000000 0.144611
1.788889 0.479086 0.815224 0.000253 0.144923
1.827778 0.480120 0.833875 0.000711 0.145236
1.866667 0.481154 0.852567 0.001296 0.145549
1.905556 0.482190 0.871298 0.001979 0.145863
1.944444 0.483227 0.890070 0.002744 0.146176
1.983333 0.484265 0.908883 0.003578 0.146490
2.022222 0.485305 0.927736 0.004472 0.146805
2.061111 0.486345 0.946629 0.005419 0.147119
2.100000 0.487387 0.965562 0.006413 0.147434
2.138889 0.488429 0.984537 0.007448 0.147750
2.177778 0.489473 1.003551 0.008520 0.148066
2.216667 0.490518 1.022607 0.009625 0.148382
2.255556 0.491564 1.041703 0.010719 0.148698
2.294444 0.492611 1.060840 0.011813 0.149015
2.333333 0.493659 1.080017 0.012907 0.149332
2.372222 0.494708 1.099235 0.014001 0.149649
2.411111 0.495758 1.118494 0.015095 0.149967
2.450000 0.496810 1.137794 0.016189 0.150285
2.488889 0.497863 1.157135 0.017283 0.150603
2.527778 0.498916 1.176517 0.018377 0.150922
2.566667 0.499971 1.195940 0.019471 0.151241
2.605556 0.501027 1.215404 0.020565 0.151561
2.644444 0.502084 1.234909 0.021659 0.151880
2.683333 0.503142 1.254455 0.022753 0.152200
2.722222 0.504201 1.274042 0.023847 0.152521
2.761111 0.505262 1.293670 0.024941 0.152842
2.800000 0.506323 1.313340 0.026035 0.153163
2.838889 0.507386 1.333051 0.027129 0.153484
2.877778 0.508450 1.352803 0.028223 0.153806
2.916667 0.509514 1.372597 0.029317 0.154128
2.955556 0.510580 1.392432 0.030411 0.154451
2.994444 0.511647 1.412309 0.031505 0.154773
3.033333 0.512715 1.432227 0.032599 0.155096
3.072222 0.513785 1.452187 0.033693 0.155420
3.111111 0.514855 1.472188 0.034787 0.155744
3.150000 0.515927 1.492231 0.035881 0.156068
3.188889 0.516999 1.512316 0.036975 0.156392
3.227778 0.518073 1.532442 0.038069 0.156717
3.266667 0.519148 1.552610 0.039163 0.157042
3.305556 0.520224 1.572820 0.040257 0.157368
3.344444 0.521301 1.593072 0.041351 0.157693
3.383333 0.522379 1.613366 0.042445 0.158020
3.422222 0.523458 1.633702 0.043539 0.158346
3.461111 0.524538 1.654079 0.044633 0.158673
3.500000 0.525620 1.674499 0.045727 0.159000

```

END FTABLE 1  
END FTABLES

EXT SOURCES

```

<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member--> ***
<Name> # <Name> # tem strg<-factor-->strg <Name> # # <Name> # # ***
WDM 2 PREC ENGL 1.2 PERLND 1 999 EXTNL PREC
WDM 2 PREC ENGL 1.2 IMPLND 1 999 EXTNL PREC
WDM 1 EVAP ENGL 0.76 PERLND 1 999 EXTNL PETINP
WDM 1 EVAP ENGL 0.76 IMPLND 1 999 EXTNL PETINP

```

END EXT SOURCES

EXT TARGETS

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name> # <Name> # #<-factor-->strg <Name> # <Name> tem strg strg***
RCHRES 1 HYDR RO 1 1 1 WDM 1012 FLOW ENGL REPL
RCHRES 1 HYDR O 1 1 1 WDM 1013 FLOW ENGL REPL
RCHRES 1 HYDR O 2 1 1 WDM 1014 FLOW ENGL REPL
RCHRES 1 HYDR STAGE 1 1 1 WDM 1015 STAG ENGL REPL
COPY 1 OUTPUT MEAN 1 1 48.4 WDM 701 FLOW ENGL REPL

```

COPY 501 OUTPUT MEAN 1 1 48.4 WDM 801 FLOW ENGL REPL  
 END EXT TARGETS

MASS-LINK

<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->\*\*\*  
 <Name> <Name> # #<-factor-> <Name> <Name> # #\*\*\*

MASS-LINK 2  
 PERLND PWATER SURO 0.083333 RCHRES INFLOW IVOL  
 END MASS-LINK 2

MASS-LINK 3  
 PERLND PWATER IFWO 0.083333 RCHRES INFLOW IVOL  
 END MASS-LINK 3

MASS-LINK 5  
 IMPLND IWATER SURO 0.083333 RCHRES INFLOW IVOL  
 END MASS-LINK 5

MASS-LINK 12  
 PERLND PWATER SURO 0.083333 COPY INPUT MEAN  
 END MASS-LINK 12

MASS-LINK 13  
 PERLND PWATER IFWO 0.083333 COPY INPUT MEAN  
 END MASS-LINK 13

MASS-LINK 15  
 IMPLND IWATER SURO 0.083333 COPY INPUT MEAN  
 END MASS-LINK 15

MASS-LINK 17  
 RCHRES OFLOW OVOL 1 COPY INPUT MEAN  
 END MASS-LINK 17

END MASS-LINK

END RUN

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*Mitigated HSPF Message File*

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## Disclaimer

### Legal Notice

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# **APPENDIX 3C**

## **CONVEYANCE CALCULATIONS**

# Emergency Spillway Design

Source: WSDOT Highway Runoff Manual

## Chapter 5

## Stormwater Best Management Practices

$$Q_{100} = C (2g)^{1/2} \left[ \frac{2}{3} LH^{3/2} + \frac{8}{15} (\text{Tan } \theta) H^{5/2} \right] \quad (\text{E-31})$$

where:  $Q_{100}$  = peak flow for the 100-year runoff event (cfs)  
 $C$  = discharge coefficient (0.6)  
 $g$  = gravity (32.2 ft/sec<sup>2</sup>)  
 $L$  = length of weir (ft)  
 $H$  = height of water over weir (ft)  
 $\theta$  = angle of side slopes

Assuming  $C = 0.6$  and  $\text{Tan } \theta = 3$  (for 3H:1V slopes), the equation becomes:

$$Q_{100} = 3.21[LH^{3/2} + 2.4 H^{5/2}] \quad (\text{E-32})$$

To find the width  $L$  for the weir section, the equation is rearranged to use the computed  $Q_{100}$  and trial values of  $H$  (0.2 feet minimum):

$$L = [Q_{100}/(3.21H^{3/2})] - 2.4 H \text{ or } 6 \text{ feet minimum} \quad (\text{E-33})$$

Analyze emergency overflow spillway designs using a Type II manhole fitted with a birdcage, as shown in [Figure 5-55](#), using [Figure 5-56](#) to pass the 100-year postdeveloped undetained peak low.

### Equation E-33

$C =$	0.6	
$g =$	32.2 ft/s <sup>2</sup>	
$H =$	0.25 ft	
$Q_{100} =$	4.01 cfs	

$$L = \frac{4.01}{0.40} - 0.6 = 9.99 - 0.6 = \mathbf{9.394 \text{ FEET}}$$

Q100 Per WWHM modeling for 100-year event.

**Project Description**

File Name ..... 211th Arlington.SPF

**Project Options**

Flow Units ..... CFS  
 Elevation Type ..... Elevation  
 Hydrology Method ..... Santa Barbara UH  
 Time of Concentration (TOC) Method ..... SCS TR-55  
 Link Routing Method ..... Hydrodynamic  
 Enable Overflow Ponding at Nodes ..... YES  
 Skip Steady State Analysis Time Periods ..... YES

**Analysis Options**

Start Analysis On ..... Jan 14, 2024 00:00:00  
 End Analysis On ..... Jan 15, 2024 00:00:00  
 Start Reporting On ..... Jan 14, 2024 00:00:00  
 Antecedent Dry Days ..... 0 days  
 Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss  
 Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss  
 Reporting Time Step ..... 0 00:05:00 days hh:mm:ss  
 Routing Time Step ..... 30 seconds

**Number of Elements**

Qty

Rain Gages ..... 1  
 Subbasins ..... 16  
 Nodes ..... 37  
     *Junctions* ..... 33  
     *Outfalls* ..... 4  
     *Flow Diversions* ..... 0  
     *Inlets* ..... 0  
     *Storage Nodes* ..... 0  
 Links ..... 33  
     *Channels* ..... 0  
     *Pipes* ..... 33  
     *Pumps* ..... 0  
     *Orifices* ..... 0  
     *Weirs* ..... 0  
     *Outlets* ..... 0  
 Pollutants ..... 0  
 Land Uses ..... 0

**Rainfall Details**

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	24hr 25-yr	Intensity	inches	Washington	Snohomish	25	2.60	SCS Type IA 24-hr

## Subbasin Summary

SN	Subbasin ID	Area (ac)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	0.13	100.00	98.00	98.00	2.59	2.36	0.31	0.08	0 00:05:00
2	Sub-02	0.21	100.00	98.00	98.00	2.59	2.36	0.49	0.12	0 00:05:00
3	Sub-03	0.17	100.00	98.00	98.00	2.59	2.36	0.40	0.10	0 00:05:00
4	Sub-04	0.06	100.00	98.00	98.00	2.59	2.36	0.14	0.04	0 00:05:00
5	Sub-05	0.17	100.00	98.00	98.00	2.59	2.36	0.39	0.10	0 00:05:00
6	Sub-06	0.12	100.00	98.00	98.00	2.59	2.36	0.27	0.07	0 00:05:00
7	Sub-07	0.08	100.00	98.00	98.00	2.59	2.36	0.19	0.05	0 00:05:00
8	Sub-11	0.08	100.00	98.00	98.00	2.59	2.36	0.20	0.05	0 00:05:00
9	Sub-13	0.17	100.00	98.00	98.00	2.59	2.36	0.39	0.10	0 00:05:00
10	Sub-14	0.12	100.00	98.00	98.00	2.59	2.36	0.28	0.07	0 00:05:00
11	Sub-15	0.18	100.00	98.00	98.00	2.59	2.36	0.43	0.11	0 00:05:00
12	Sub-16	0.12	100.00	98.00	98.00	2.59	2.36	0.27	0.07	0 00:05:00
13	Sub-17	0.14	100.00	98.00	98.00	2.59	2.36	0.34	0.09	0 00:05:00
14	Sub-18	0.18	100.00	98.00	98.00	2.59	2.36	0.43	0.11	0 00:05:00
15	Sub-19	0.12	100.00	98.00	98.00	2.59	2.36	0.29	0.07	0 00:05:00
16	Sub-20	0.09	100.00	98.00	98.00	2.59	2.36	0.22	0.06	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation Attained	Max Surcharge Depth Attained	Min Freeboard	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft <sup>2</sup> )	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	CB 01	Junction	67.87	71.87	67.87	71.87	0.00	0.44	68.19	0.00	3.68	0 00:00	0.00	0.00
2	CB 02	Junction	68.12	71.50	68.12	71.50	0.00	0.08	68.30	0.00	3.20	0 00:00	0.00	0.00
3	CB 03	Junction	68.25	71.06	68.25	71.06	0.00	0.08	68.43	0.00	2.62	0 00:00	0.00	0.00
4	CB 04	Junction	89.77	93.96	89.77	93.96	0.00	0.64	90.15	0.00	3.82	0 00:00	0.00	0.00
5	CB 05	Junction	70.79	72.43	70.79	72.43	0.00	0.12	70.97	0.00	1.45	0 00:00	0.00	0.00
6	CB 06	Junction	72.08	76.08	72.08	76.08	0.00	0.24	72.31	0.00	3.77	0 00:00	0.00	0.00
7	CB 07	Junction	76.47	80.47	76.47	80.47	0.00	0.24	76.69	0.00	3.77	0 00:00	0.00	0.00
8	CB 08	Junction	76.06	79.18	76.06	79.18	0.00	0.10	76.70	0.00	2.47	0 00:00	0.00	0.00
9	CB 10	Junction	87.31	91.26	87.31	91.26	0.00	0.81	87.79	0.00	3.47	0 00:00	0.00	0.00
10	CB 11	Junction	94.24	99.14	94.24	99.14	0.00	0.44	94.56	0.00	4.58	0 00:00	0.00	0.00
11	CB 12	Junction	92.38	97.63	92.38	97.63	0.00	0.59	92.75	0.00	4.88	0 00:00	0.00	0.00
12	CB 13	Junction	94.00	98.70	94.00	98.70	0.00	0.49	94.33	0.00	4.36	0 00:00	0.00	0.00
13	CB 14	Junction	96.88	98.37	96.88	98.37	0.00	0.05	97.04	0.00	1.33	0 00:00	0.00	0.00
14	CB 15	Junction	95.26	99.26	95.26	99.26	0.00	0.07	95.44	0.00	3.82	0 00:00	0.00	0.00
15	CB 16	Junction	96.94	101.77	96.94	101.77	0.00	0.39	97.23	0.00	4.54	0 00:00	0.00	0.00
16	CB 17	Junction	97.08	100.72	97.08	100.72	0.00	0.11	97.25	0.00	3.47	0 00:00	0.00	0.00
17	CB 18	Junction	98.22	102.50	98.22	102.50	0.00	0.28	98.47	0.00	4.03	0 00:00	0.00	0.00
18	CB 19	Junction	98.83	102.84	98.83	102.84	0.00	0.19	99.08	0.00	3.76	0 00:00	0.00	0.00
19	CB 20	Junction	100.30	104.30	100.30	104.30	0.00	0.11	100.51	0.00	3.79	0 00:00	0.00	0.00
20	CB 21	Junction	100.07	105.12	100.07	105.12	0.00	0.13	100.30	0.00	4.82	0 00:00	0.00	0.00
21	CB 22	Junction	100.26	104.40	100.26	104.40	0.00	0.13	100.49	0.00	3.91	0 00:00	0.00	0.00
22	CB 23	Junction	102.65	104.22	102.65	104.22	0.00	0.05	102.81	0.00	1.41	0 00:00	0.00	0.00
23	CB 24	Junction	68.43	73.97	68.43	73.97	0.00	0.37	68.71	0.00	5.25	0 00:00	0.00	0.00
24	CB 25	Junction	91.67	97.13	91.67	97.13	0.00	0.64	92.05	0.00	5.08	0 00:00	0.00	0.00
25	CB 26	Junction	66.60	71.56	66.60	71.56	0.00	0.44	66.91	0.00	4.64	0 00:00	0.00	0.00
26	CB 27	Junction	85.86	89.40	85.86	89.40	0.00	0.86	86.11	0.00	3.29	0 00:00	0.00	0.00
27	CB 28	Junction	89.96	95.36	89.96	95.36	0.00	0.64	90.34	0.00	5.02	0 00:00	0.00	0.00
28	CB 29	Junction	95.12	100.87	95.12	100.87	0.00	0.44	95.44	0.00	5.44	0 00:00	0.00	0.00
29	EX CB 103	Junction	82.75	87.38	82.75	87.38	0.00	0.84	83.11	0.00	4.27	0 00:00	0.00	0.00
30	EX CB 115	Junction	99.63	102.71	99.63	102.71	0.00	0.00	99.63	0.00	3.08	0 00:00	0.00	0.00
31	EXCB108	Junction	102.62	103.87	102.62	103.87	0.00	0.06	102.77	0.00	1.10	0 00:00	0.00	0.00
32	EXCB110	Junction	100.05	101.19	100.05	101.19	0.00	0.13	100.28	0.00	0.91	0 00:00	0.00	0.00
33	POND	Junction	67.75	71.80	67.75	71.80	0.00	0.44	68.06	0.00	3.74	0 00:00	0.00	0.00
34	Out-1Pipe - (115)	Outfall	77.79					0.86	77.95					
35	Out-1Pipe - (116)	Outfall	68.02					0.00	68.02					
36	Out-1Pipe - (121)	Outfall	99.76					0.13	99.89					
37	OVERFLOW	Outfall	65.29					0.44	65.56					

Link Summary

SN	Element ID	Element Type	From (Inlet Node)	To (Outlet Node)	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/Total Depth Ratio	Total Time Reported Surcharged	Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-01	Pipe	CB 27	EX CB 103	60.73	85.86	83.01	4.6900	12.000	0.0150	0.81	6.69	0.12	5.54	0.24	0.24	0.00	Calculated
2	Link-02	Pipe	EX CB 103	CB 07	156.96	83.01	76.47	4.1700	12.000	0.0150	0.14	6.30	0.02	1.69	0.16	0.16	0.00	Calculated
3	Pipe - (10)	Pipe	CB 20	CB 19	123.35	100.30	98.83	1.1900	12.000	0.0120	0.11	4.21	0.03	0.80	0.23	0.23	0.00	Calculated
4	Pipe - (10) (1)	Pipe	CB 19	CB 18	121.02	98.83	98.22	0.5000	12.000	0.0120	0.21	2.74	0.08	1.42	0.25	0.25	0.00	Calculated
5	Pipe - (11)	Pipe	CB 18	CB 16	150.01	98.22	97.47	0.5000	12.000	0.0120	0.28	2.73	0.10	2.01	0.23	0.23	0.00	Calculated
6	Pipe - (115)	Pipe	EX CB 103	Out-1Pipe - (115)	44.23	82.75	77.79	11.2100	18.000	0.0120	0.86	38.11	0.02	4.16	0.26	0.17	0.00	Calculated
7	Pipe - (121)	Pipe	EXCB110	Out-1Pipe - (121)	35.03	100.05	99.76	0.8300	12.000	0.0120	0.13	3.51	0.04	1.32	0.18	0.18	0.00	Calculated
8	Pipe - (123)	Pipe	EXCB108	CB 22	47.18	102.62	102.49	0.2800	12.000	0.0120	0.05	2.03	0.03	1.00	0.12	0.12	0.00	Calculated
9	Pipe - (126)	Pipe	CB 26	OVERFLOW	261.91	66.60	65.29	0.5000	12.000	0.0120	0.44	2.73	0.16	2.29	0.29	0.29	0.00	Calculated
10	Pipe - (146) (1)	Pipe	CB 10	CB 27	51.83	87.31	85.86	2.8000	12.000	0.0120	0.86	6.46	0.13	3.57	0.36	0.36	0.00	Calculated
11	Pipe - (146) (2)	Pipe	CB 28	CB 04	14.61	89.96	89.77	1.3000	12.000	0.0120	0.64	4.40	0.15	2.33	0.38	0.38	0.00	Calculated
12	Pipe - (148)	Pipe	CB 13	CB 12	149.70	94.00	92.38	1.0800	12.000	0.0120	0.49	4.02	0.12	2.01	0.35	0.35	0.00	Calculated
13	Pipe - (151)	Pipe	CB 21	EXCB110	5.18	100.07	100.05	0.3900	12.000	0.0120	0.13	2.40	0.05	0.92	0.23	0.23	0.00	Calculated
14	Pipe - (152)	Pipe	CB 23	EXCB108	5.48	102.65	102.62	0.5000	8.000	0.0120	0.06	0.93	0.06	0.94	0.16	0.24	0.00	Calculated
15	Pipe - (153)	Pipe	CB 22	CB 21	37.26	100.26	100.07	0.5000	12.000	0.0120	0.13	2.72	0.05	0.92	0.23	0.23	0.00	Calculated
16	Pipe - (156)	Pipe	CB 15	CB 29	27.76	95.26	95.12	0.5100	8.000	0.0120	0.07	0.93	0.08	0.68	0.25	0.37	0.00	Calculated
17	Pipe - (158)	Pipe	CB 17	CB 16	28.34	97.08	96.94	0.4900	8.000	0.0120	0.11	0.92	0.12	1.11	0.23	0.35	0.00	Calculated
18	Pipe - (161)	Pipe	CB 29	CB 11	109.92	95.12	94.24	0.8000	12.000	0.0120	0.44	3.45	0.13	2.08	0.32	0.32	0.00	Calculated
19	Pipe - (162)	Pipe	CB 11	CB 13	43.64	94.24	94.00	0.5500	12.000	0.0120	0.44	2.86	0.15	2.00	0.32	0.32	0.00	Calculated
20	Pipe - (166)	Pipe	CB 01	POND	24.40	67.87	67.75	0.4900	12.000	0.0120	0.44	2.71	0.16	2.05	0.32	0.32	0.00	Calculated
21	Pipe - (168)	Pipe	CB 03	CB 02	26.16	68.25	68.12	0.5000	12.000	0.0120	0.08	2.73	0.03	0.83	0.18	0.18	0.00	Calculated
22	Pipe - (169)	Pipe	CB 14	CB 13	26.04	96.88	96.75	0.5000	8.000	0.0120	0.05	0.93	0.05	1.04	0.13	0.20	0.00	Calculated
23	Pipe - (170)	Pipe	POND	CB 26	76.95	67.75	66.62	1.4700	12.000	0.0120	0.44	4.69	0.09	2.21	0.31	0.31	0.00	Calculated
24	Pipe - (172)	Pipe	CB 04	CB 10	70.09	89.77	87.31	3.5100	12.000	0.0120	0.64	7.23	0.09	2.08	0.43	0.43	0.00	Calculated
25	Pipe - (19)	Pipe	CB 12	CB 25	71.53	92.38	91.67	0.9900	12.000	0.0120	0.59	3.85	0.15	2.21	0.37	0.37	0.00	Calculated
26	Pipe - (19) (3)	Pipe	CB 25	CB 28	71.88	91.67	89.96	2.3800	12.000	0.0120	0.64	5.95	0.11	2.32	0.38	0.38	0.00	Calculated
27	Pipe - (22)	Pipe	CB 08	CB 07	26.16	76.06	75.93	0.5000	8.000	0.0120	0.10	1.64	0.06	0.42	0.43	0.65	0.00	Calculated
28	Pipe - (23)	Pipe	CB 07	CB 06	106.37	76.47	72.08	4.1300	12.000	0.0120	0.24	7.84	0.03	1.81	0.23	0.23	0.00	Calculated
29	Pipe - (23) (1) (1)	Pipe	CB 06	CB 24	95.70	72.08	69.47	2.7300	12.000	0.0120	0.25	6.37	0.04	2.54	0.18	0.18	0.00	Calculated
30	Pipe - (24)	Pipe	CB 24	CB 01	84.19	68.43	67.87	0.6700	12.000	0.0120	0.36	3.15	0.12	1.85	0.30	0.30	0.00	Calculated
31	Pipe - (24) (2)	Pipe	CB 02	CB 01	49.16	68.12	67.87	0.5000	12.000	0.0120	0.08	2.73	0.03	0.59	0.25	0.25	0.00	Calculated
32	Pipe - (26)	Pipe	CB 05	CB 24	28.34	70.79	70.65	0.4900	8.000	0.0120	0.12	0.92	0.13	1.73	0.17	0.26	0.00	Calculated
33	Pipe - (32)	Pipe	CB 16	CB 29	150.19	96.94	96.19	0.5000	12.000	0.0120	0.37	2.73	0.14	2.19	0.27	0.27	0.00	Calculated

## Subbasin Hydrology

### Subbasin : Sub-01

#### Input Data

Area (ac) ..... 0.13  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

#### Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.13		98

#### Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T<sub>c</sub> = Time of Concentration (hr)  
 n = Manning's roughness  
 L<sub>f</sub> = Flow Length (ft)  
 P = 2 yr, 24 hr Rainfall (inches)  
 S<sub>f</sub> = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 \* (S<sub>f</sub><sup>0.5</sup>) (unpaved surface)  
 V = 20.3282 \* (S<sub>f</sub><sup>0.5</sup>) (paved surface)  
 V = 15.0 \* (S<sub>f</sub><sup>0.5</sup>) (grassed waterway surface)  
 V = 10.0 \* (S<sub>f</sub><sup>0.5</sup>) (nearly bare & untilled surface)  
 V = 9.0 \* (S<sub>f</sub><sup>0.5</sup>) (cultivated straight rows surface)  
 V = 7.0 \* (S<sub>f</sub><sup>0.5</sup>) (short grass pasture surface)  
 V = 5.0 \* (S<sub>f</sub><sup>0.5</sup>) (woodland surface)  
 V = 2.5 \* (S<sub>f</sub><sup>0.5</sup>) (forest w/heavy litter surface)  
 T<sub>c</sub> = (L<sub>f</sub> / V) / (3600 sec/hr)

Where:

T<sub>c</sub> = Time of Concentration (hr)  
 L<sub>f</sub> = Flow Length (ft)  
 V = Velocity (ft/sec)  
 S<sub>f</sub> = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$$

R = A<sub>q</sub> / W<sub>p</sub>  
 T<sub>c</sub> = (L<sub>f</sub> / V) / (3600 sec/hr)

Where :

T<sub>c</sub> = Time of Concentration (hr)  
 L<sub>f</sub> = Flow Length (ft)  
 R = Hydraulic Radius (ft)  
 A<sub>q</sub> = Flow Area (ft<sup>2</sup>)  
 W<sub>p</sub> = Wetted Perimeter (ft)  
 V = Velocity (ft/sec)  
 S<sub>f</sub> = Slope (ft/ft)  
 n = Manning's roughness

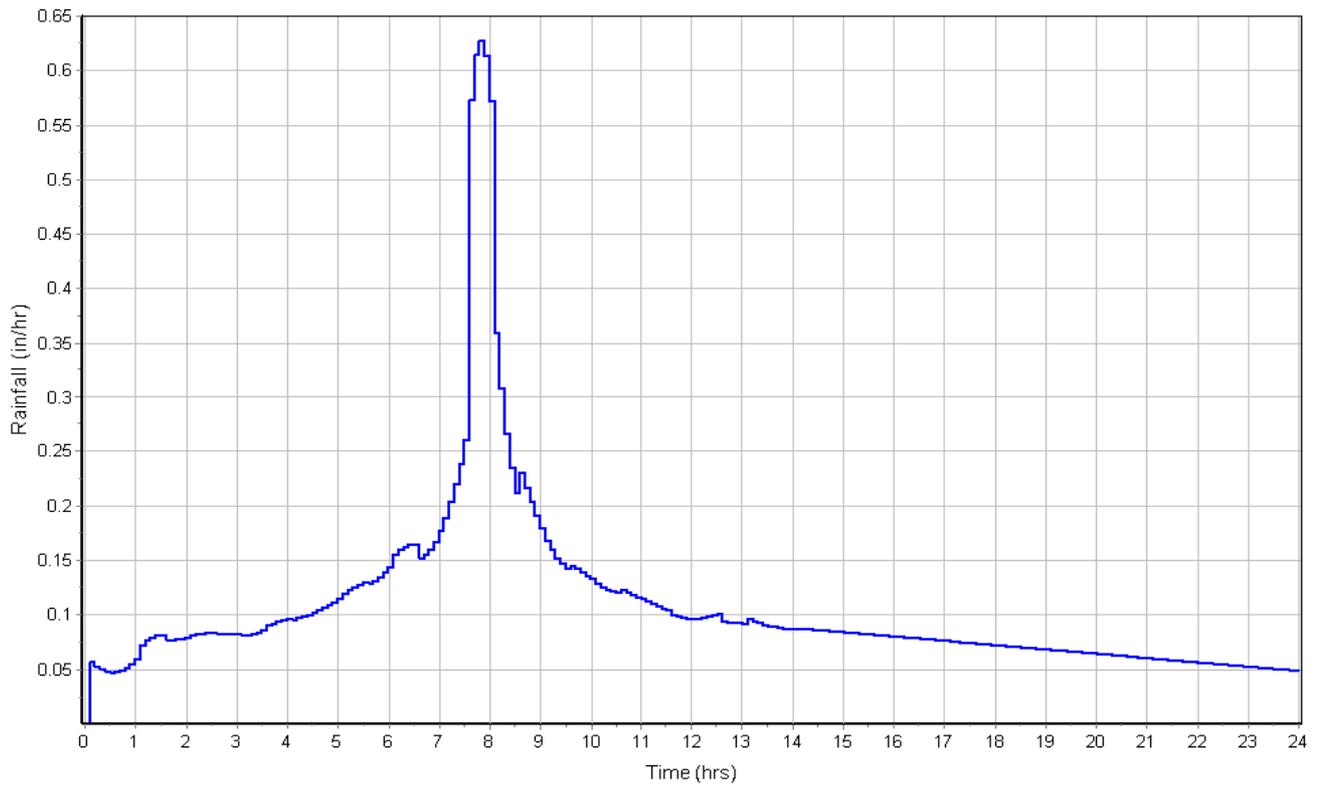
User-Defined TOC override (minutes): 5

#### Subbasin Runoff Results

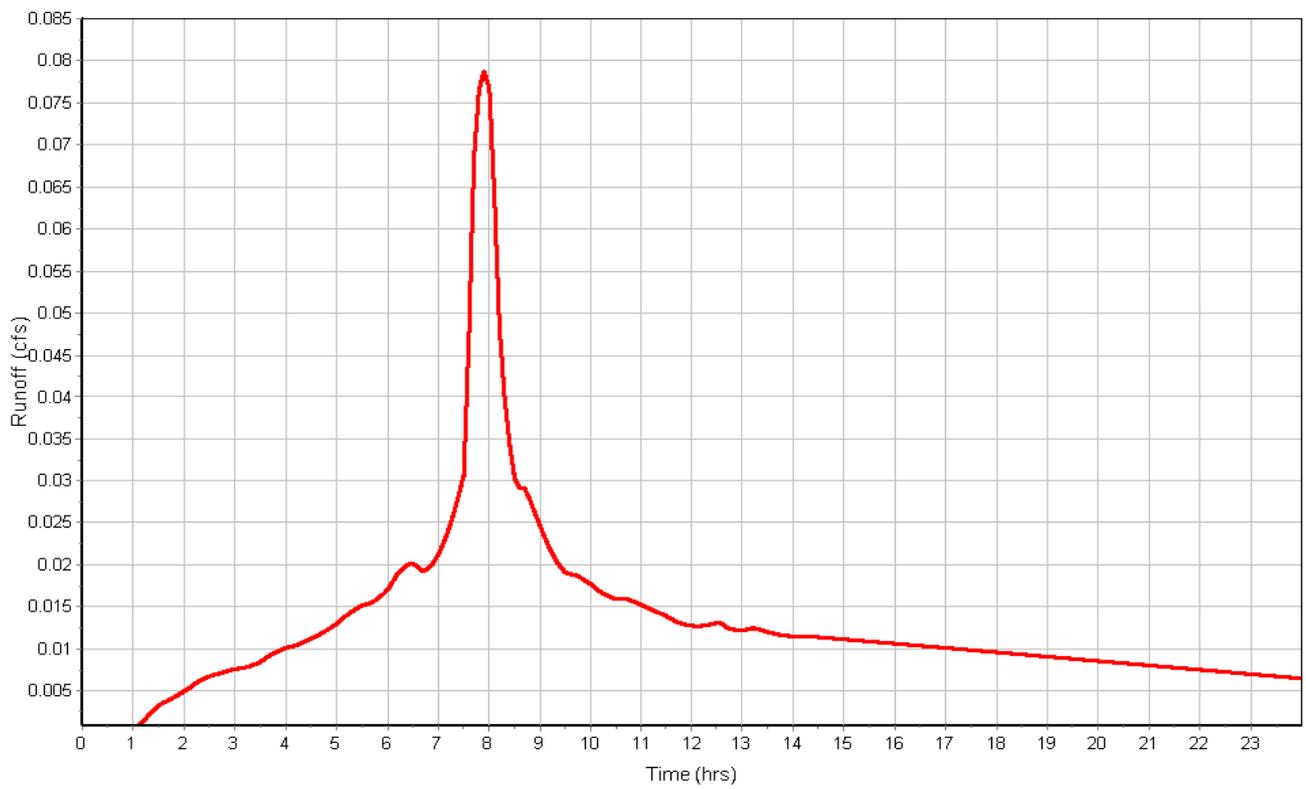
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.08  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-02**

**Input Data**

Area (ac) ..... 0.21  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.21		98

**Time of Concentration**

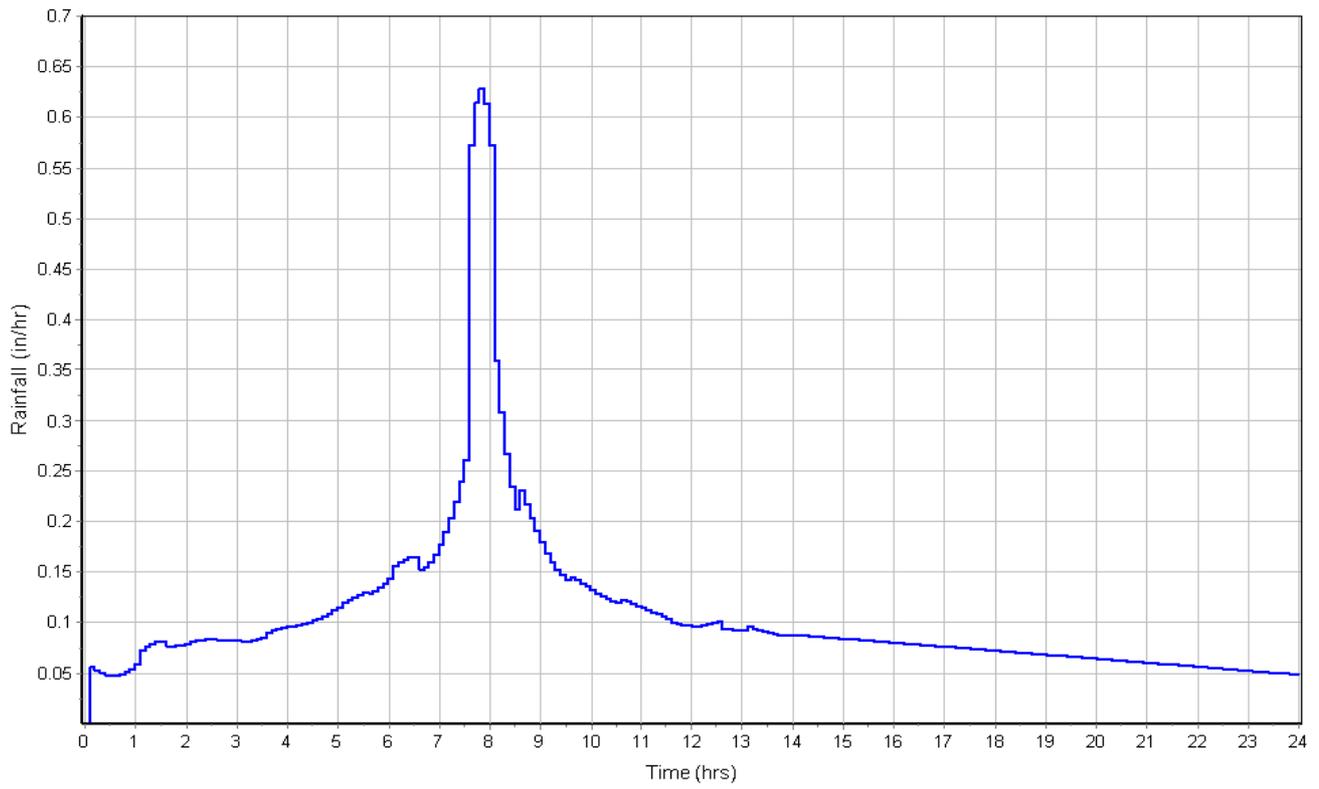
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

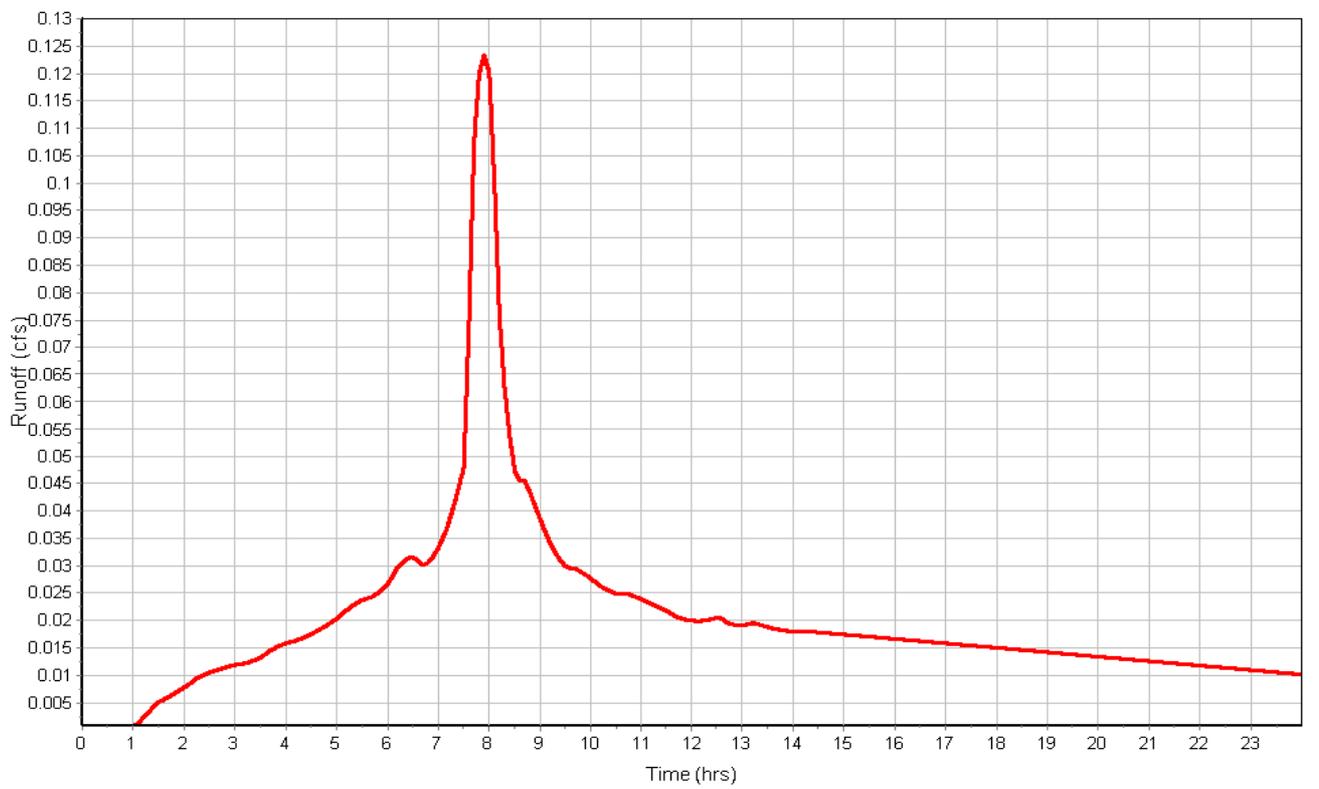
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.12  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-02

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-03**

**Input Data**

Area (ac) ..... 0.17  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.17		98

**Time of Concentration**

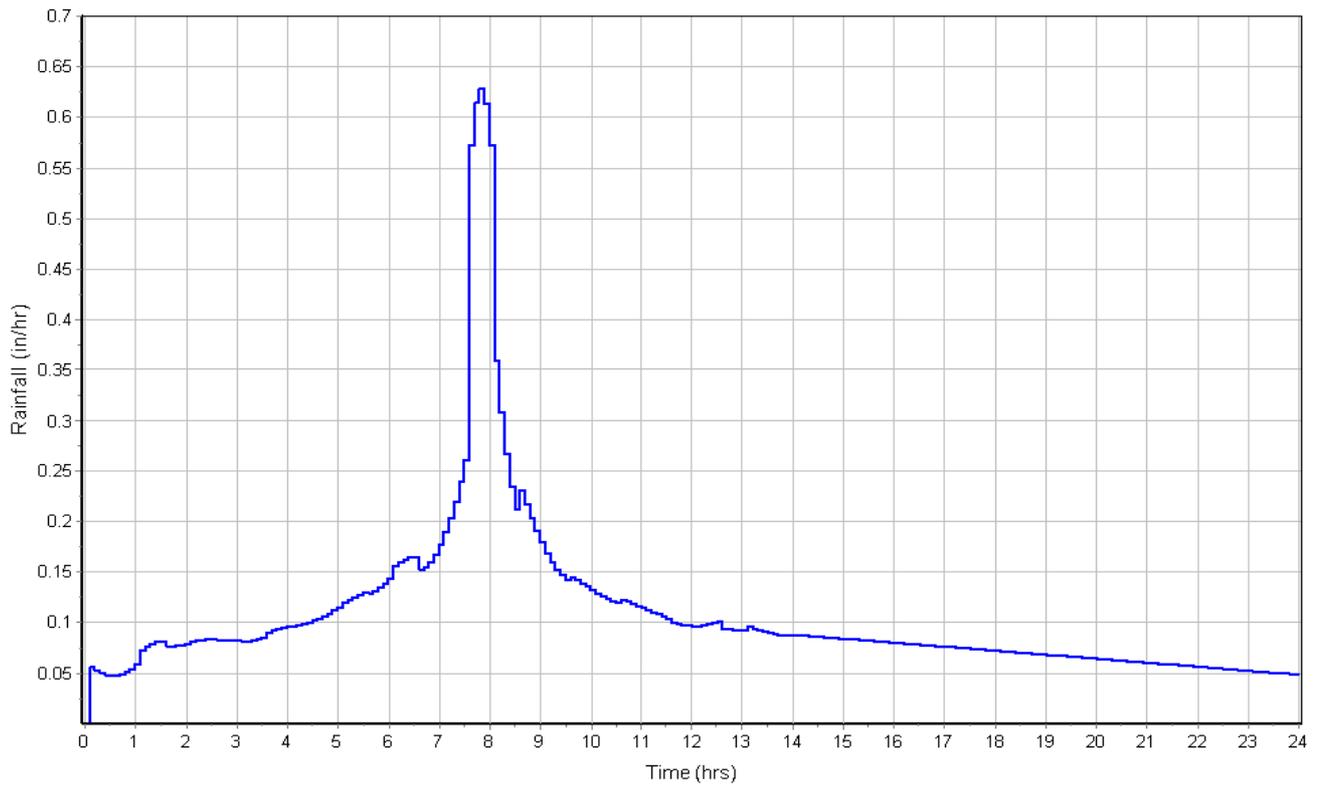
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

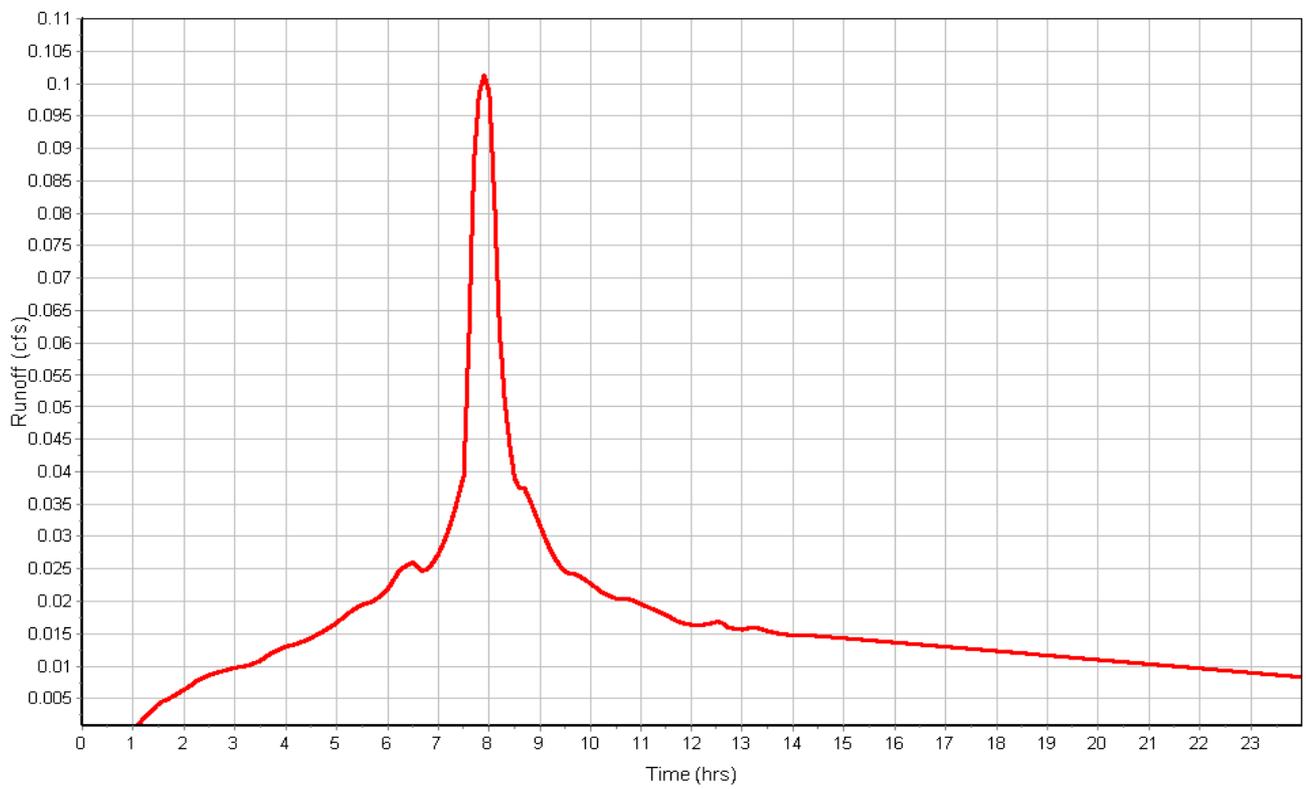
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.10  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-03

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-04**

**Input Data**

Area (ac) ..... 0.06  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.06		98

**Time of Concentration**

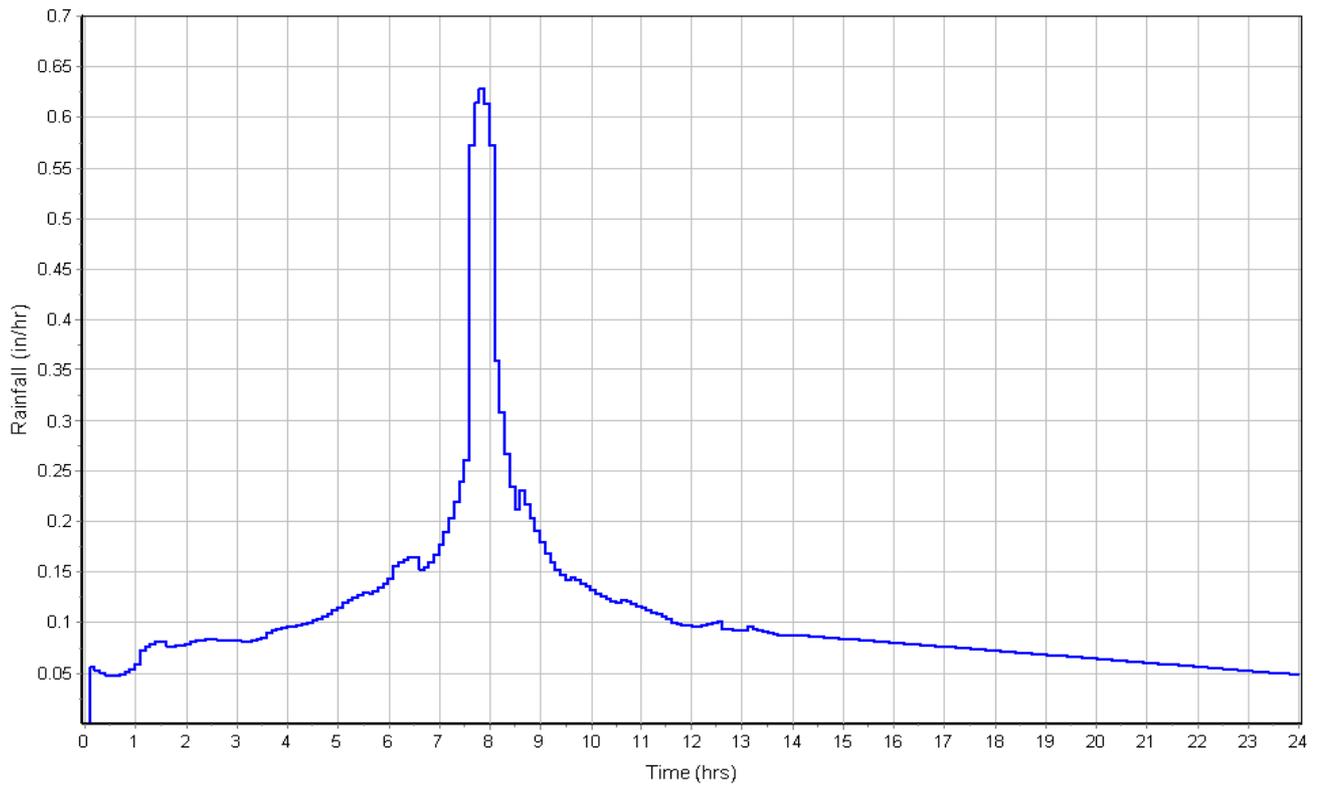
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

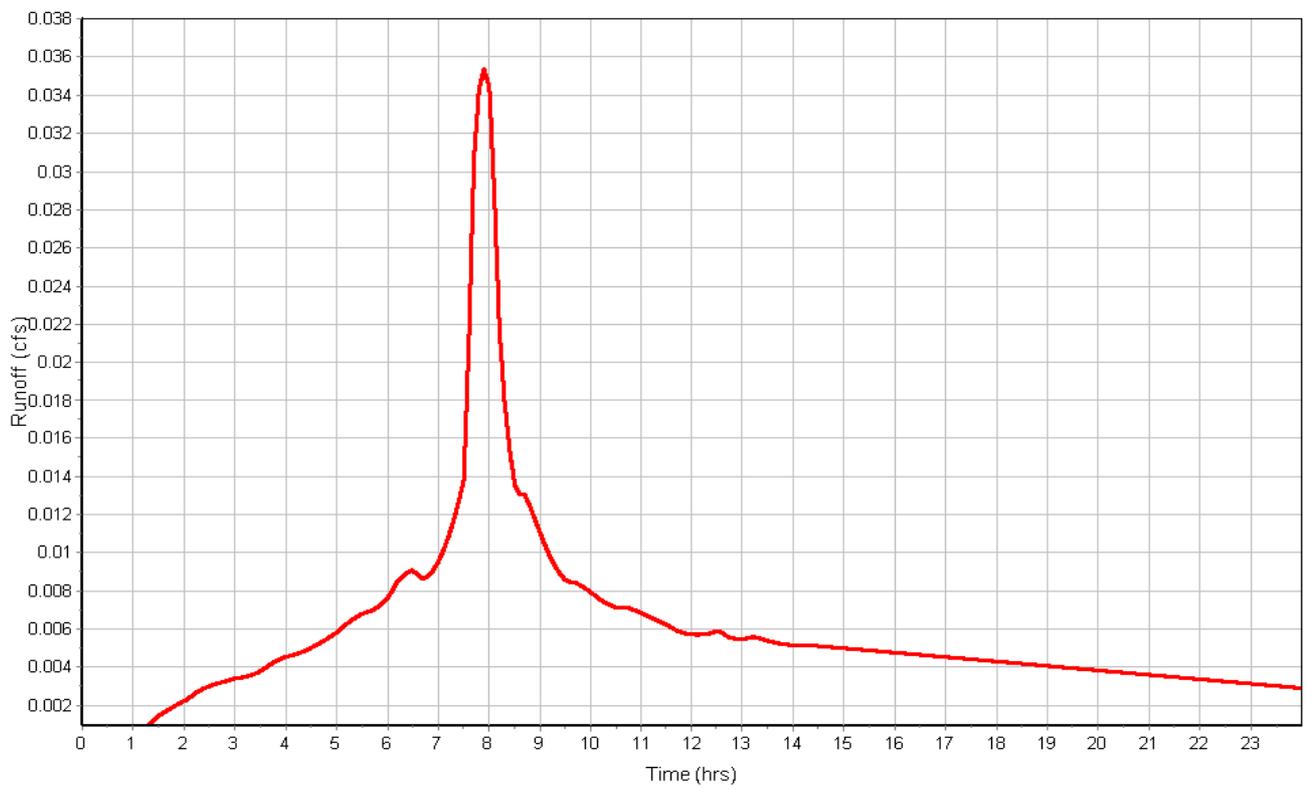
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.04  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-04

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-05**

**Input Data**

Area (ac) ..... 0.17  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.17		98

**Time of Concentration**

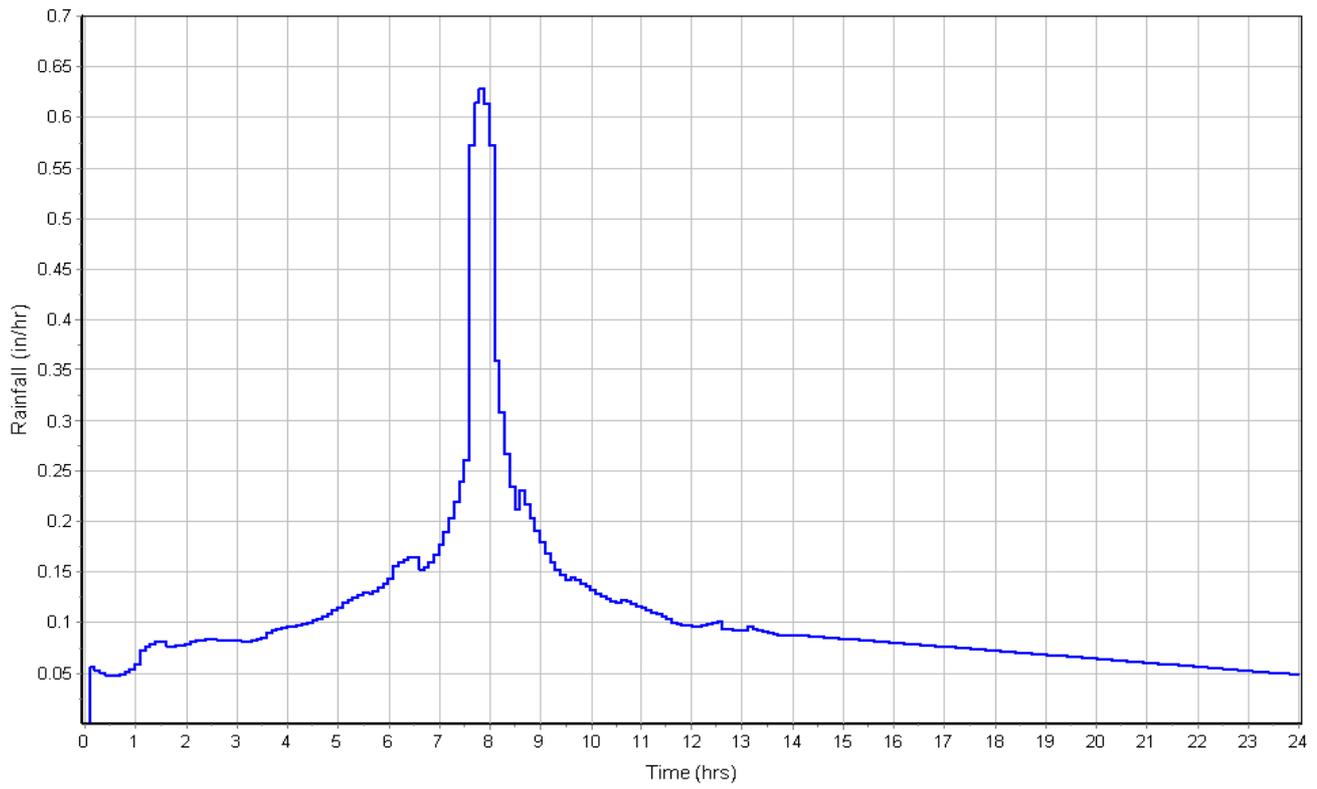
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

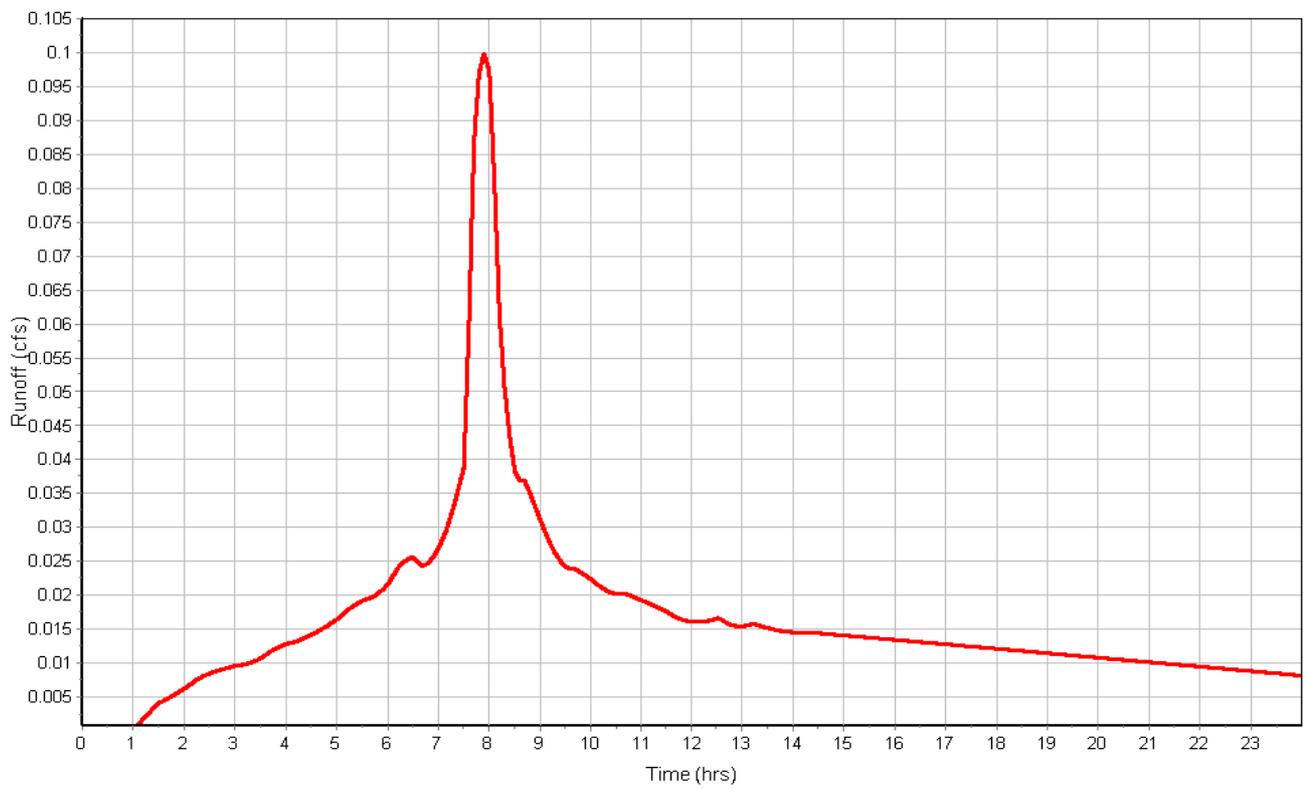
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.10  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-05

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-06**

**Input Data**

Area (ac) ..... 0.12  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.12		98

**Time of Concentration**

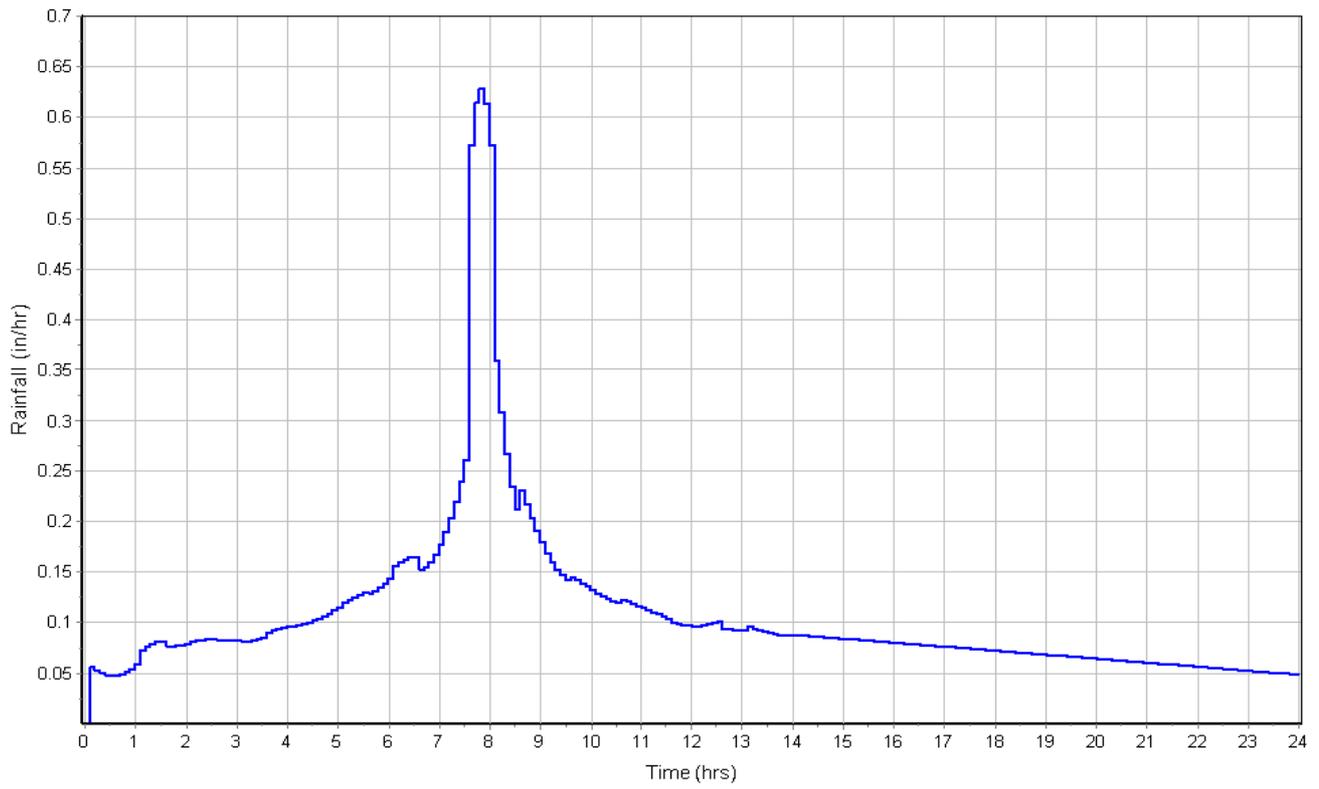
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

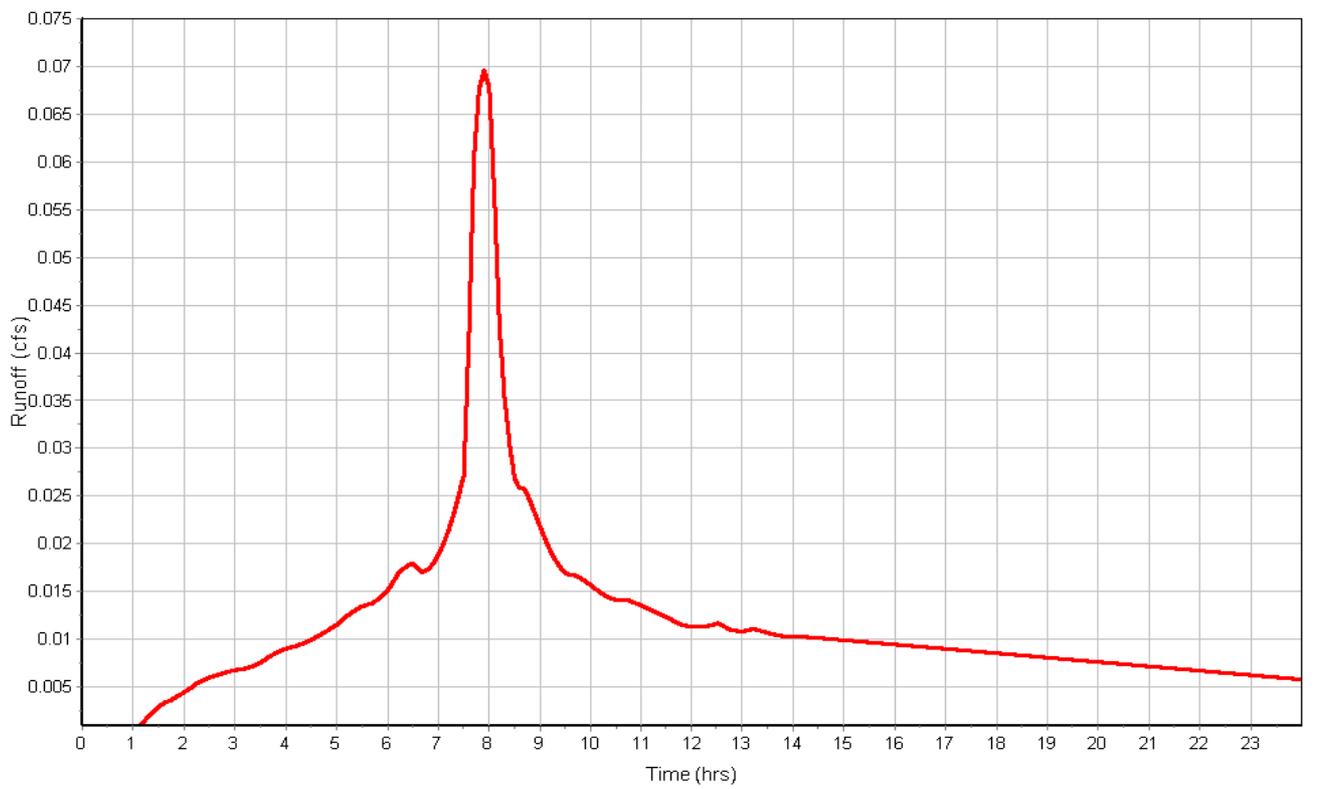
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.07  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-06

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-07**

**Input Data**

Area (ac) ..... 0.08  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.08		98

**Time of Concentration**

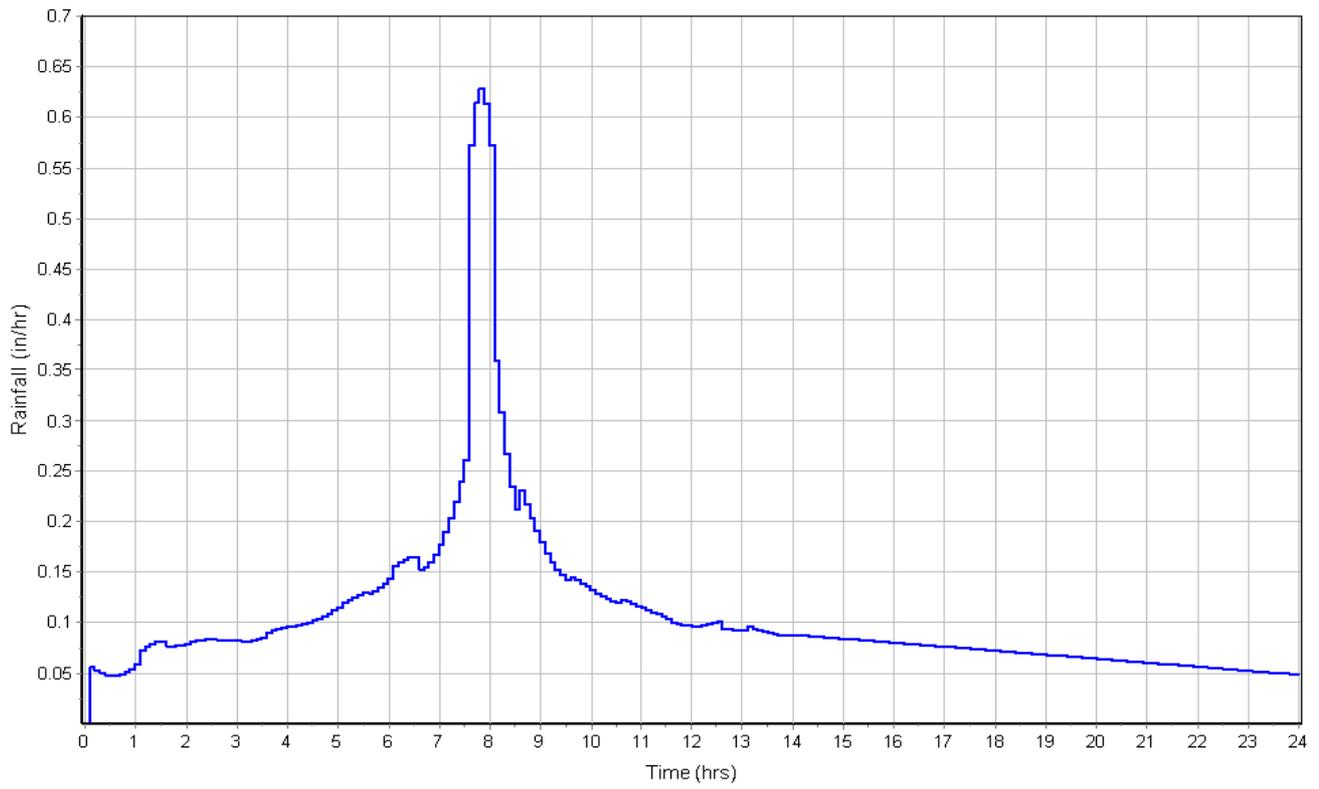
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

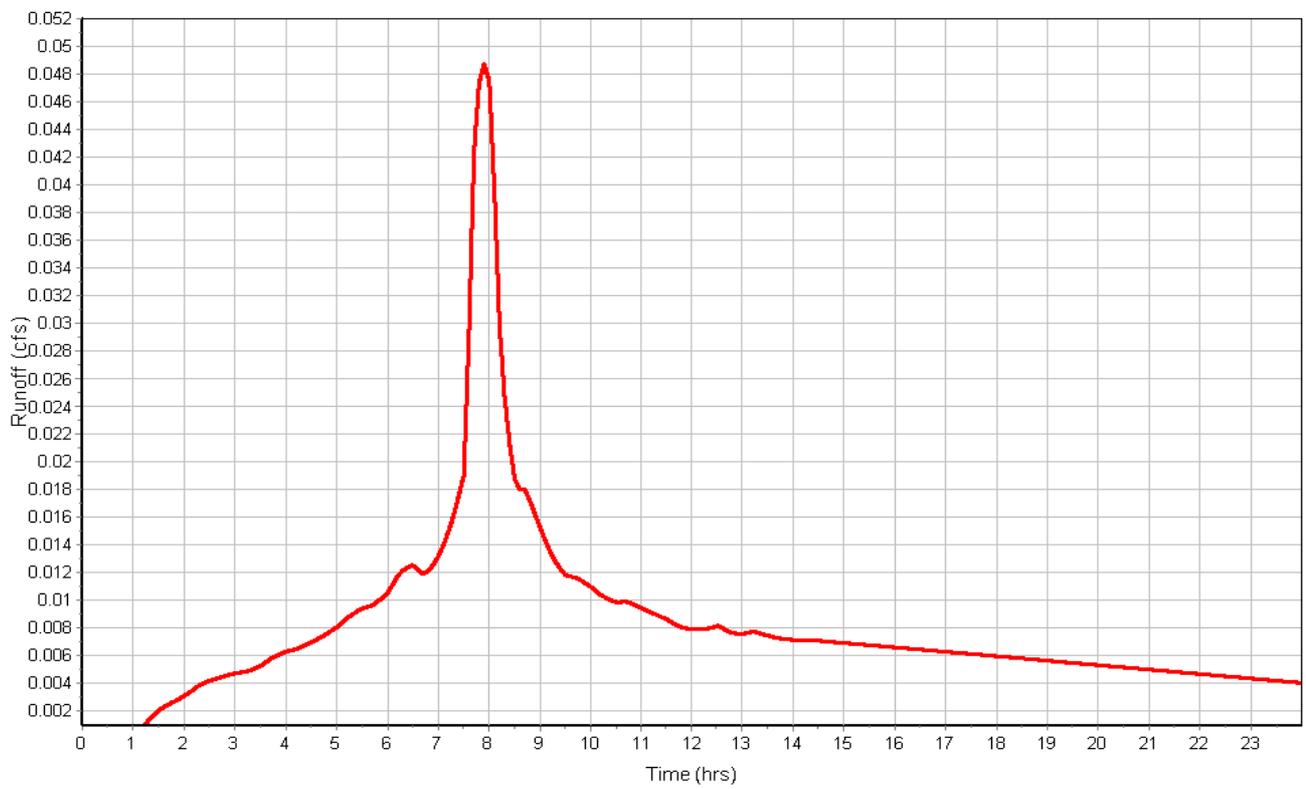
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.05  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-07

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-11**

**Input Data**

Area (ac) ..... 0.08  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.08		98

**Time of Concentration**

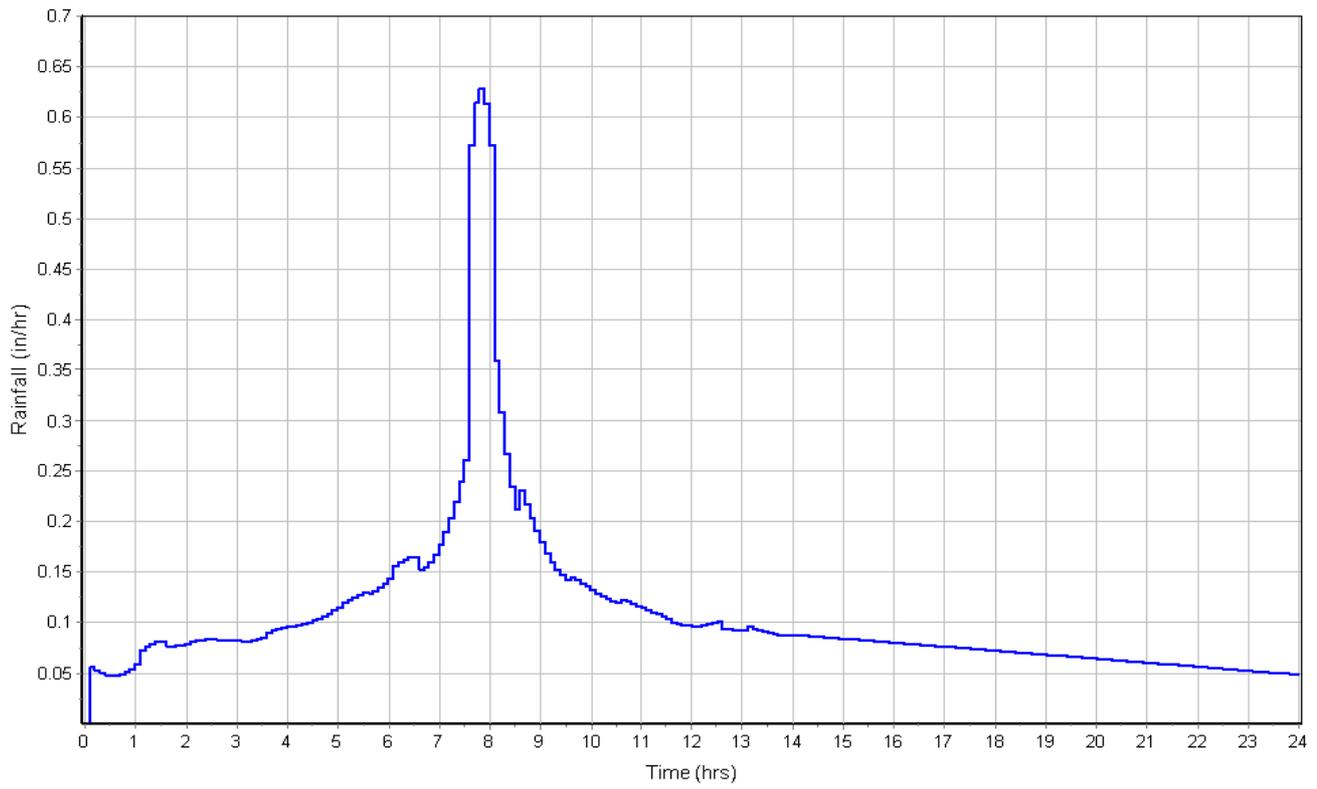
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

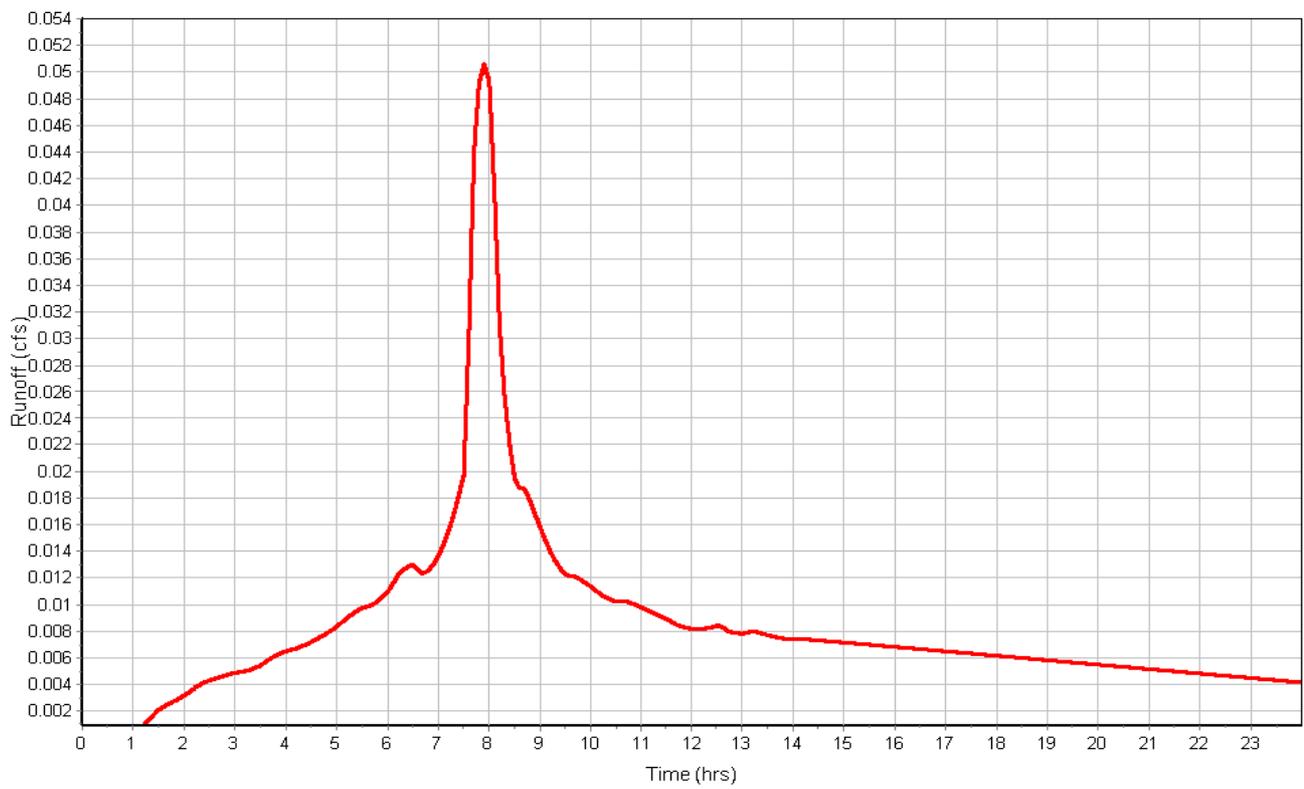
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.05  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-11

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-13**

**Input Data**

Area (ac) ..... 0.17  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.17		98

**Time of Concentration**

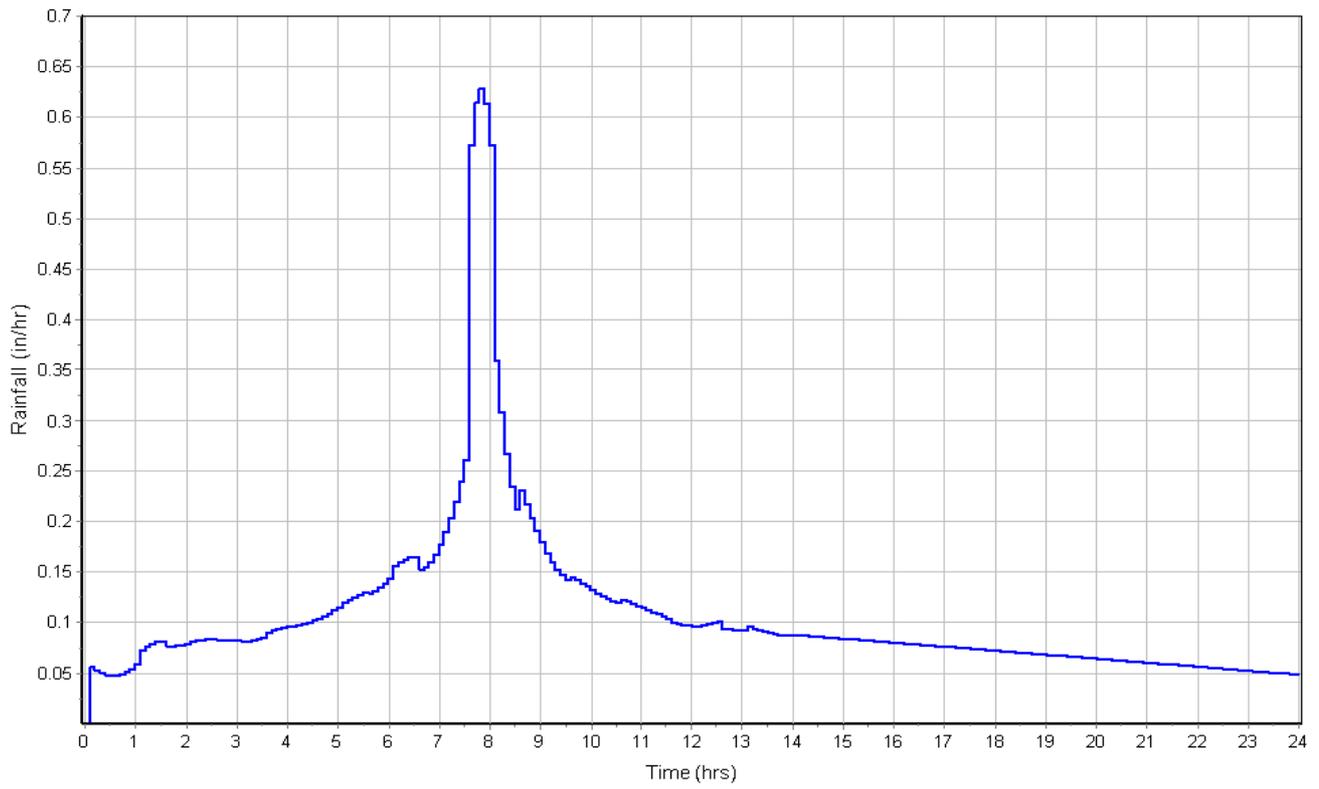
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

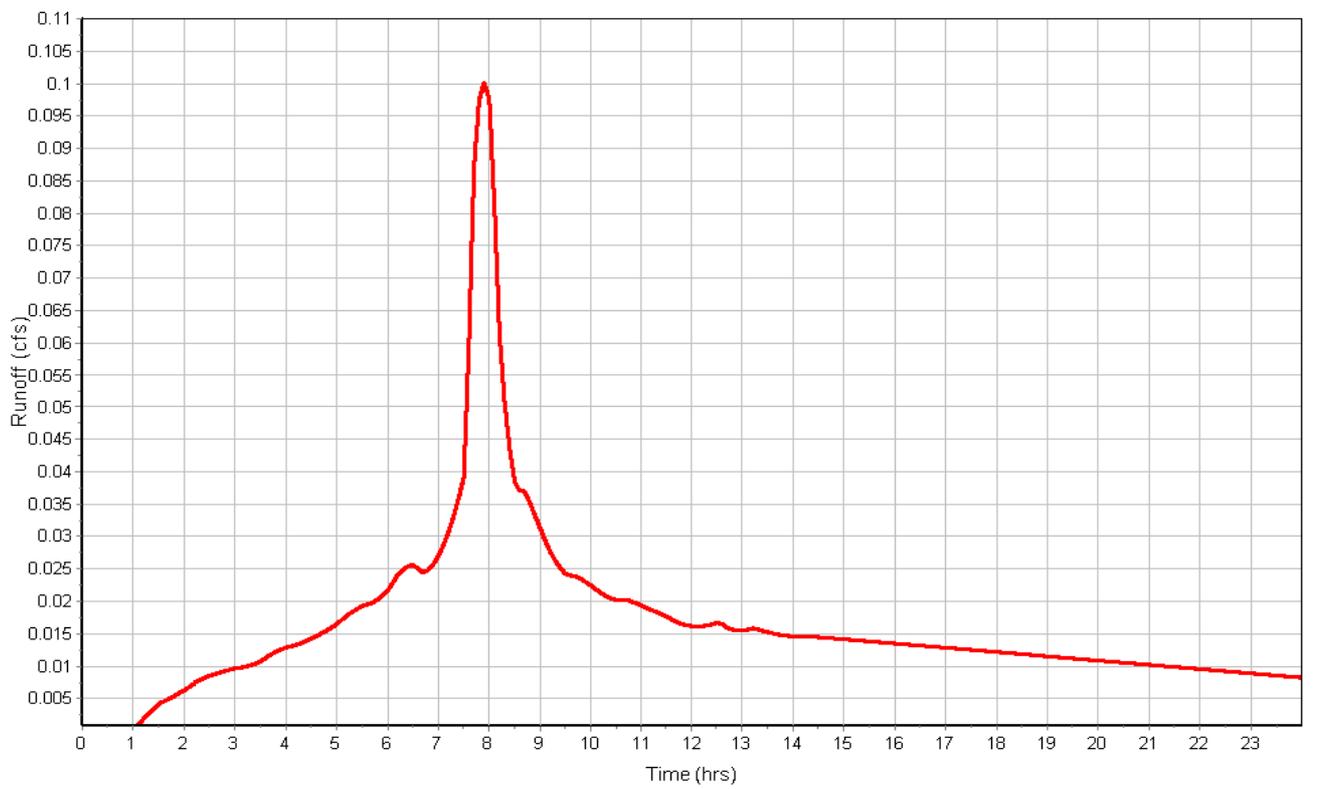
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.10  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-13

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-14**

**Input Data**

Area (ac) ..... 0.12  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.12		98

**Time of Concentration**

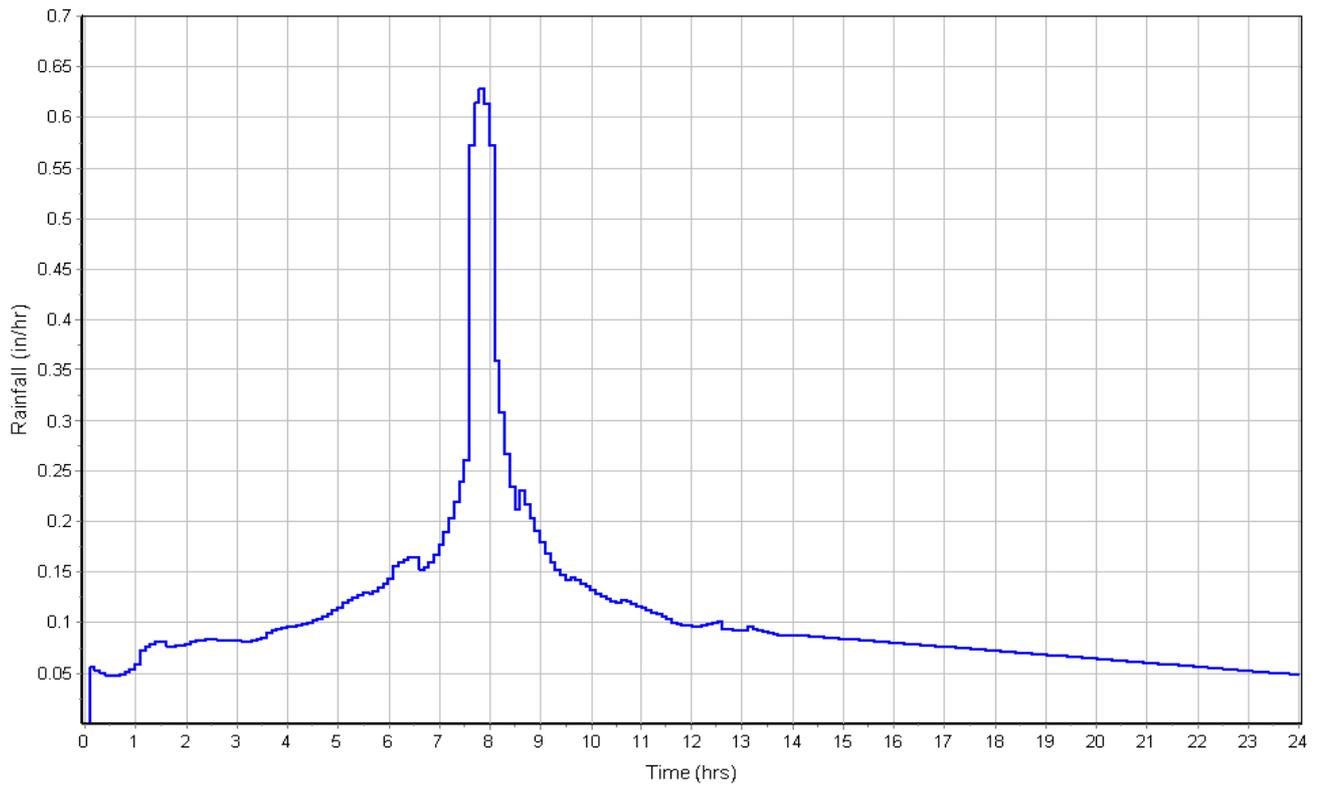
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

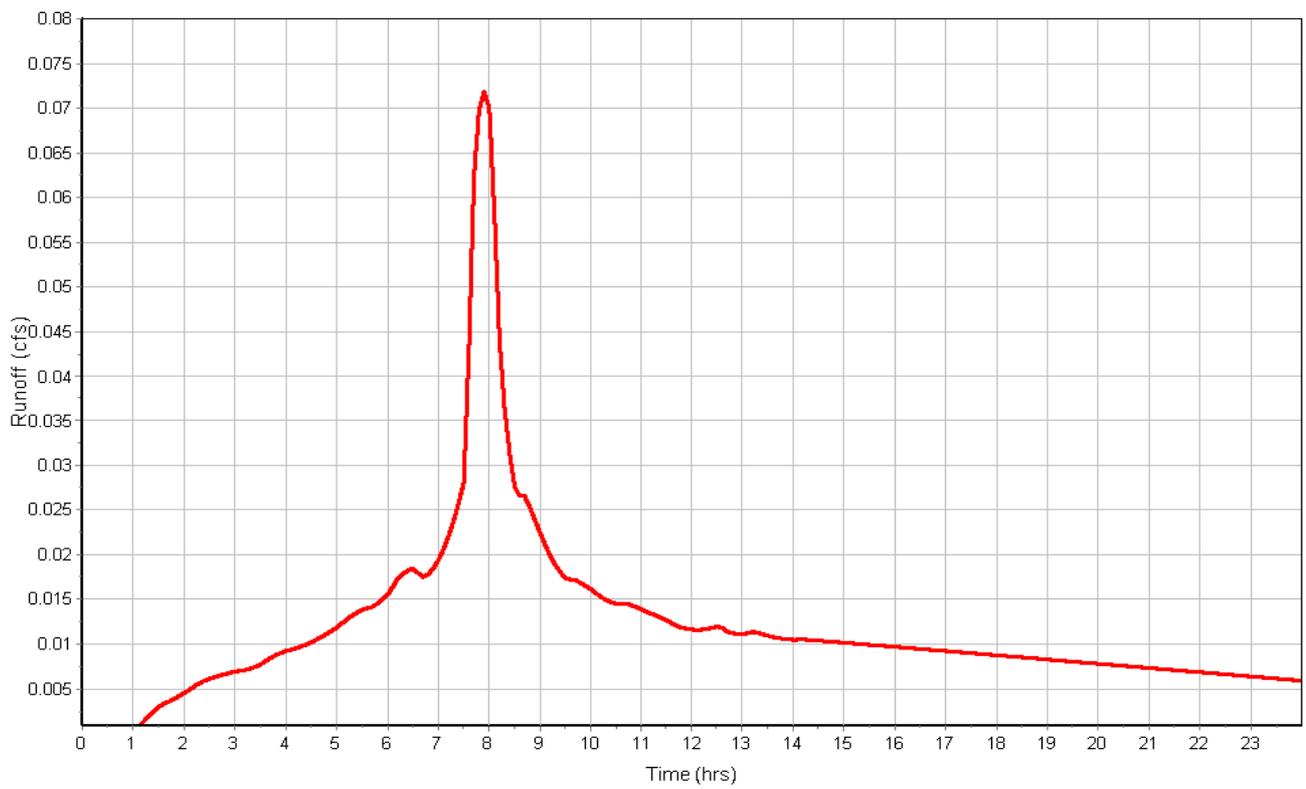
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.07  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-14

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-15**

**Input Data**

Area (ac) ..... 0.18  
Impervious Area (%) ..... 100.00  
Impervious Area Curve Number ..... 98.00  
Pervious Area Curve Number ..... 98.00  
Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.18		98

**Time of Concentration**

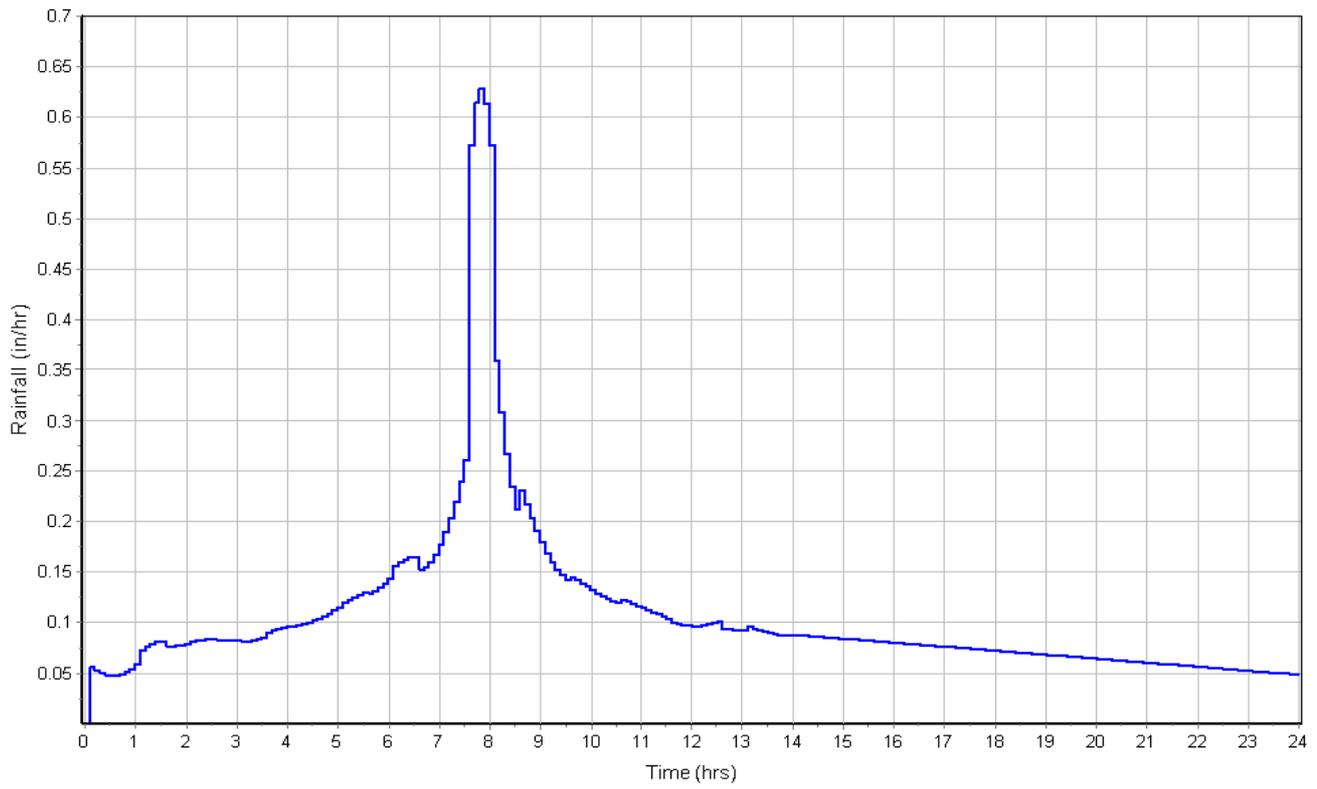
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

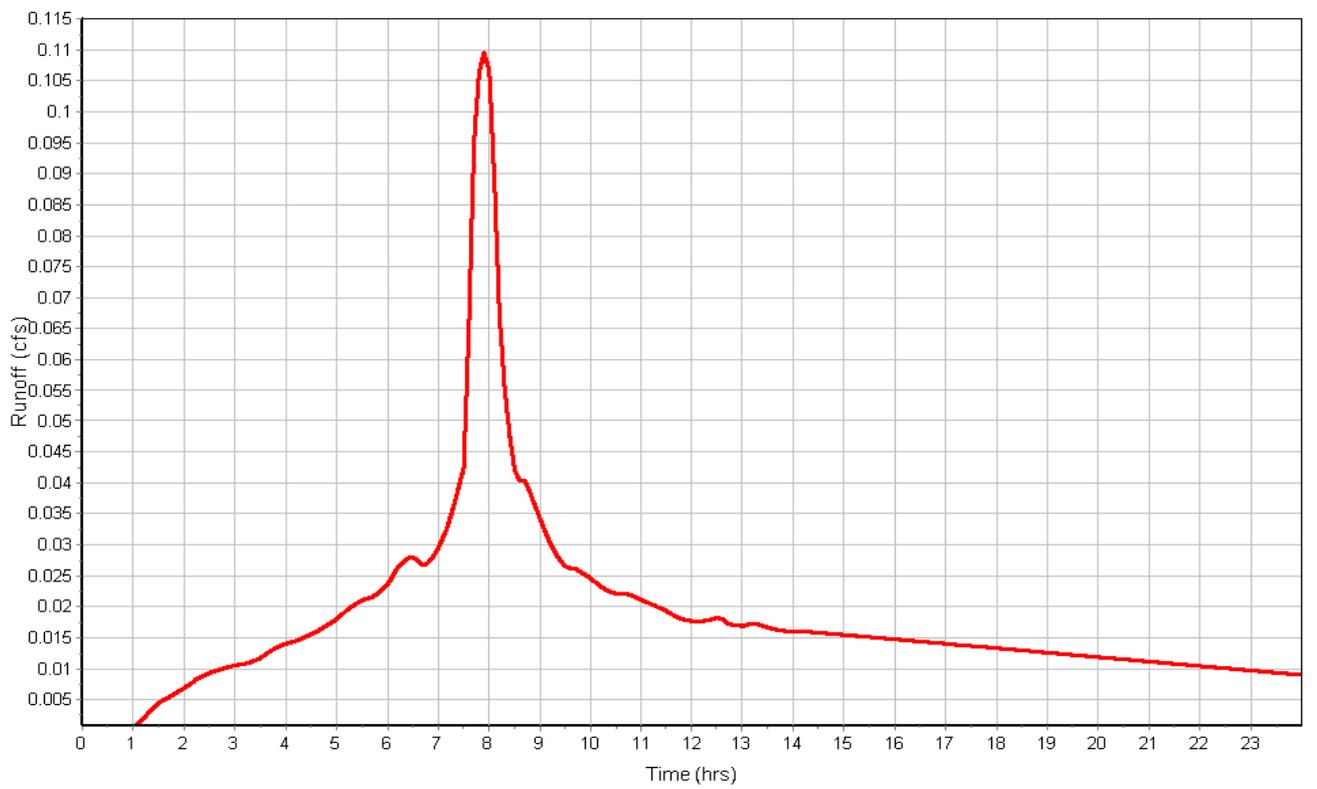
Total Rainfall (in) ..... 2.59  
Total Runoff (in) ..... 2.36  
Peak Runoff (cfs) ..... 0.11  
Weighted Curve Number ..... 98.00  
Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-15

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-16**

**Input Data**

Area (ac) ..... 0.12  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.12		98

**Time of Concentration**

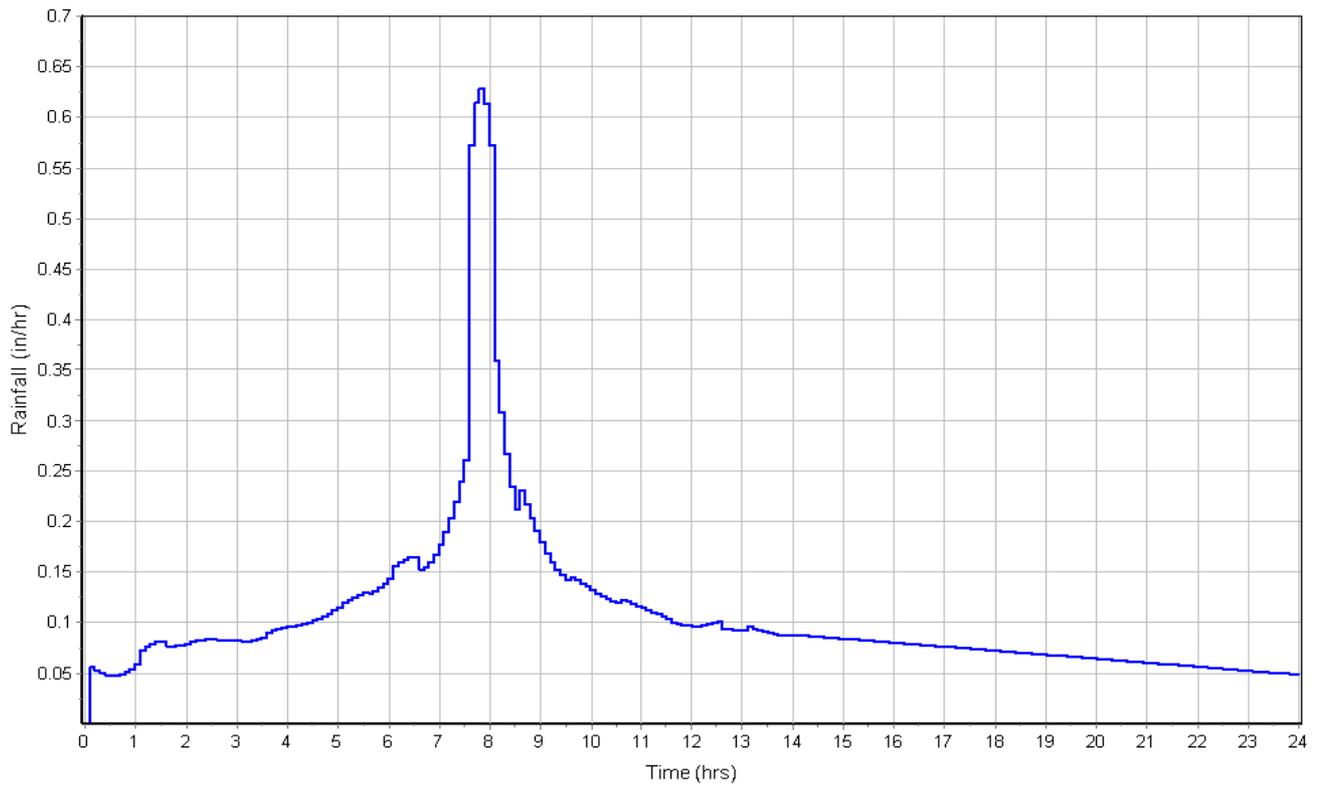
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

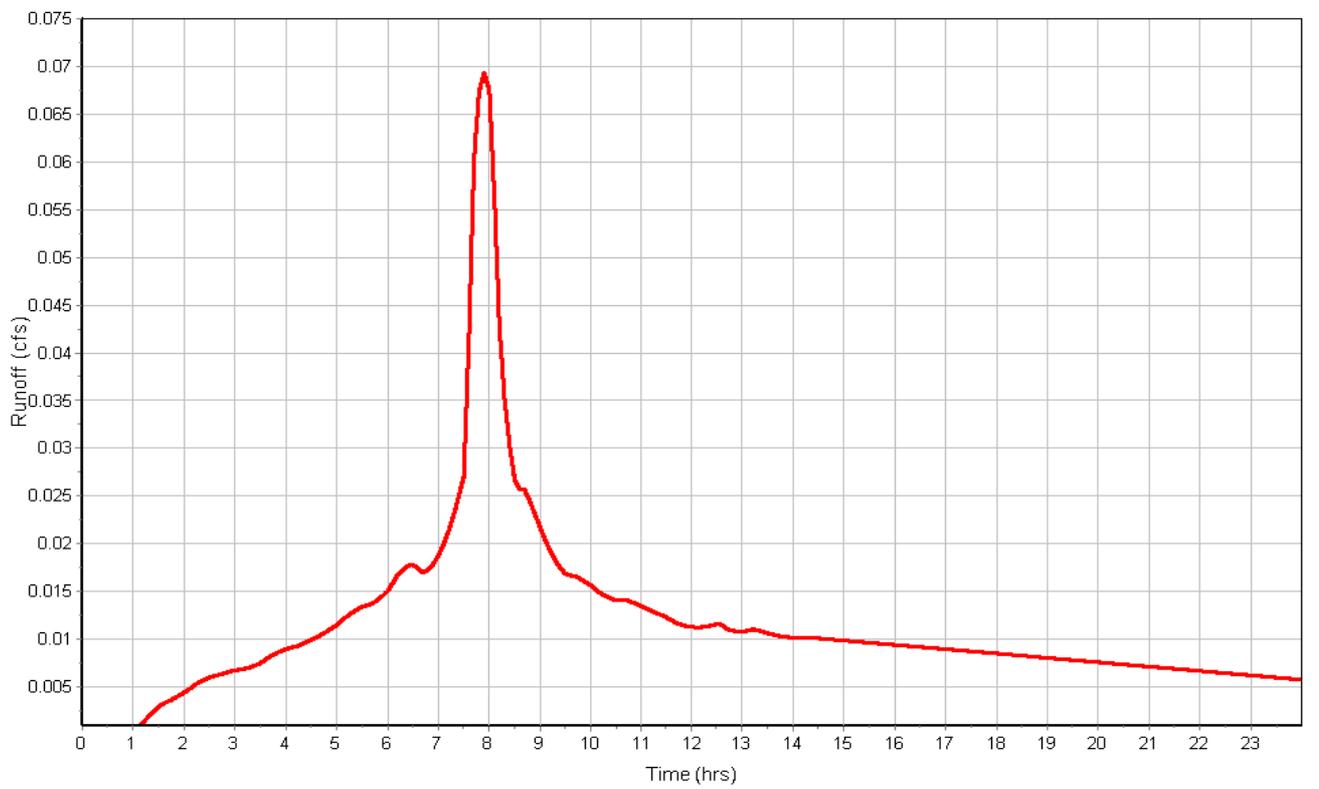
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.07  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-16

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-17**

**Input Data**

Area (ac) ..... 0.14  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.14		98

**Time of Concentration**

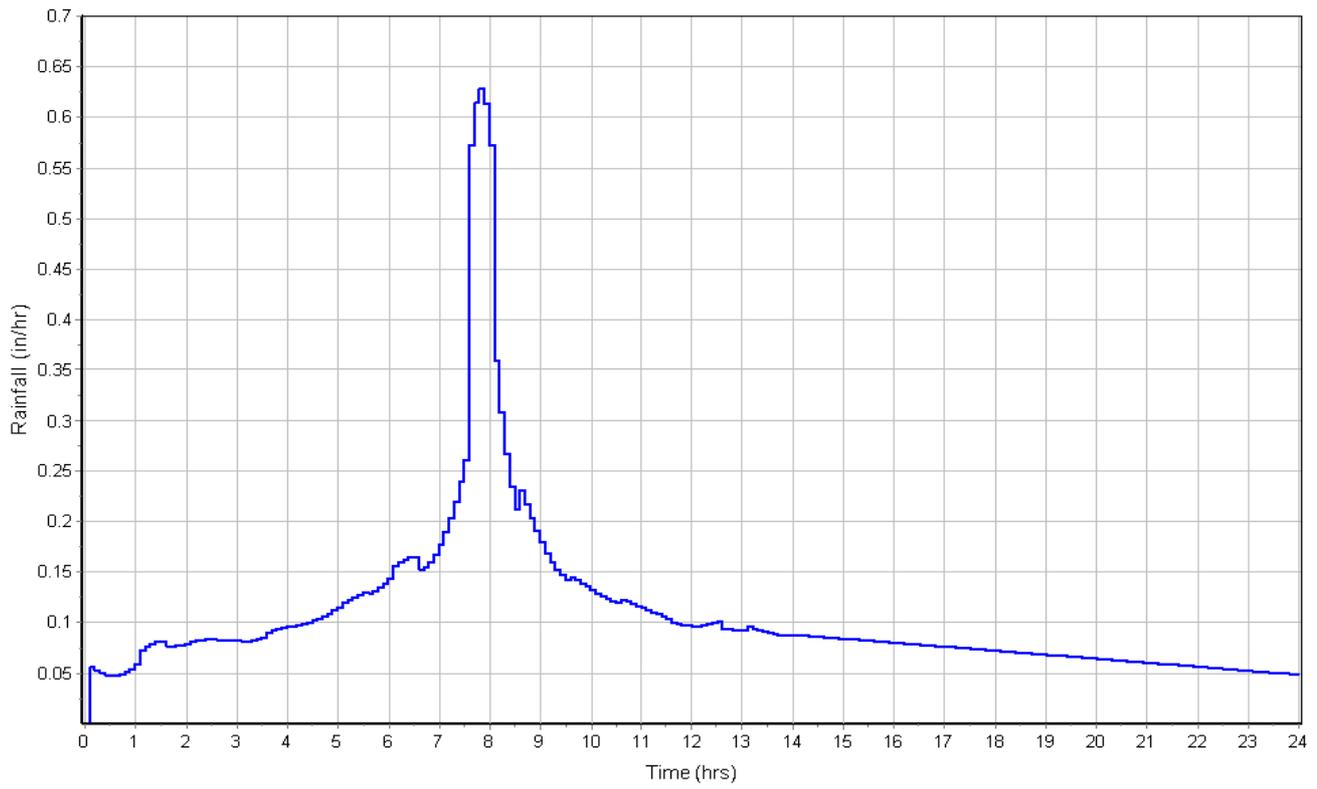
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

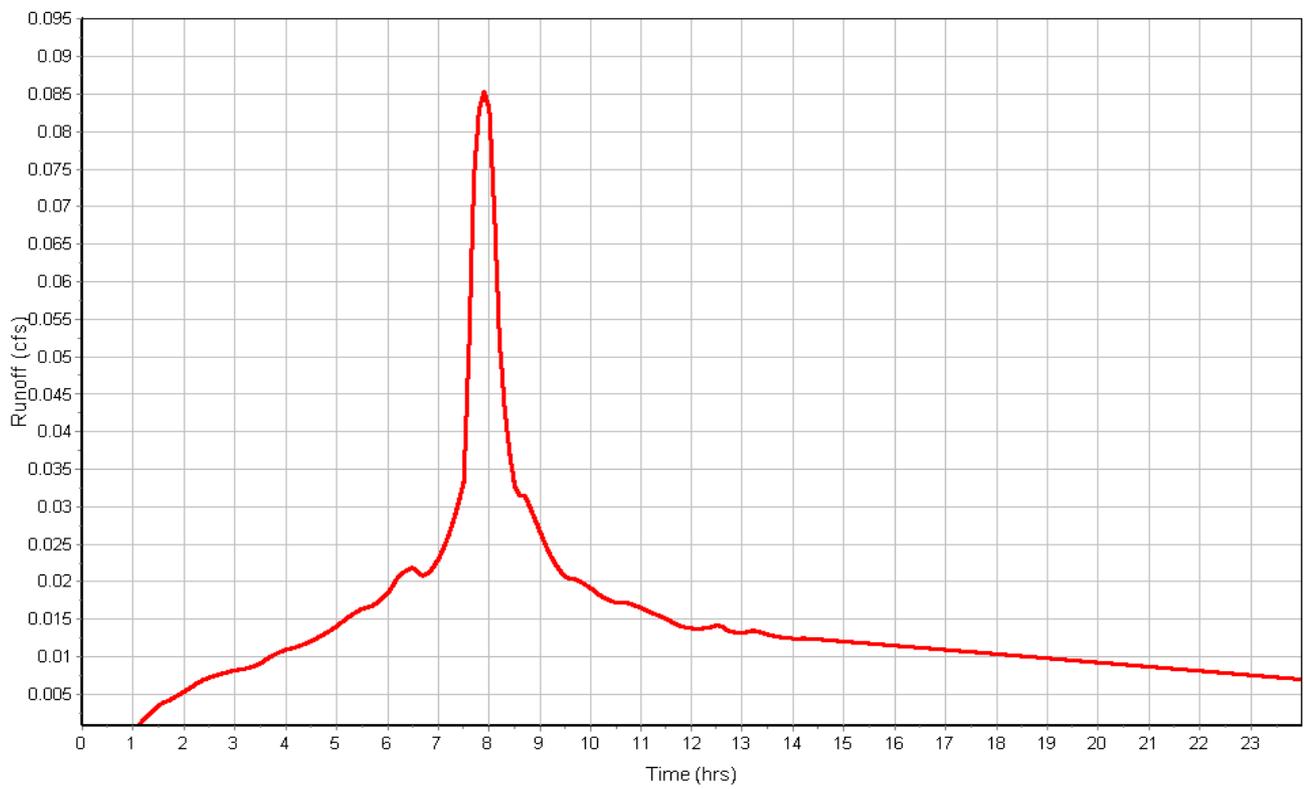
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.09  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-17

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-18**

**Input Data**

Area (ac) ..... 0.18  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.18		98

**Time of Concentration**

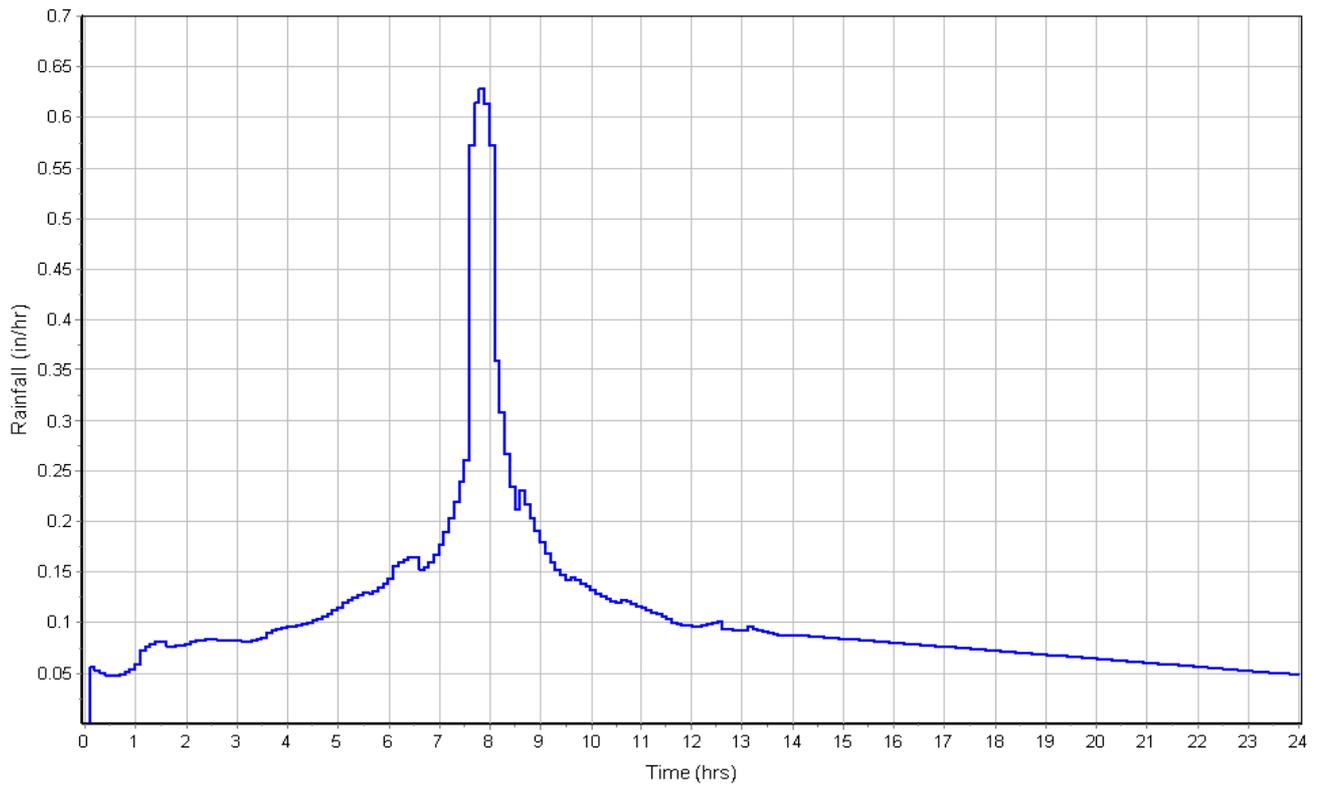
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

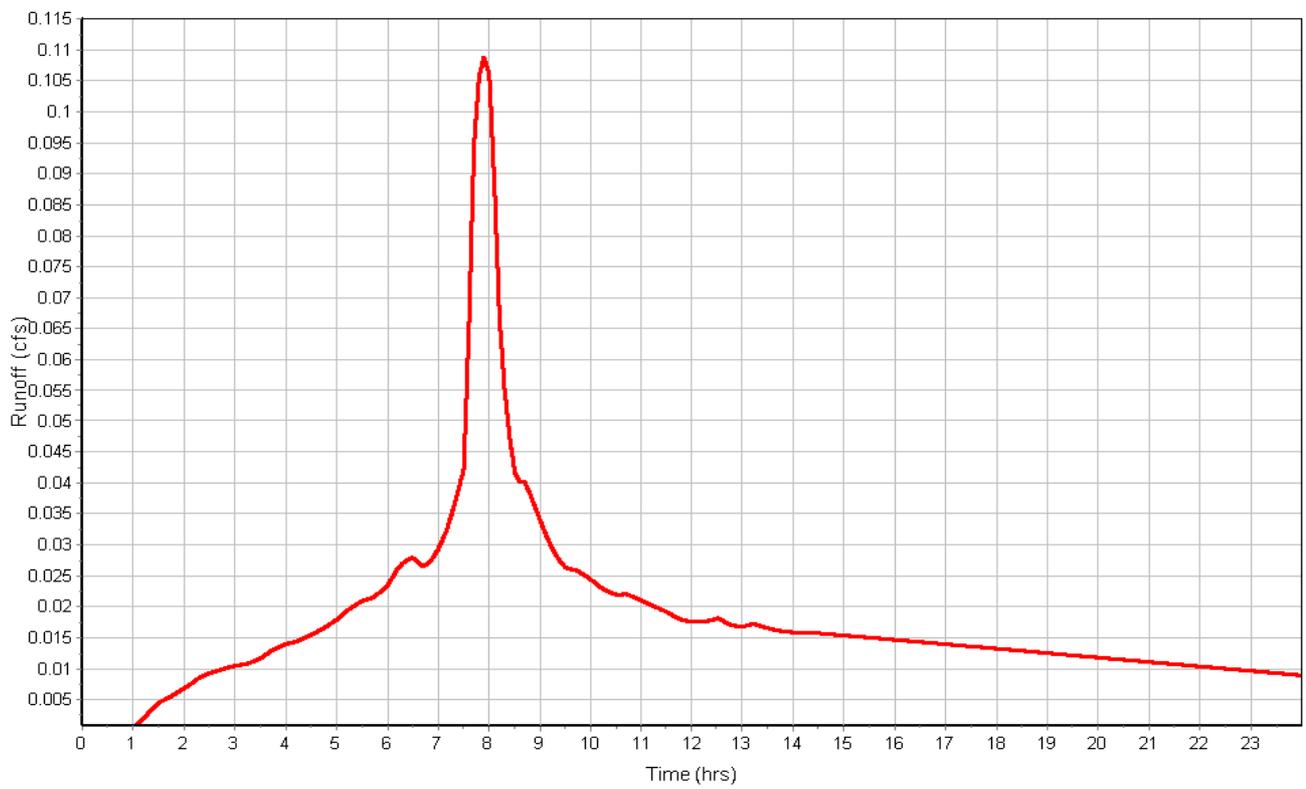
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.11  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-18

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-19**

**Input Data**

Area (ac) ..... 0.12  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.12		98

**Time of Concentration**

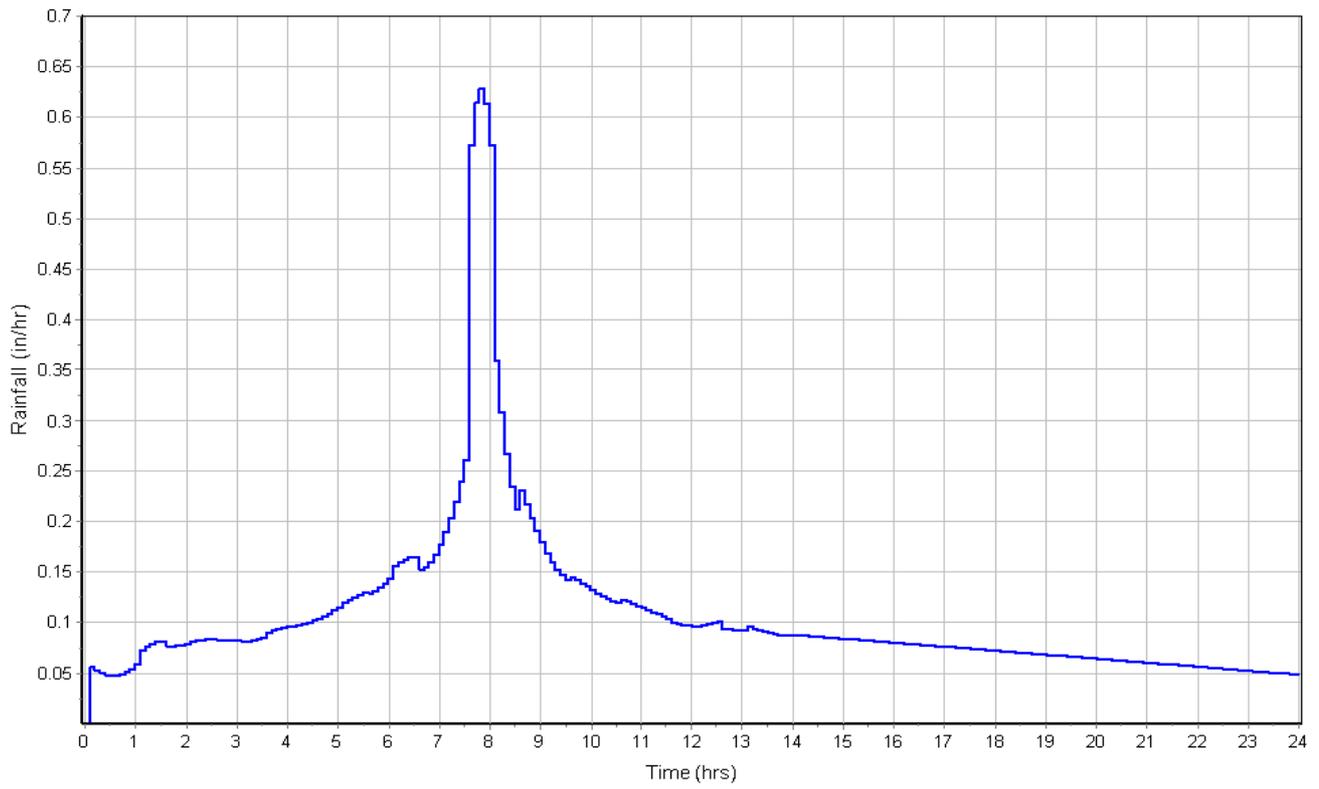
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

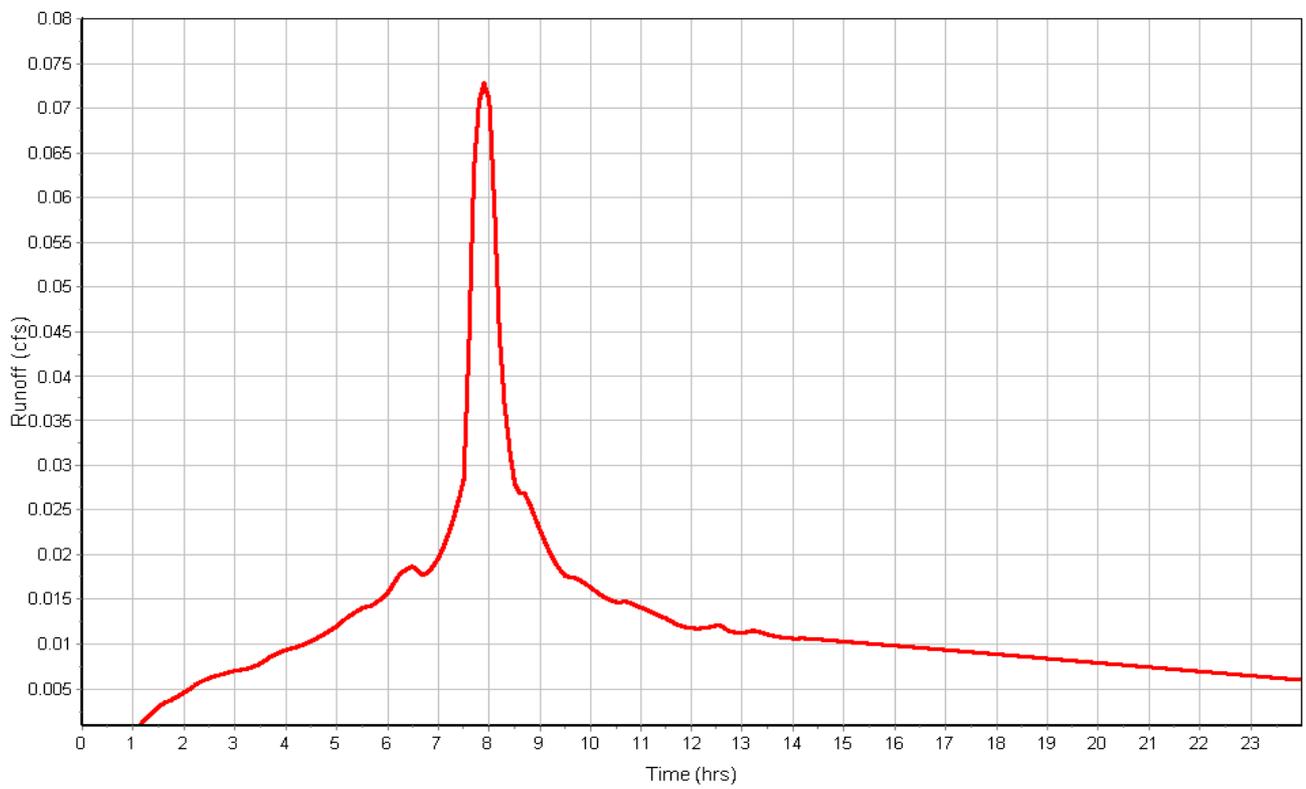
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.07  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-19

Rainfall Intensity Graph



Runoff Hydrograph



**Subbasin : Sub-20**

**Input Data**

Area (ac) ..... 0.09  
 Impervious Area (%) ..... 100.00  
 Impervious Area Curve Number ..... 98.00  
 Pervious Area Curve Number ..... 98.00  
 Rain Gage ID ..... Rain Gage-01

**Composite Curve Number**

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Composite Area & Weighted CN	0.09		98

**Time of Concentration**

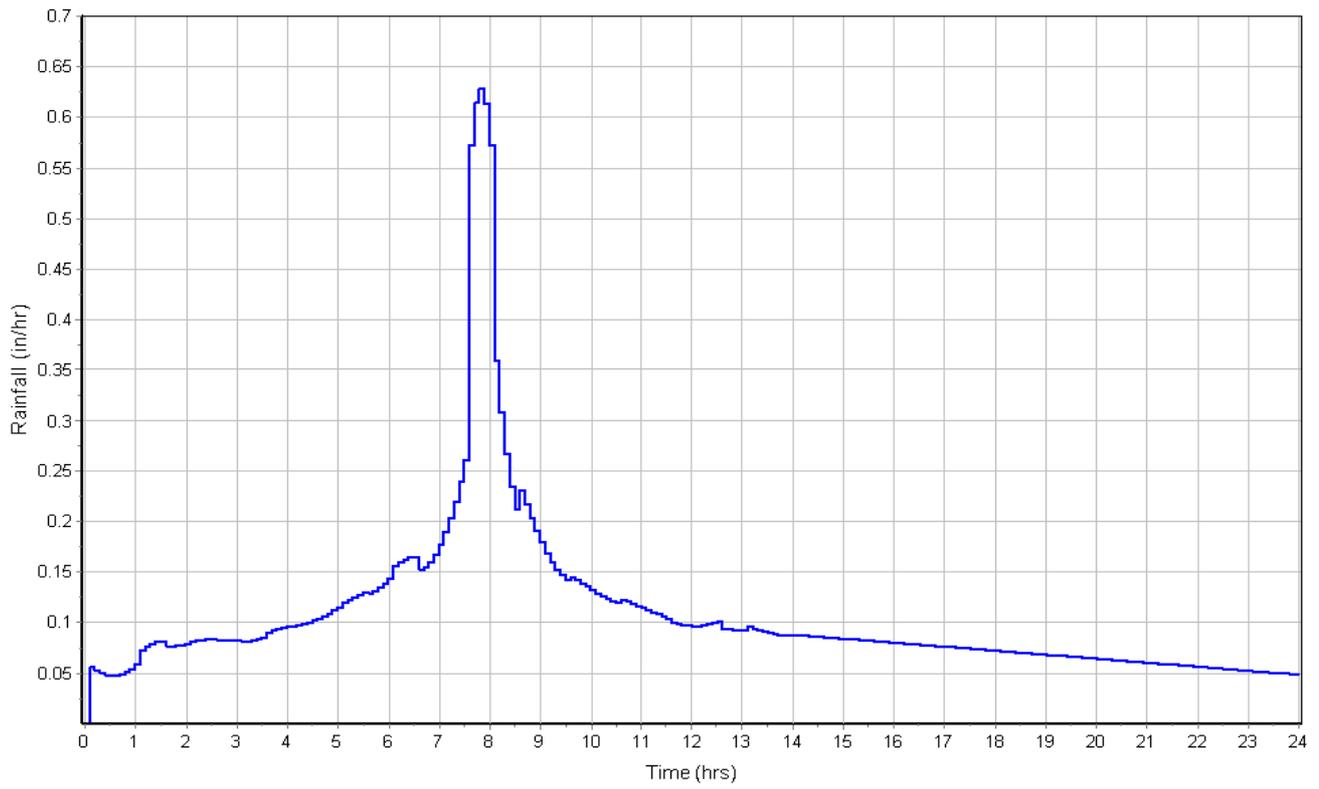
User-Defined TOC override (minutes): 5

**Subbasin Runoff Results**

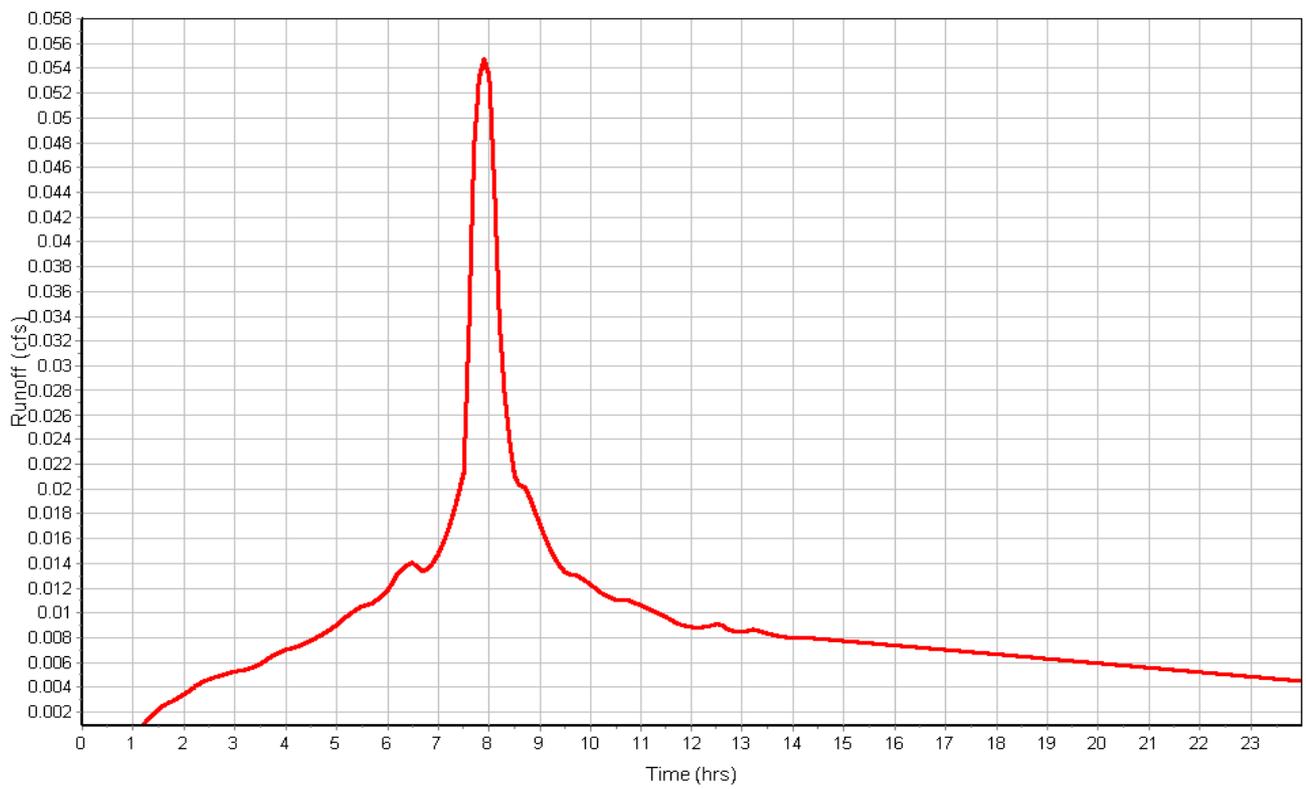
Total Rainfall (in) ..... 2.59  
 Total Runoff (in) ..... 2.36  
 Peak Runoff (cfs) ..... 0.06  
 Weighted Curve Number ..... 98.00  
 Time of Concentration (days hh:mm:ss) ..... 0 00:05:00

Subbasin : Sub-20

Rainfall Intensity Graph



Runoff Hydrograph



## Junction Input

SN Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft <sup>2</sup> )	Minimum Pipe Cover (in)
1 CB 01	67.87	71.87	4.00	67.87	0.00	71.87	0.00	0.00	0.00
2 CB 02	68.12	71.50	3.39	68.12	0.00	71.50	0.00	0.00	0.00
3 CB 03	68.25	71.06	2.81	68.25	0.00	71.06	0.00	0.00	0.00
4 CB 04	89.77	93.96	4.19	89.77	0.00	93.96	0.00	0.00	0.00
5 CB 05	70.79	72.43	1.64	70.79	0.00	72.43	0.00	0.00	0.00
6 CB 06	72.08	76.08	4.00	72.08	0.00	76.08	0.00	0.00	0.00
7 CB 07	76.47	80.47	4.00	76.47	0.00	80.47	0.00	0.00	0.00
8 CB 08	76.06	79.18	3.12	76.06	0.00	79.18	0.00	0.00	0.00
9 CB 10	87.31	91.26	3.95	87.31	0.00	91.26	0.00	0.00	0.00
10 CB 11	94.24	99.14	4.90	94.24	0.00	99.14	0.00	0.00	0.00
11 CB 12	92.38	97.63	5.25	92.38	0.00	97.63	0.00	0.00	0.00
12 CB 13	94.00	98.70	4.70	94.00	0.00	98.70	0.00	0.00	0.00
13 CB 14	96.88	98.37	1.49	96.88	0.00	98.37	0.00	0.00	0.00
14 CB 15	95.26	99.26	4.00	95.26	0.00	99.26	0.00	0.00	0.00
15 CB 16	96.94	101.77	4.83	96.94	0.00	101.77	0.00	0.00	0.00
16 CB 17	97.08	100.72	3.64	97.08	0.00	100.72	0.00	0.00	0.00
17 CB 18	98.22	102.50	4.28	98.22	0.00	102.50	0.00	0.00	0.00
18 CB 19	98.83	102.84	4.01	98.83	0.00	102.84	0.00	0.00	0.00
19 CB 20	100.30	104.30	4.00	100.30	0.00	104.30	0.00	0.00	0.00
20 CB 21	100.07	105.12	5.05	100.07	0.00	105.12	0.00	0.00	0.00
21 CB 22	100.26	104.40	4.14	100.26	0.00	104.40	0.00	0.00	0.00
22 CB 23	102.65	104.22	1.57	102.65	0.00	104.22	0.00	0.00	0.00
23 CB 24	68.43	73.97	5.54	68.43	0.00	73.97	0.00	0.00	0.00
24 CB 25	91.67	97.13	5.46	91.67	0.00	97.13	0.00	0.00	0.00
25 CB 26	66.60	71.56	4.96	66.60	0.00	71.56	0.00	0.00	0.00
26 CB 27	85.86	89.40	3.54	85.86	0.00	89.40	0.00	0.00	0.00
27 CB 28	89.96	95.36	5.40	89.96	0.00	95.36	0.00	0.00	0.00
28 CB 29	95.12	100.87	5.75	95.12	0.00	100.87	0.00	0.00	0.00
29 EX CB 103	82.75	87.38	4.63	82.75	0.00	87.38	0.00	0.00	0.00
30 EX CB 115	99.63	102.71	3.08	99.63	0.00	102.71	0.00	0.00	0.00
31 EXCB108	102.62	103.87	1.25	102.62	0.00	103.87	0.00	0.00	0.00
32 EXCB110	100.05	101.19	1.14	100.05	0.00	101.19	0.00	0.00	0.00
33 POND	67.75	71.80	4.05	67.75	0.00	71.80	0.00	0.00	0.00

Junction Results

SN Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1 CB 01	0.44	0.00	68.19	0.32	0.00	3.68	68.03	0.16	0 07:54	0 00:00	0.00	0.00
2 CB 02	0.08	0.00	68.30	0.18	0.00	3.20	68.20	0.08	0 07:55	0 00:00	0.00	0.00
3 CB 03	0.08	0.08	68.43	0.18	0.00	2.62	68.33	0.08	0 07:54	0 00:00	0.00	0.00
4 CB 04	0.64	0.00	90.15	0.38	0.00	3.82	89.97	0.20	0 07:57	0 00:00	0.00	0.00
5 CB 05	0.12	0.12	70.97	0.18	0.00	1.45	70.90	0.11	0 07:54	0 00:00	0.00	0.00
6 CB 06	0.24	0.00	72.31	0.23	0.00	3.77	72.17	0.09	0 08:05	0 00:00	0.00	0.00
7 CB 07	0.24	0.00	76.69	0.22	0.00	3.77	76.55	0.08	0 08:05	0 00:00	0.00	0.00
8 CB 08	0.10	0.10	76.70	0.64	0.00	2.47	76.54	0.48	0 07:54	0 00:00	0.00	0.00
9 CB 10	0.81	0.17	87.79	0.48	0.00	3.47	87.54	0.23	0 08:02	0 00:00	0.00	0.00
10 CB 11	0.44	0.00	94.56	0.32	0.00	4.58	94.42	0.18	0 07:56	0 00:00	0.00	0.00
11 CB 12	0.59	0.10	92.75	0.37	0.00	4.88	92.58	0.20	0 07:57	0 00:00	0.00	0.00
12 CB 13	0.49	0.00	94.33	0.33	0.00	4.36	94.19	0.19	0 07:56	0 00:00	0.00	0.00
13 CB 14	0.05	0.05	97.04	0.16	0.00	1.33	96.95	0.07	0 07:54	0 00:00	0.00	0.00
14 CB 15	0.07	0.07	95.44	0.18	0.00	3.82	95.35	0.09	0 07:55	0 00:00	0.00	0.00
15 CB 16	0.39	0.00	97.23	0.29	0.00	4.54	97.11	0.17	0 07:55	0 00:00	0.00	0.00
16 CB 17	0.11	0.11	97.25	0.17	0.00	3.47	97.18	0.10	0 07:55	0 00:00	0.00	0.00
17 CB 18	0.28	0.07	98.47	0.25	0.00	4.03	98.36	0.14	0 07:56	0 00:00	0.00	0.00
18 CB 19	0.19	0.09	99.08	0.25	0.00	3.76	98.96	0.13	0 07:46	0 00:00	0.00	0.00
19 CB 20	0.11	0.11	100.51	0.21	0.00	3.79	100.39	0.09	0 07:55	0 00:00	0.00	0.00
20 CB 21	0.13	0.00	100.30	0.23	0.00	4.82	100.18	0.11	0 07:55	0 00:00	0.00	0.00
21 CB 22	0.13	0.07	100.49	0.24	0.00	3.91	100.36	0.11	0 07:54	0 00:00	0.00	0.00
22 CB 23	0.05	0.05	102.81	0.16	0.00	1.41	102.72	0.07	0 07:54	0 00:00	0.00	0.00
23 CB 24	0.37	0.00	68.71	0.28	0.00	5.25	68.57	0.14	0 07:54	0 00:00	0.00	0.00
24 CB 25	0.64	0.05	92.05	0.38	0.00	5.08	91.88	0.21	0 07:57	0 00:00	0.00	0.00
25 CB 26	0.44	0.00	66.91	0.31	0.00	4.64	66.76	0.16	0 07:57	0 00:00	0.00	0.00
26 CB 27	0.86	0.00	86.11	0.25	0.00	3.29	85.97	0.11	0 07:57	0 00:00	0.00	0.00
27 CB 28	0.64	0.00	90.34	0.38	0.00	5.02	90.17	0.21	0 07:57	0 00:00	0.00	0.00
28 CB 29	0.44	0.00	95.44	0.32	0.00	5.44	95.30	0.18	0 07:55	0 00:00	0.00	0.00
29 EX CB 103	0.84	0.04	83.11	0.36	0.00	4.27	82.91	0.16	0 08:05	0 00:00	0.00	0.00
30 EX CB 115	0.00	0.00	99.63	0.00	0.00	3.08	99.63	0.00	0 00:00	0 00:00	0.00	0.00
31 EXCB108	0.06	0.00	102.77	0.15	0.00	1.10	102.69	0.07	0 07:54	0 00:00	0.00	0.00
32 EXCB110	0.13	0.00	100.28	0.23	0.00	0.91	100.15	0.10	0 07:55	0 00:00	0.00	0.00
33 POND	0.44	0.00	68.06	0.31	0.00	3.74	67.90	0.15	0 07:55	0 00:00	0.00	0.00

Pipe Input

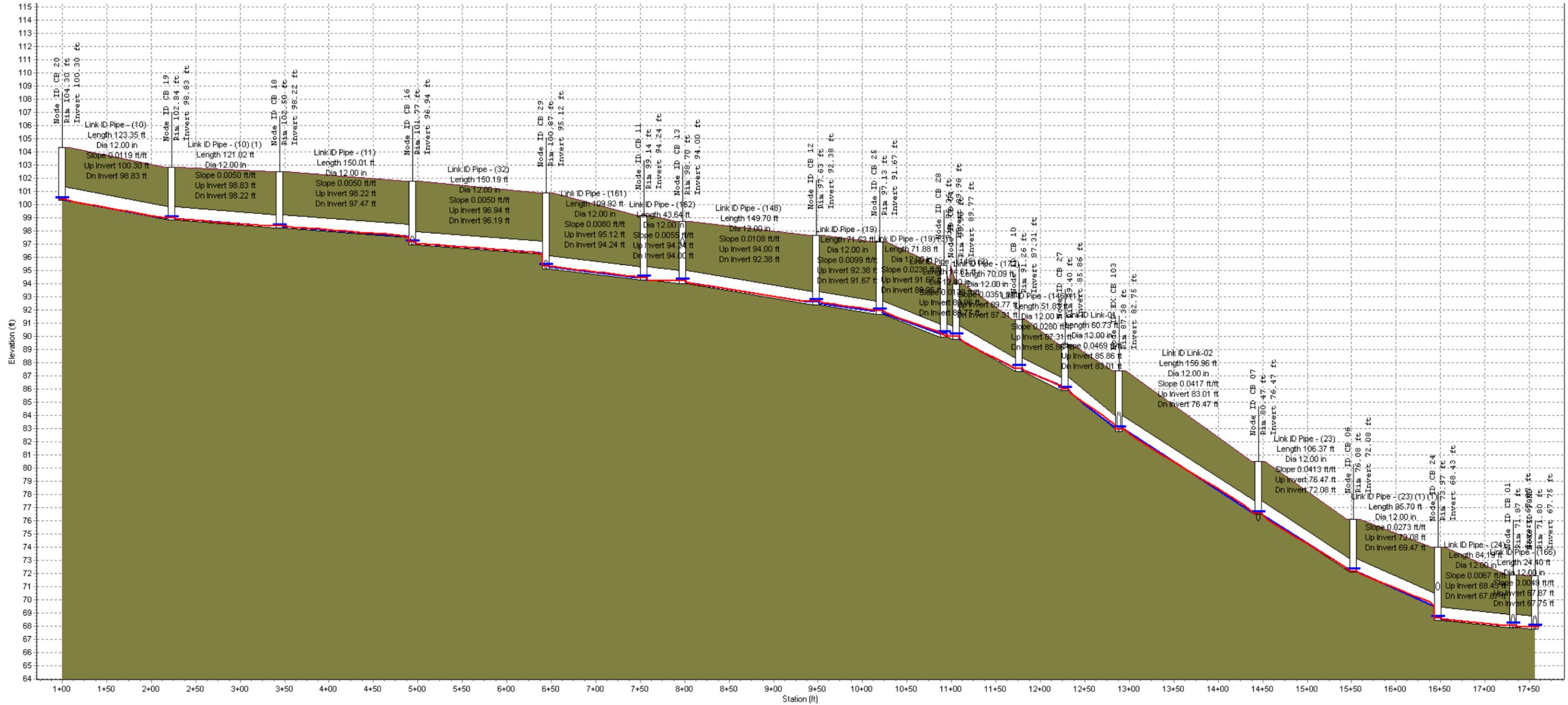
SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1 Link-01	60.73	85.86	0.00	83.01	0.26	2.85	4.6900	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No
2 Link-02	156.96	83.01	0.26	76.47	0.00	6.54	4.1700	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No
3 Pipe - (10)	123.35	100.30	0.00	98.83	0.00	1.47	1.1900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
4 Pipe - (10) (1)	121.02	98.83	0.00	98.22	0.00	0.61	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
5 Pipe - (11)	150.01	98.22	0.00	97.47	0.53	0.75	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
6 Pipe - (115)	44.23	82.75	0.00	77.79	0.00	4.96	11.2100	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No
7 Pipe - (121)	35.03	100.05	0.00	99.76	0.00	0.29	0.8300	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
8 Pipe - (123)	47.18	102.62	0.00	102.49	2.24	0.13	0.2800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
9 Pipe - (126)	261.91	66.60	0.00	65.29	0.00	1.31	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
10 Pipe - (146) (1)	51.83	87.31	0.00	85.86	0.00	1.45	2.8000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
11 Pipe - (146) (2)	14.61	89.96	0.00	89.77	0.00	0.19	1.3000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
12 Pipe - (148)	149.70	94.00	0.00	92.38	0.00	1.62	1.0800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
13 Pipe - (151)	5.18	100.07	0.00	100.05	0.00	0.02	0.3900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
14 Pipe - (152)	5.48	102.65	0.00	102.62	0.00	0.03	0.5000	CIRCULAR	8.040	8.040	0.0120	0.5000	0.5000	0.0000	0.00	No
15 Pipe - (153)	37.26	100.26	0.00	100.07	0.00	0.19	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
16 Pipe - (156)	27.76	95.26	0.00	95.12	0.00	0.14	0.5100	CIRCULAR	8.040	8.040	0.0120	0.5000	0.5000	0.0000	0.00	No
17 Pipe - (158)	28.34	97.08	0.00	96.94	0.00	0.14	0.4900	CIRCULAR	8.040	8.040	0.0120	0.5000	0.5000	0.0000	0.00	No
18 Pipe - (161)	109.92	95.12	0.00	94.24	0.00	0.88	0.8000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
19 Pipe - (162)	43.64	94.24	0.00	94.00	0.00	0.24	0.5500	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
20 Pipe - (166)	24.40	67.87	0.00	67.75	0.00	0.12	0.4900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
21 Pipe - (168)	26.16	68.25	0.00	68.12	0.00	0.13	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
22 Pipe - (169)	26.04	96.88	0.00	96.75	2.75	0.13	0.5000	CIRCULAR	8.040	8.040	0.0120	0.5000	0.5000	0.0000	0.00	No
23 Pipe - (170)	76.95	67.75	0.00	66.62	0.02	1.14	1.4700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
24 Pipe - (172)	70.09	89.77	0.00	87.31	0.00	2.46	3.5100	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
25 Pipe - (19)	71.53	92.38	0.00	91.67	0.00	0.71	0.9900	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
26 Pipe - (19) (3)	71.88	91.67	0.00	89.96	0.00	1.71	2.3800	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
27 Pipe - (22)	26.16	76.06	0.00	75.93	-0.54	0.13	0.5000	CIRCULAR	8.040	8.040	0.0120	0.5000	0.5000	0.0000	0.00	No
28 Pipe - (23)	106.37	76.47	0.00	72.08	0.00	4.39	4.1300	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
29 Pipe - (23) (1) (1)	95.70	72.08	0.00	69.47	1.04	2.61	2.7300	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
30 Pipe - (24)	84.19	68.43	0.00	67.87	0.00	0.56	0.6700	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
31 Pipe - (24) (2)	49.16	68.12	0.00	67.87	0.00	0.25	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No
32 Pipe - (26)	28.34	70.79	0.00	70.65	2.22	0.14	0.4900	CIRCULAR	8.040	8.040	0.0120	0.5000	0.5000	0.0000	0.00	No
33 Pipe - (32)	150.19	96.94	0.00	96.19	1.07	0.75	0.5000	CIRCULAR	12.000	12.000	0.0120	0.5000	0.5000	0.0000	0.00	No



Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 Link-01	0.81	0 07:57	6.69	0.12	5.54	0.18	0.24	0.24	0.00		Calculated
2 Link-02	0.14	0 08:05	6.30	0.02	1.69	1.55	0.16	0.16	0.00		Calculated
3 Pipe - (10)	0.11	0 07:55	4.21	0.03	0.80	2.57	0.23	0.23	0.00		Calculated
4 Pipe - (10) (1)	0.21	0 07:52	2.74	0.08	1.42	1.42	0.25	0.25	0.00		Calculated
5 Pipe - (11)	0.28	0 07:56	2.73	0.10	2.01	1.24	0.23	0.23	0.00		Calculated
6 Pipe - (115)	0.86	0 07:58	38.11	0.02	4.16	0.18	0.26	0.17	0.00		Calculated
7 Pipe - (121)	0.13	0 07:55	3.51	0.04	1.32	0.44	0.18	0.18	0.00		Calculated
8 Pipe - (123)	0.05	0 07:54	2.03	0.03	1.00	0.79	0.12	0.12	0.00		Calculated
9 Pipe - (126)	0.44	0 07:57	2.73	0.16	2.29	1.91	0.29	0.29	0.00		Calculated
10 Pipe - (146) (1)	0.86	0 07:58	6.46	0.13	3.57	0.24	0.36	0.36	0.00		Calculated
11 Pipe - (146) (2)	0.64	0 07:57	4.40	0.15	2.33	0.10	0.38	0.38	0.00		Calculated
12 Pipe - (148)	0.49	0 07:56	4.02	0.12	2.01	1.24	0.35	0.35	0.00		Calculated
13 Pipe - (151)	0.13	0 07:55	2.40	0.05	0.92	0.09	0.23	0.23	0.00		Calculated
14 Pipe - (152)	0.06	0 07:52	0.93	0.06	0.94	0.10	0.16	0.24	0.00		Calculated
15 Pipe - (153)	0.13	0 07:54	2.72	0.05	0.92	0.67	0.23	0.23	0.00		Calculated
16 Pipe - (156)	0.07	0 07:57	0.93	0.08	0.68	0.68	0.25	0.37	0.00		Calculated
17 Pipe - (158)	0.11	0 07:54	0.92	0.12	1.11	0.43	0.23	0.35	0.00		Calculated
18 Pipe - (161)	0.44	0 07:55	3.45	0.13	2.08	0.88	0.32	0.32	0.00		Calculated
19 Pipe - (162)	0.44	0 07:56	2.86	0.15	2.00	0.36	0.32	0.32	0.00		Calculated
20 Pipe - (166)	0.44	0 07:54	2.71	0.16	2.05	0.20	0.32	0.32	0.00		Calculated
21 Pipe - (168)	0.08	0 07:54	2.73	0.03	0.83	0.53	0.18	0.18	0.00		Calculated
22 Pipe - (169)	0.05	0 07:54	0.93	0.05	1.04	0.42	0.13	0.20	0.00		Calculated
23 Pipe - (170)	0.44	0 07:55	4.69	0.09	2.21	0.58	0.31	0.31	0.00		Calculated
24 Pipe - (172)	0.64	0 07:57	7.23	0.09	2.08	0.56	0.43	0.43	0.00		Calculated
25 Pipe - (19)	0.59	0 07:57	3.85	0.15	2.21	0.54	0.37	0.37	0.00		Calculated
26 Pipe - (19) (3)	0.64	0 07:57	5.95	0.11	2.32	0.52	0.38	0.38	0.00		Calculated
27 Pipe - (22)	0.10	0 07:54	1.64	0.06	0.42	1.04	0.43	0.65	0.00		Calculated
28 Pipe - (23)	0.24	0 08:05	7.84	0.03	1.81	0.98	0.23	0.23	0.00		Calculated
29 Pipe - (23) (1) (1)	0.25	0 08:05	6.37	0.04	2.54	0.63	0.18	0.18	0.00		Calculated
30 Pipe - (24)	0.36	0 07:54	3.15	0.12	1.85	0.76	0.30	0.30	0.00		Calculated
31 Pipe - (24) (2)	0.08	0 07:55	2.73	0.03	0.59	1.39	0.25	0.25	0.00		Calculated
32 Pipe - (26)	0.12	0 07:54	0.92	0.13	1.73	0.27	0.17	0.26	0.00		Calculated
33 Pipe - (32)	0.37	0 07:55	2.73	0.14	2.19	1.14	0.27	0.27	0.00		Calculated

Profile Plot  
CB 20 TO POND



Node ID:	CB 20	CB 19	CB 18	CB 16	CB 29	CB 11	CB 13	CB 12	CB 25	CB 04	CB 10	CB 27	EX CB 103	CB 07	CB 06	CB 24	CB 01	POND
Rim (ft):	104.30	102.84	102.50	101.77	100.87	99.14	98.70	97.63	97.13	95.53	91.26	89.40	87.38	80.47	76.08	73.97	71.87	71.80
Invert (ft):	100.30	98.83	98.22	96.94	95.12	94.24	94.00	92.38	91.67	89.96	87.31	85.86	82.75	76.47	72.08	68.43	67.87	67.75
Min Pipe Cover (ft):	3.00	3.01	3.28	3.30	3.68	3.90	1.28	4.25	4.46	4.40	2.95	2.54	3.13	3.00	3.00	2.65	3.00	3.05
Max HGL (ft):	100.51	99.08	98.47	97.23	95.44	94.56	94.33	92.75	92.05	90.50	87.79	86.11	83.11	76.69	72.31	68.71	68.19	68.06
Link ID:	Pipe - (10)	Pipe - (10) (1)	Pipe - (11)	Pipe - (32)	Pipe - (161)	Pipe - (162)	Pipe - (148)	Pipe - (19)	Pipe - (19)	Pipe - (145)	Pipe - (172)	Pipe - (146) (1)	Link-01	Link-02	Pipe - (23)	Pipe - (23) (1) (1)	Pipe - (24)	Pipe - (166)
Length (ft):	123.35	121.02	150.01	150.19	109.92	43.64	149.70	71.53	71.88	14.61	70.09	51.83	60.73	156.96	106.37	95.70	84.19	24.40
Dia (in):	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Slope (ft/ft):	0.0119	0.0050	0.0050	0.0050	0.0080	0.0055	0.0108	0.0099	0.0238	0.0130	0.0351	0.0280	0.0469	0.0417	0.0413	0.0273	0.0067	0.0049
Up Invert (ft):	100.30	98.83	98.22	96.94	95.12	94.24	94.00	92.38	91.67	89.96	89.77	87.31	85.86	83.01	76.47	72.08	68.43	67.87
Dn Invert (ft):	98.83	98.22	97.47	96.19	94.24	94.00	92.38	91.67	89.96	89.77	87.31	85.86	83.01	76.47	72.08	69.47	67.87	67.75
Max Q (cfs):	0.11	0.21	0.28	0.37	0.44	0.44	0.49	0.59	0.64	0.64	0.64	0.86	0.91	0.14	0.24	0.25	0.36	0.44
Max Vel (ft/s):	1.42	2.01	2.19	2.08	2.00	2.01	2.21	2.32	2.33	2.08	3.57	5.54	1.69	1.81	2.54	1.85	2.05	
Max Depth:	Autodesk Storm and Sanitary Analysis	25	0.23	0.27	0.32	0.32	0.35	0.37	0.38	0.38	0.43	0.36	0.24	0.16	0.23	0.18	0.30	0.32

# **APPENDIX 4**

## **SOILS MAP & GEOTECHNICAL REPORT**

Subbasin A

On Wed, Sep 13, 2023 at 9:27 AM David Hall <[david.hall@scjalliance.com](mailto:david.hall@scjalliance.com)> wrote:

Thank you Sean! Just for clarity, are these long-term infiltration rates?

On Wed, Sep 13, 2023 at 9:02 AM Sean Schlitt <[SSchlitt@hwageo.com](mailto:sschlitt@hwageo.com)> wrote:

Dan,  
To follow up on this, it appears the western location near SR530 (BH-1) showed rates of approximately 0.3 in/hr. However, the Arlington manual states that the rates need to be at least 0.5 in/hr to consider; we could potentially request a deviation if needed. Furthermore, the borings were drilled in the dry summer months and the groundwater table was observed at a height of approximately 12.5 ft below ground surface. Therefore, there is a chance that the groundwater rebounds during the wet weather season and there is not suitable separation at this location. Until we can take the reading in January, we will be unable to definitively determine infiltration feasibility at this location.

On the other hand, the two borings completed to the east (BH-5 and BH-6) showed dry well conditions at the time of drilling and an approximate infiltration rate of 1 in/hr at a depth of 5 ft below ground surface. As a result, we anticipate infiltration to be feasible at these locations.

Subbasins B and C

Please let us know if you have any questions.

**Sean Schlitt, P.E.**  
Geotechnical Engineer

Office: 425.774.0106 ext. 264  
Cell: 425.478.3854

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**From:** Sean Schlitt  
**Sent:** Tuesday, September 12, 2023 11:12 AM  
**To:** Dan Ireland <[dan.ireland@scjalliance.com](mailto:dan.ireland@scjalliance.com)>; Donald Huling <[dhuling@hwageo.com](mailto:dhuling@hwageo.com)>  
**Cc:** Melissa Greenheck <[melissa.greenheck@scjalliance.com](mailto:melissa.greenheck@scjalliance.com)>; David Hall <[david.hall@scjalliance.com](mailto:david.hall@scjalliance.com)>  
**Subject:** RE: 211th Infiltration Rates

Dan,  
We are running the infiltration rates now and will have something by the end of the week at the latest. Preliminarily, rates look usable for BH-5 and 6 but we may want to discuss further on rates at BH-1. I will chat with Donald and get something back to you as soon as I can.

**Sean Schlitt, P.E.**  
Geotechnical Engineer

# APPENDIX 5

## FEMA FLOOD INSURANCE RATE MAP

# National Flood Hazard Layer FIRMette



122°08'45"W 48°11'28"N



## Legend EXHIBIT J

SE F IS P R E O F F E T I D I E D L E G E N D A N D I N D E X M P I D R F I A R N I I A P O U T

S P E C I A L H A Z A R D

- Without Base Flood (Zone AE)
- With Base Flood (Zone AE)
- Residual Floodway

OTHER AREAS

- 0.2% Annual Chance of 1% Annual Flood Depth less than or within areas of less than 200 feet
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Flood Risk
- Area with Flood Risk

OTHER AREAS

- No Section of Minimal Flood Hazard
- Effective MRs
- Area of Unneeded Flood Hazard
- General Channel, to be removed
- Structural Loss, Dir Flood

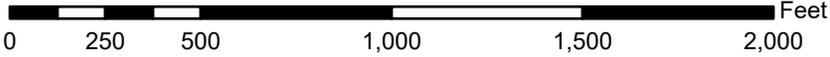
OTHER AREAS

- 2.0' Cross Sections with 1% Water Surface Elevation
- 1.7' Cross Section
- Coastal Section
- Base Flood Elevation (BFE)
- Limit of J
- Jurisdiction Boundary
- Coastal Section Baseline
- Profile Baseline
- Hydrographic

MAPPING

- Digital Available
- No Digital Available
- Unmapped

The pin indicates the approximate location of the point of interest.



1:6,000

122°08'17"W 48°11'28"N

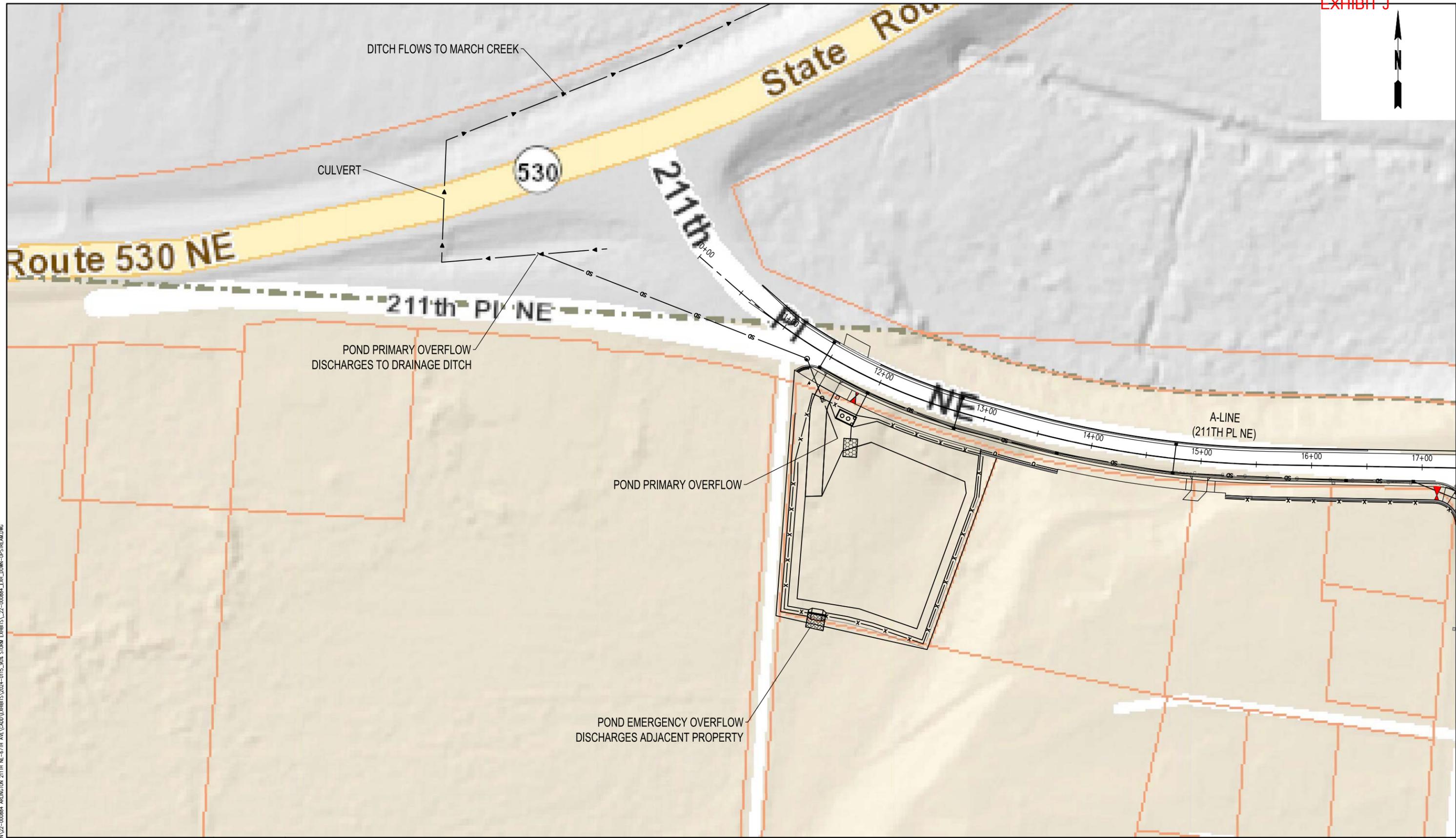
This map complies with the minimum standards for digital maps as described below. The base map complies with FEMA's accuracy standards.

The flood hazard information displayed on this map was prepared on 4/20/2023. It is not intended to be used for any other purpose. The information on this map is not intended to be used for any other purpose.

This map contains the following information: base map, flood hazard legend, and other information. The information on this map is not intended to be used for any other purpose.

# **APPENDIX 6**

## **DOWNSTREAM MAP**



Jan 19, 2024, 9:52:39pm - User: scj\scj\j...  
PROJECTS\06884 - CITY OF BURLINGTON\22-000884 - BURLINGTON, 211TH, NE-67TH, AVE\ADD\EXHIBITS\2024-0115\_90X\_STORM\_EXHIBITS\_22-000884\_EXL\_DOWN-UPSTREAM.DWG

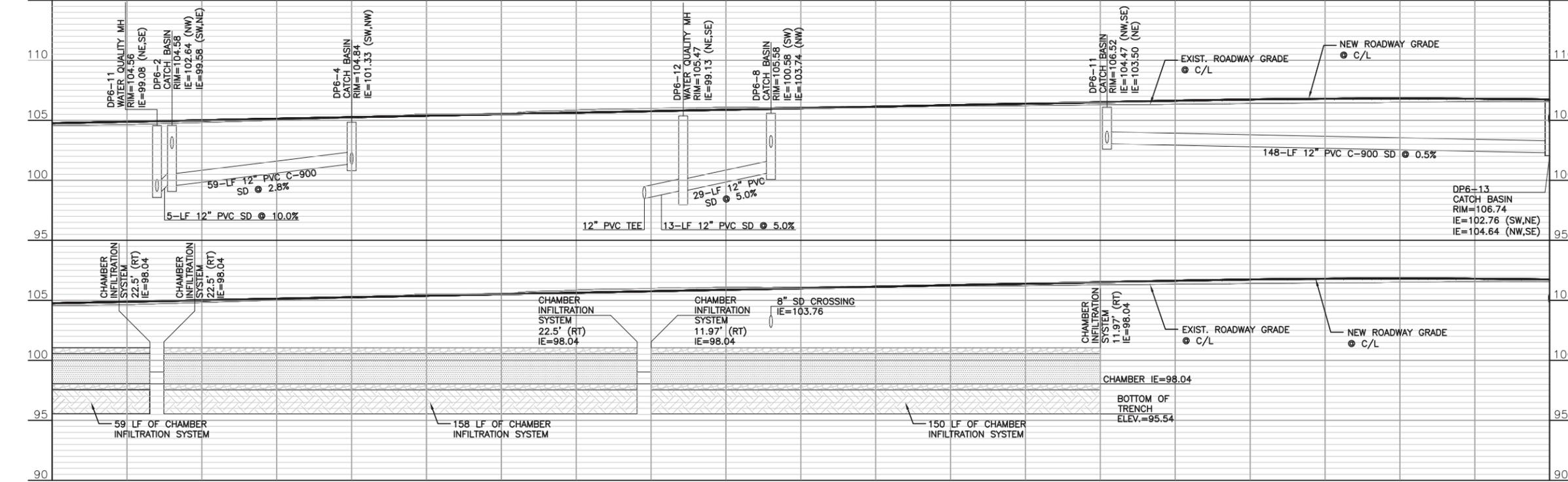
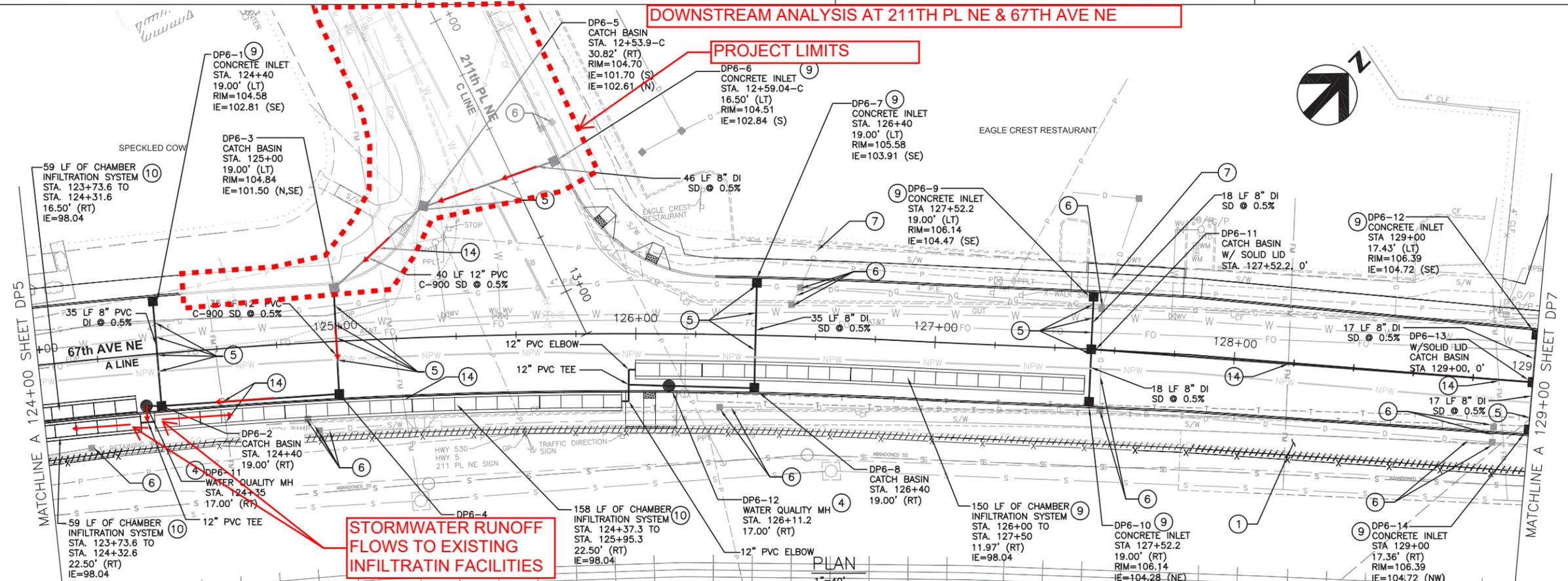
**DOWNSTREAM ANALYSIS AT 211TH PL NE & 67TH AVE NE**

GENERAL NOTES: **EXHIBIT J**

1. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SPECIFIED.
2. SEE CITY OF ARLINGTON STORM DRAINAGE NOTES ON SHEET SD1.
3. ALL CATCH BASINS ARE TYPE 1 PER CITY OF ARLINGTON STD. DETAIL SD-020 UNLESS OTHERWISE NOTED ON PLANS. FOR CATCH BASINS LOCATED ON THE GUTTER LINE, OFFSETS PROVIDED ON PLANS REFER TO FACE OF CURB. SEE CITY OF ARLINGTON STD. DETAIL SD-060 FOR STANDARD GRATE OR STD. DETAIL SD-080 FOR SOLID COVER, AND STD. DETAIL SD-090 FOR FRAME AND GRATE INSTALLATION TO DETERMINE THE CENTER OF GRATE OFFSET FROM FACE OF CURB.
4. INSTALL CATCH BASIN INLET PROTECTION TO ALL PROPOSED CATCH BASINS DURING CONSTRUCTION. SEE DETAIL ON SHEET SPD1.

**(X) DRAINAGE NOTES**

1. POROUS ASPHALT TRAIL
2. FISH PASSABLE CULVERT, SEE DETAILS ON SHEETS FP1-FP3
3. INFILTRATION TRENCH, SEE DETAIL ON SHEET SD1
4. HYDRODYNAMIC SEPARATING WATER QUALITY MANHOLE WITH SOLID RING AND COVER PER CITY OF ARLINGTON STD DETAIL SD-110. OFFSETS PROVIDED REFER TO CENTER OF STRUCTURE.
5. COORDINATE AND/OR RESTORE IMPACTED UTILITY LINES. FIELD VERIFY LOCATION AND DEPTH OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. SEE UTILITY PLANS, SHEETS UT1A-UT14
6. REMOVE EXISTING STORM DRAINAGE FEATURES
7. ABANDON EXISTING STORM DRAINAGE FEATURES
8. CATCH BASIN TYPE 2 PER CITY OF ARLINGTON STD. DETAIL SD-040. FOR TYPE 2 CATCH BASINS LOCATED IN THE GUTTER LINE, OFFSETS PROVIDED REFER TO THE FACE OF CURB. SEE CITY OF ARLINGTON STD. DETAIL SD-090 FOR FRAME AND GRATE INSTALLATION TO DETERMINE CENTER OF GRATE OFFSET FROM FACE OF CURB.
9. CONCRETE INLET PER CITY OF ARLINGTON STD. DETAIL SD-010. OFFSETS PROVIDED ON PLANS REFER TO FACE OF CURB. SEE CITY OF ARLINGTON STD. DETAIL SD-060 FOR STANDARD GRATE DETAIL, AND STD. DETAIL SD-090 FOR FRAME AND GRATE INSTALLATION TO DETERMINE CENTER OF GRATE OFFSET FROM FACE OF CURB.
10. SECTIONAL CHAMBER INFILTRATION SYSTEM IN 6.3-FOOT WIDE TRENCH, SEE DETAIL ON SHEET SD2. OFFSETS GIVEN ARE TO CENTERLINE OF EACH SYSTEM. PROVIDE 24-INCH DEEP LAYER OF TREATMENT LINER AMENDED SOIL UNDER TRENCH
11. ADJUST EXISTING CATCH BASIN OR MANHOLE RIM TO FINISHED GRADE
12. OBSERVATION WELL STORM DRAIN CLEANOUT, SEE DETAIL ON SHEET SD1
13. INFILTRATION TRENCH STORM DRAIN CLEANOUT, SEE DETAIL ON SHEET SD1
14. COORDINATE UTILITY WORK WITH EXISTING FORCE MAIN PIPE. FIELD VERIFY LOCATION AND TAKE PRECAUTIONS TO AVOID DISRUPTION OF SERVICE. CONTACT FRED RAPELYEA IN THE PUBLIC WORKS DEPARTMENT IN CASE OF EMERGENCY (360) 913-7058



PROJECT MANAGER	
ISSUE	DATE DESCRIPTION
PROJECT NUMBER	0000000110731



**CITY OF ARLINGTON**  
67th AVENUE PHASE III  
RECONSTRUCTION PROJECT

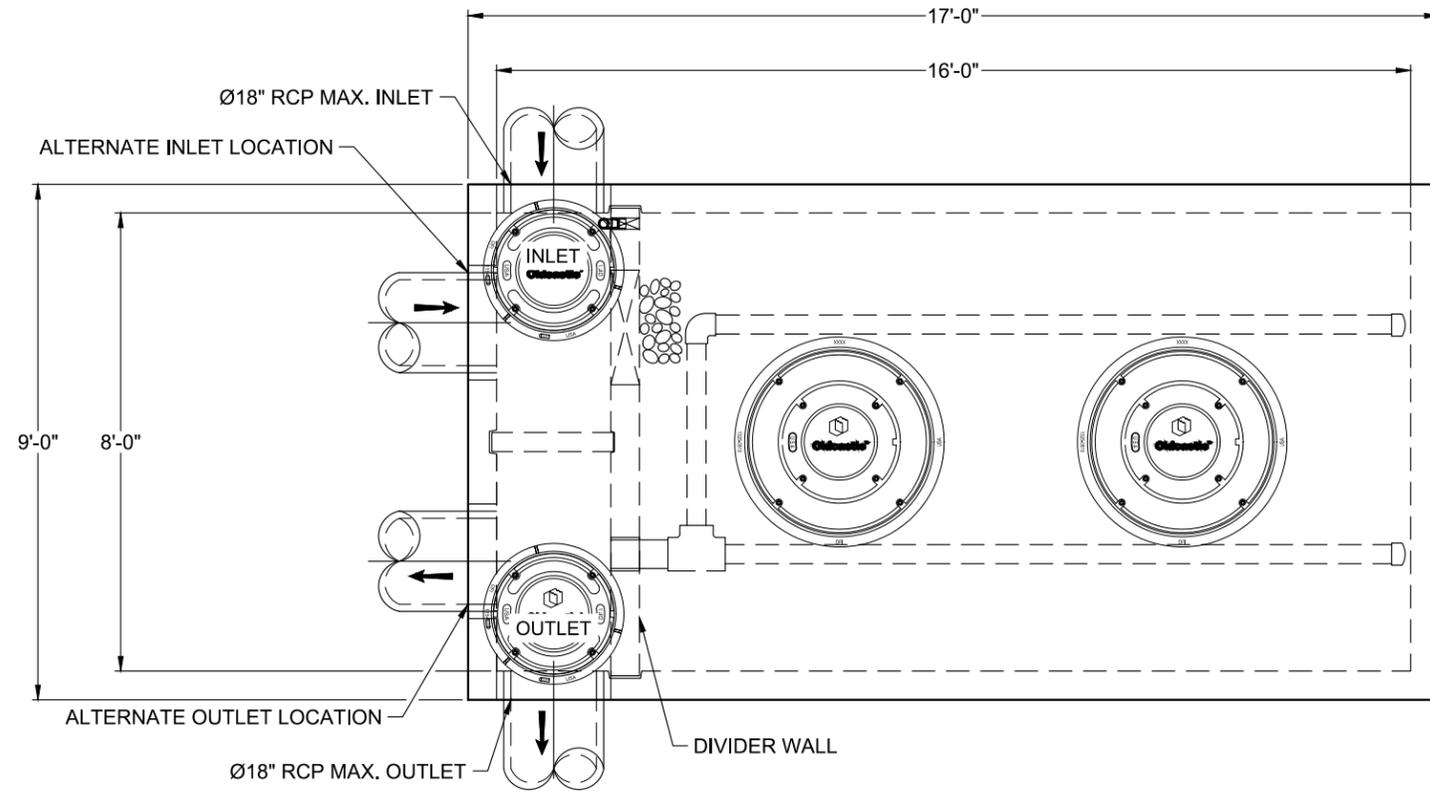
**DRAINAGE PLAN AND PROFILE**  
DP6  
(6 OF 10)

FILENAME: DP-00C-06.dwg  
SCALE: 1"=40' (11x17)  
SHEET: **067**

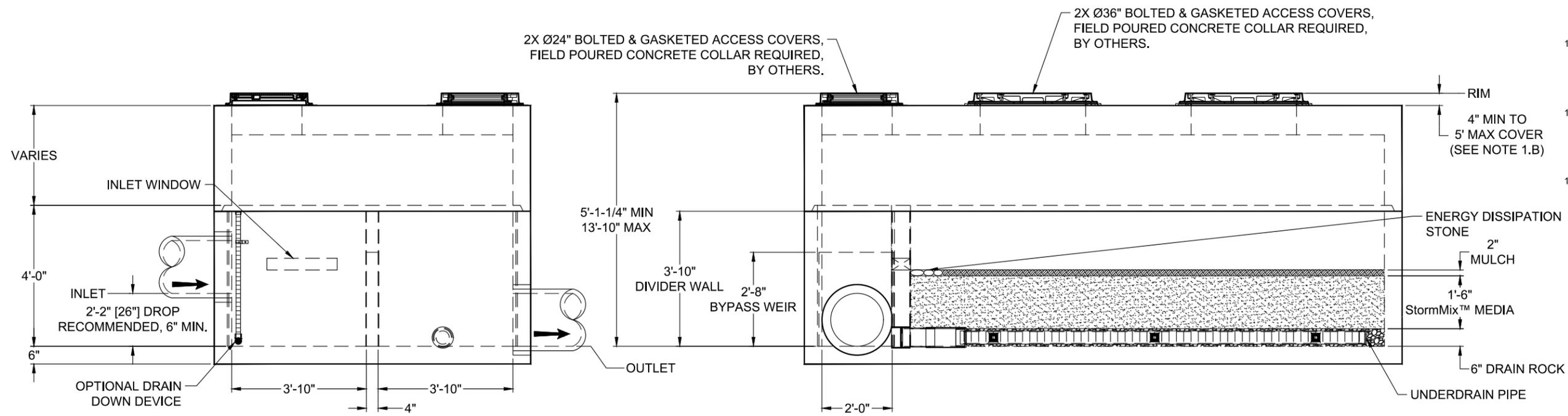
# **Appendix 7**

## **Manufacturer's Water Quality and Infiltration Chamber Facility Specifications**

SITE SPECIFIC DATA				
Structure ID	ID			
Treatment Flow Rate (cfs)	-			
Peak Flow Rate (cfs)	-			
Rim Elevation	-			
Top of Vault Elevation	-			
Pipe Data	Pipe Location	Pipe Size	Pipe Type	Invert Elevation
Inlet	-	-	-	-
Outlet	-	-	-	-
Notes:				
PERFORMANCE SPECIFICATIONS				
Treatment Flow Capacities:*				
NJDEP 80% Removal, 75 micron	0.432 cfs			
WA Ecology GULD - Basic, Enhanced & Phosphorus	0.384 cfs			
Bypass Capacity	6.5 cfs			
*Contact Oldcastle for alternative treatment flow capacities.				



PLAN VIEW



LEFT END VIEW

ELEVATION VIEW

- NOTES:
- DESIGN LOADINGS:
    - AASHTO HS-20-44 (WITH IMPACT)
    - DESIGN SOIL COVER: 5'-0" MAXIMUM
    - ASSUMED WATER TABLE: BELOW BASE OF PRECAST (ENGINEER-OF-RECORD TO CONFIRM SITE WATER TABLE ELEVATION)
    - LATERAL EARTH PRESSURE: 45 PCF (DRAINED)
    - LATERAL LIVE LOAD SURCHARGE: 80 PSF (APPLIED TO 8'-0" BELOW GRADE)
    - NO LATERAL SURCHARGE FROM ADJACENT BUILDINGS, WALLS, PIERS, OR FOUNDATIONS.
  - CONCRETE 28-DAY MINIMUM COMPRESSIVE STRENGTH: 5,000 PSI MINIMUM.
  - REINFORCING: REBAR, ASTM A615/A706, GRADE 60
  - CEMENT: ASTM C150
  - REQUIRED ALLOWABLE SOIL BEARING CAPACITY: 2,500 PSF
  - REFERENCE STANDARD:
    - ASTM C890
    - ASTM C913
    - ACI 318-14
  - THIS STRUCTURE IS DESIGNED TO THE PARAMETERS NOTED HEREIN. ENGINEER-OF-RECORD SHALL VERIFY THAT NOTED PARAMETERS MEET OR EXCEED PROJECT REQUIREMENTS. IF DESIGN PARAMETERS ARE INCORRECT, REVIEWING ENGINEER/AUTHORITY SHALL NOTIFY OLDCASTLE INFRASTRUCTURE UPON REVIEW.
  - INLET AND OUTLET HOLES WILL BE FACTORY CORED/CAST PER PLANS AND CUSTOMER REQUIREMENTS. INLET AND OUTLET LOCATIONS CAN BE MIRRORED.
  - CONTRACTOR RESPONSIBLE TO VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS.
  - CONTRACTOR RESPONSIBLE TO ENSURE ADEQUATE BEARING SURFACE IS PROVIDED (I.E. COMPACTED AND LEVEL PER PROJECT SPECIFICATIONS).
  - SECTION HEIGHTS, SLAB/WALL THICKNESSES, AND KEYWAYS ARE SUBJECT TO CHANGE AS REQUIRED FOR SITE REQUIREMENTS AND/OR DUE TO PRODUCT AVAILABILITY AND PRODUCTION FACILITY CONSTRAINTS.
  - MAXIMUM PICK WEIGHTS\*:
    - TOP: XX,XXX LBS
    - BASE: XX,XXX LBS\* (\* COMBINED WEIGHT OF BASE INCLUDES BYPASS WEIR, DIVIDER WALL, ROCK & MEDIA)
  - INTERNALS SHALL CONSIST OF UNDERDRAIN PIPE, ROCK, STORMMIX™ MEDIA, MULCH, DIVIDER WALL, BYPASS WEIR AND OPTIONAL DRAIN DOWN.

**Oldcastle Infrastructure**  
A CRH COMPANY

Ph: 800.579.8819 | www.oldcastleinfrastructure.com/stormwater

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BioPod™ Biofilter System (STANDARD)		
Underground Vault with Internal Bypass		
CUSTOMER		
PROJECT NAME		
SHEET NAME	REVISION	SHEET
Specifier Drawing BPU-8161B	REV DATE	1 OF 1



**GEOTECHNICAL ENGINEERING REPORT  
211<sup>TH</sup> PLACE CORRIDOR IMPROVEMENTS  
PROJECT  
ARLINGTON, WASHINGTON**

HWA Project No. 2020-106-21

SCJ Alliance

July 22, 2024



**GEOSCIENCES INC.**

DBE/MWBE

Geotechnical Engineering  
Pavement Engineering  
Geoenvironmental  
Hydrogeology  
Inspection & Testing



GEOSCIENCES INC.  
DBE/MWBE

July 22, 2024  
HWA Project No. 2023-049-21

## SCJ Alliance

25 North Wenatchee Ave  
Suite 238  
Wenatchee, Washington 98801

Attention: Dan Ireland, P.E.

Subject: DRAFT GEOTECHNICAL REPORT  
211<sup>TH</sup> Place Corridor Improvements Project  
Arlington, Washington

Mr. Ireland:

Attached is our final geotechnical report for the proposed 211<sup>th</sup> Place Corridor Improvements project in Arlington, Washington. This final geotechnical report includes the results of our field explorations, and our engineering analyses for design and construction of the proposed pedestrian, lighting, pavement, and utility improvements.

We appreciate the opportunity to provide geotechnical engineering services on this project. Please call if you have any questions or comments concerning this report, or if we may be of further service.

Sincerely,

HWA GEOSCIENCES INC.

A handwritten signature in blue ink, appearing to read 'Steven R. Wright'.

Steven R. Wright, P.E.  
Geotechnical Engineer, Vice President

A handwritten signature in blue ink, appearing to read 'Sean Schlitt'.

Sean Schlitt, P.E.  
Geotechnical Engineer

## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 GENERAL.....	1
1.2 PROJECT DESCRIPTION .....	1
2.0 FIELD INVESTIGATION .....	1
2.1 GEOTECHNICAL BORINGS.....	1
2.2 LABORATORY TESTING .....	2
2.3 EXPLORATIONS BY OTHERS.....	3
2.4 PAVEMENT CORING.....	3
3.0 SITE CONDITIONS .....	5
3.1 SITE TOPOGRAPHY .....	5
3.2 GENERAL GEOLOGIC CONDITIONS .....	6
3.3 SITE SOIL CONDITIONS.....	6
3.4 GROUNDWATER.....	7
3.5 SLOPE SITE RECONNAISSANCE .....	8
4.0 CONCLUSIONS AND RECOMMENDATIONS .....	8
4.1 GENERAL.....	8
4.2 SEISMIC CONSIDERATIONS .....	10
4.2.1 Design Parameters .....	10
4.2.2 Near Fault Ground Motion Considerations.....	11
4.2.3 Liquefaction Susceptibility .....	11
4.2.4 Liquefaction Settlement Analysis.....	12
4.2.5 Post Liquefaction Residual Shear Strengths .....	12
4.3 SLOPE STABILITY OF EXISTING ROADWAY.....	13
4.3.1 Slope Stability (Existing Conditions, Static) .....	13
4.3.2 Slope Stability (Existing Conditions, Pseudo-Static) .....	14
4.3.3 Slope Stability (Existing Conditions, Post Liquefaction).....	15
4.4 RECOMMENDED SLOPE CREST REPAIRS.....	15
4.5 RETAINING WALLS.....	16
4.5.1 Wall 2: Structural Earth Walls.....	16
4.5.2 Wall 2: Soldier Pile and Lagging.....	18
4.6 UTILITY DESIGN.....	20
4.6.1 General.....	20
4.6.2 Temporary Shoring Considerations .....	20
4.6.3 Utility Line Trenching Obstructions.....	20
4.6.4 Utility Line Trench Caving.....	21
4.6.5 Trench Dewatering.....	21
4.6.6 Utility Bedding Recommendations.....	21
4.6.7 Trench Backfill Recommendations.....	22
4.6.8 Trench Backfill Placement and Compaction .....	22

4.6.9	Water Main Thrust Blocks.....	23
4.7	LUMINAIRE FOUNDATION RECOMMENDATIONS .....	23
4.7.1	General Construction Considerations .....	24
4.8	EVALUATION OF INFILTRATION POTENTIAL OF SITE SOILS.....	25
4.8.1	Feasibility of Using Infiltration .....	25
4.8.2	Design Infiltration Rate.....	25
4.8.3	Subgrade Preparation for Infiltration Facilities .....	27
4.8.4	Design Considerations for Infiltration Facilities.....	28
4.9	CATTLE UNDERCROSSING .....	28
4.9.1	Cattle Crossing Options .....	28
4.9.2	Preferred Option.....	29
4.10	PAVEMENT REPAIR RECOMMENDATIONS .....	30
4.10.1	Pavement Grind and Overlay Above Existing Concrete Panels .....	30
4.10.2	Pavement Design Recommendations Outside of Concrete Panels .....	31
4.10.3	Pavement Design Recommendations in Areas of Slope- Related Pavement Distressed.....	32
4.10.4	General Pavement Construction Considerations .....	33
4.11	GENERAL EARTHWORK .....	36
4.11.1	Structural Fill .....	36
4.11.2	Compaction.....	36
4.11.3	Temporary Excavation.....	36
4.11.4	Wet Weather Earthwork .....	37
5.0	CONDITIONS AND LIMITATIONS .....	37
6.0	REFERENCES.....	39

LIST OF FIGURES (FOLLOWING TEXT)

Figure 1	Vicinity & Site Map
Figure 2A through 2D	Site and Exploration Plans
Figure 3	Geologic Cross Section A-A'
Figure 4	Groundwater Elevation Data
Figure 5	Lateral Earth Pressures Figures 6A through 6D
	Existing and Proposed Cross Sections of Pavement Sections

**Appendices**

**Appendix A: Field Exploration**

A-1	Legend to Symbols and Terms Used on Explorations
A-2 through A-7	Logs of Borings BH-1 through BH-6
A-8 through A-17	Logs of Pavement Cores C-1 through C-10

**Appendix B: Laboratory Testing**

B-1 through B-3	Summary of Material Properties
B-4 through B-9	Particle Size Analysis of Soils

**Appendix C: Explorations by Others**

**FINAL GEOTECHNICAL REPORT  
211<sup>TH</sup> PLACE CORRIDOR IMPROVEMENTS PROJECT  
ARLINGTON, WASHINGTON**

**1.0 INTRODUCTION**

**1.1 GENERAL**

This final report presents the results of a geotechnical engineering study performed by HWA GeoSciences Inc. (HWA) in support of the 211<sup>th</sup> Place Corridor Improvements project in Arlington, Washington, along 211<sup>th</sup> Place between the intersections of SR 530 and 67<sup>th</sup> Avenue NE. The purpose of this study was to evaluate soil and groundwater conditions in the vicinity of the project and to provide recommendations regarding design and construction of the proposed improvements.

Our scope of work included drilling six (6) geotechnical borings, installing two (2) groundwater monitoring wells, drilling ten (10) pavement cores, geotechnical laboratory testing of representative soil samples, geotechnical engineering analysis, and preparation of this final geotechnical report.

**1.2 PROJECT DESCRIPTION**

We understand that the City of Arlington (City) is proposing to construct retaining walls, water line improvements, stormwater upgrades, pedestrian improvements, pavement repairs, demolition of a historic cattle undercrossing, and lighting upgrades along 211<sup>th</sup> Place NE. The project location is indicated on the Vicinity Map, [Figure 1](#). The locations of the explorations completed for this project are shown on our Site and Exploration Plans, [Figures 2A through 2D](#).

**2.0 FIELD INVESTIGATION**

**2.1 GEOTECHNICAL BORINGS**

HWA completed a field subsurface investigation program that consisted of drilling five (5) exploratory borings to depths of approximately 21.5 to 61.5 feet below ground surface (bgs) using hollow stem drilling methods and attempting one additional boring (BH-3). Proposed exploration BH-3 was abandoned after encountering concrete approximately 1.4 feet bgs, under about 6 inches of asphalt and 10 inches of granular fill. The exploratory borings, designated BH-1 through BH-6, were drilled on August 10 and 11, 2023 by Geologic Drill Partners of Fall City, Washington, under subcontract to HWA, using an Acker Recon tracked drill rig. The approximate borehole locations are shown on the Site and Exploration Plans, [Figures 2A through 2D](#).

July 22, 2024

HWA Project No. 2023-049-21

Soil samples were collected within the exploratory borings at 2.5- to 5-foot depth intervals per Standard Penetration Test (SPT) sampling methods, which consisted of using a 2-inch outside diameter, split-spoon sampler driven with a 140-pound auto-hammer. During the test, each sample was obtained by driving the sampler up to 18 inches into the soil with the hammer free-falling 30 inches per stroke. The number of blows required for each 6 inches of penetration was recorded. The standard penetration resistance of the soil was calculated as the number of blows required for the final 12 inches of penetration. If a total of 50 blows was recorded within a single 6-inch interval, the test was terminated, and the blow count was recorded as 50 blows/number of inches of penetration. This resistance provides an indication of the relative density of granular soils and the relative consistency of cohesive soils. At the completion of the boreholes, they were backfilled with bentonite chips or completed with a well, per Washington State Department of Ecology (DOE) requirements.

Groundwater monitoring wells were installed in two geotechnical borings, BH-1 and BH-5, to monitor seasonal groundwater fluctuations, using water level transducers. Once the target depth was reached, a 2-inch diameter PVC groundwater monitoring piezometer was installed per DOE requirements. Flush mount monuments were installed directly over the well holes to allow access for continued monitoring over the course of the design process.

The borings were completed under the full-time observation of an HWA geologist, who collected pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence, as the exploration was advanced. Soils were classified in general accordance with the classification system described in [Figure A-1](#), which also provides a key to the exploration log symbols. The boring logs are presented on [Figures A-2 through A-7](#).

The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types. Actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

## **2.2 LABORATORY TESTING**

Laboratory tests were conducted at HWA's Bothell, Washington laboratory on selected samples from the explorations to characterize relevant engineering and index parameters. The tests included visual classification, natural moisture content determination, and grain size distribution analyses using washed sieve or combined sieve and hydrometer methods. All tests were conducted in general accordance with appropriate ASTM International (ASTM) standards. Testing is discussed in further detail in [Appendix B](#). The test results are presented in [Appendix B](#), and displayed on the exploration logs in [Appendix A](#), as appropriate.

July 22, 2024

HWA Project No. 2023-049-21

### 2.3 EXPLORATIONS BY OTHERS

The City provided previous geotechnical studies conducted in the vicinity of the project alignment. These studies included two exploration logs (H-3-22 and H-4-22) from borings drilled near the west end of the site, near the intersection of SR 530 and 211<sup>th</sup> Place NE, completed for the 2022 Washington State Department of Transportation (WSDOT) SR 530 MP 19.20 to MP 19.90 59<sup>th</sup> Ave NE & 211<sup>th</sup> Pl NE Intersection Improvements project (WSDOT, 2022a). Explorations H-3-22 and H-4-22 were completed to 21 and 26 feet bgs on June 16 and 15, 2022, respectively. The explorations were conducted by a CME 45C skid mounted drill rig using an auto-hammer to drive SPTs up to 24 inches. No laboratory tests were included in the reference document. The locations of these explorations are presented on [Figure 2D](#), and exploration logs are provided in [Appendix C](#).

### 2.4 PAVEMENT CORING

HWA performed ten (10), 6-inch diameter pavement cores, designated Core-1 (C-1) through Core-10 (C-10) on October 16 and 17, 2023, to assess pavement layer thicknesses and shallow subgrade support conditions. The locations of the pavement cores are shown on the Site and Exploration Plans, [Figures 2A through 2D](#). Shallow subsurface explorations were performed below each pavement core using hand augers to depths between 1.1 and 2.7 feet bgs. The coring and subsurface explorations were performed by an HWA geologist. All core holes were backfilled with existing material, crushed rock added to base of pavement where necessary, materials compacted in place, and patched at the surface with Aquaphalt cold patch to match existing conditions. A legend of the terms and symbols used on exploration logs is presented in Appendix A, [Figure A-1](#). Photographic logs of the pavement cores are presented in [Figures A-8 through A-17](#). [Table 1](#) summarizes the pavement structures encountered in the pavement core explorations.

**Table 1.**  
**Thickness of Pavement Layers**

Designation	Stationing	Figure	HMA Thickness (in.)	Crushed Base Thickness (in.)	PCC Thickness (in.)	General Notes
Core-1	23+96	2B	5.5 2 lifts 2.5" & 3"	2.5	5	No cracking at coring location. Longitudinal cracking 10 feet from centerline. Lifts are unbonded. Class 1" Mix.
Core-2	25+11.16	2B	5.25 2 lifts 2.25" & 3"	2.75	6	No cracking at coring location. Cracks in outside wheel-path. Lifts are unbonded with degraded asphalt or gravel between lifts. Class 1" Mix.

July 22, 2024

HWA Project No. 2023-049-21

Designation	Stationing	Figure	HMA Thickness (in.)	Crushed Base Thickness (in.)	PCC Thickness (in.)	General Notes
Core-3	25+10.97	2B	5.0 2 lifts 2" & 3"	N/A	N/A	Cored in high severity alligator cracking in outside wheel-path. Upper lift is cracked through and unbonded. Lower lift crumbled at bottom of core, lost 1/2". Class 1" Mix. Edge of PCC appears to be 5.5-6.0' from centerline.
Core-4	26+61.72	2A	7.0 3 lifts 1.5" & 2" & 3.5"	N/A	N/A	Cored on medium severity longitudinal cracking. Cracked through full depth. All lifts are unbonded. Class 1" Mix.
Core-5	20+47	2B	5.5 2 lifts 2.5" & 3"	2.75	N/A	Cored on high severity alligator cracking in outside wheel-path. Upper lift is unbonded and cracked through. Class 1" Mix.
Core-6	16+82.30	2C	4.5 2 lifts 2.5" & 2"	3.5 over 9" gravel backfill	5.5	Cored on high severity alligator cracking along the inside wheel-path. High severity raveling. Upper lift is cracked through and unbonded. Class 1" Mix.
Core-7	15+16.43	2C	6.25 2 lifts 3" & 3.25"	2.75 over 9 in gravel backfill	6.5	Medium to high severity longitudinal cracking along inside wheel-path. Not cored on crack. High severity raveling. Lifts are unbonded. Class 1" Mix.
Core-8	15+16.36	2C	6 2 lifts 3" & 3"	3	N/A	Cored on low severity longitudinal cracking, adjacent to high severity alligator cracking. Lifts are unbonded. Cracking extends 1" into upper lift. Longitudinal cracking, likely from underlying PCC, lies 8' from centerline.

July 22, 2024

HWA Project No. 2023-049-21

Designation	Stationing	Figure	HMA Thickness (in.)	Crushed Base Thickness (in.)	PCC Thickness (in.)	General Notes
Core-9	15+15.19	2C	6.5 2 lifts 2.75" & 3.75"	2.5 over 6" gravel backfill	6	No cracks at coring location. Lifts are unbonded. Class 1" Mix. Medium severity longitudinal and transverse cracking travels towards centerline by approximately 1' and behind core.
Core-10	16+82.14	2C	4.25 2 lifts 2" & 2.25"	2.75	N/A	Cored on high severity alligator cracking and raveling. Upper lift is unbonded and cracked through.

The pavement section along the project alignment varied in condition and composition. Under the westbound travel lane and approximately 1/3 of the eastbound travel lane, the pavement section consisted of Hot Mix Asphalt (HMA) over Portland cement Concrete (PCC) with varying amounts of fill placed between the two layers. The HMA observed in this area consisted of two lifts with a total thickness ranging from 4.25 inches to 6.5 inches. The surface lift of HMA varied from 1.5 inches to 3 inches thick and was highly distressed. The thickness of the fill observed between the HMA and PCC varied from as little as 2.5 inches to as great as 12 inches in some areas. We expect the fill was placed to level the roadway surface at the time the roadway was widened, and the PCC panels were overlain by HMA. Longitudinal and transverse cracking was observed at the surface along this portion of the roadway. These cracks may be indicators of the location of underlying PCC panel joints.

The pavement section along the southern 2/3 of the eastbound travel lane consists of HMA placed directly over a thin layer of crushed surfacing base course (CSBC) or the native subgrade soils. The HMA observed in this area consisted of two lifts with a total thickness ranging from 4.25 inches to 7 inches. Linear HMA patching and distress was observed along the majority of this section of roadway. We expect that this distress is associated with the poor subgrade conditions as a result of installation of a subsurface utility and poor-quality trench backfill compaction.

### 3.0 SITE CONDITIONS

#### 3.1 SITE TOPOGRAPHY

211<sup>th</sup> Place NE is located between central Arlington and the Arlington Municipal Airport, bound by SR 530 to the west and 67<sup>th</sup> Avenue NE to the east. The Site is approximately 3,950 feet south

July 22, 2024

HWA Project No. 2023-049-21

of the Stillaguamish River. The road follows the north edge of a generally flat terrace, sloping to a lower elevation between 66<sup>th</sup> Drive NE and SR 530. North of the road is a steep slope dropping down to a lower flat terrace. The area contains primarily residential and agricultural developments, with some commercial and public infrastructure developments.

### 3.2 GENERAL GEOLOGIC CONDITIONS

The project is located within the Puget Lowland. The Puget Lowland has repeatedly been occupied by a portion of the continental glaciers that developed during the ice ages of the Quaternary period. During at least four periods, portions of the ice sheet advanced south from British Columbia into the lowlands of Western Washington. The southern extent of these glacial advances was near Olympia, Washington. Each major advance included numerous local advances and retreats, and each advance and retreat resulted in its own sequence of erosion and deposition of glacial lacustrine, outwash, till, and drift deposits. Between and following these glacial advances, sediments from the Olympic and Cascade Mountains accumulated in the Puget Lowland. As the most recent glacier retreated, it uncovered a sculpted landscape of elongated, north-south trending hills and valleys between the Cascade and Olympic Mountain ranges. This landscape is composed of a complex sequence of glacial and interglacial deposits.

Geological information for this site was obtained from the published *Geologic Map of the Arlington West 7.5 Minute Quadrangle, Snohomish County, Washington* (Minard, 1985). According to this geologic map, the near-surface deposits in the vicinity of the project are identified as Marysville Sand recessional outwash at the elevation of the road and younger Quaternary alluvium in the terrace beneath the road. The outwash sediments were deposited by meltwater flowing south from the stagnating and receding Vashon Glacier. Marysville sand deposits generally consist of well-drained, stratified to massive outwash sand, some fine gravel, and some areas of silt and clay. The Marysville Sand member unit is at least 65 feet thick according to the geologic map. Alluvium is deposited by rivers and streams, and generally consists of stratified clays, silts, sands, and gravels, with grain size dependent on stream energy and distance from active channels. Fine-grained soils are typically indicative of flood deposits. Alluvial deposits range in thickness from approximately 2 to 20 feet according to the geologic map.

### 3.3 SITE SOIL CONDITIONS

Based on our subsurface explorations, the site is underlain by fill, alluvium, and recessional outwash deposits. Our interpretation of the geologic conditions perpendicular to the roadway at Station 15+73 are shown on [Figure 3](#), Geologic Cross Section A-A'. Further descriptions of soils encountered in our explorations are presented below in order of deposition, beginning with the most recently deposited. The exploration logs in [Appendix A](#) provide more detail of subsurface conditions observed at specific locations and depths.

July 22, 2024

HWA Project No. 2023-049-21

- Fill – Fill was encountered in all borings to depths ranging from approximately 3 to 7.5 feet. The fill generally consists of surficial asphalt and/or concrete in the roadway, very loose to dense, reddish brown to olive brown, gravelly to very gravelly, silty to very silty sand, and medium stiff, yellowish brown fine sandy silt. Silt was observed at BH-5.
- Alluvium – Alluvium was encountered in BH-1 from about 2.5 to 10 feet bgs. The alluvium consists of medium stiff, yellow-brown, very sandy silt, and medium dense, yellow-brown, gravelly, silty sand. BH-1 is at the lowest elevation of the project.
- Recessional Outwash – Recessional outwash deposits were encountered in all borings underlying fill or alluvium and extended to the termination depth of each exploration. The outwash consisted of two distinct portions: an upper more-gravelly portion over a cleaner and more uniform sand lower portion. The upper portion of the unit consisted of medium dense to very dense with blow counts likely overstated, olive brown, slightly silty to clean, very sandy gravel and slightly silty, very gravelly sand. The gravelly portion of recessional outwash was typically 5 to 12.5 feet thick. The recessional outwash was generally more gravelly in the explorations further east. More uniform sand was located beneath the upper gravelly portions of the unit and extended to the termination depth of each exploration. The lower portion of the unit generally consisted of medium dense, olive brown, slightly silty, fine to medium sand with few silty or gravelly layers. The deepest boring, BH-2, was advanced to 61.5 feet bgs.

### 3.4 GROUNDWATER

Groundwater and saturated soil conditions were observed in BH-1, BH-2, and BH-4 at depths of 11.9, 27.1, and 30 feet, respectively, at the time of drilling, or several hours after in well BH-1. Exploration BH-1 is located at a lower elevation than the other two borings with observed groundwater. Groundwater and saturated soil conditions were observed in BH-1, BH-2, and BH-4 at elevations of 57.1, 57.7, and 59.7 feet, respectively.

HWA installed groundwater monitoring wells in BH-1 and BH-5 (monitoring well BH-5 was dry at the time of transducer installation). Groundwater monitoring transducers were set to record water levels every 60 minutes. Transducers were retrieved and downloaded on July 9, 2024; data are presented on [Figure 4](#). No groundwater readings were recorded at the location of BH-5, which suggests that groundwater at BH-5 is below the base of the well. However, this well should be monitored during the wet-weather season to ensure groundwater does not rise. At the location of BH-1, groundwater levels varied over time and ranged from elevation 57 to 59.5 feet, which corresponds to depths of 9.5 to 12 feet bgs.

For design of stormwater facilities, a minimum seasonal high groundwater elevation of 60 feet should be assumed.

July 22, 2024  
HWA Project No. 2023-049-21

### 3.5 SLOPE SITE RECONNAISSANCE

Site conditions along the roadway and slope near boring BH-3 were observed in August 2023 by an HWA geologist. Pavement and slope observations were made from within the right-of-way (ROW) to document geomorphology, vegetation patterns and conditions, soil exposures, and groundwater seeps. No physical reconnaissance of the slope base was conducted due to very steep and heavily vegetated slopes. No observation of the slopes from below was conducted due to being restricted to ROW access. Pavement cracks associated with the pavement distress near boring BH-3 were documented using GPS and are shown on the Site and Exploration Plan, [Figure 2C](#).

In the vicinity of boring BH-3, the slope drops off steeply approximately 5 to 5 feet north of the westbound fog line. No groundwater seepage was observed from the ROW. The slope was heavily vegetated with Himalayan blackberry, shrub undergrowth, and smaller trees further down the slope. An exposed edge of the former road surface was observed approximately 3.5 feet from the north edge of the fog line.

Multiple lines of moderate to severe pavement distress are present, predominantly consisting of arcuate or longitudinal cracking and alligator cracking, with a few spots of transverse cracking (See [Figure 2C](#)). The most significant cracking are two parallel arcuate cracks just south of the location for BH-3, within the center of the west-bound lane. Vertical offset is present between the two arcuate cracks, with lesser settlement of the road north of the cracks. The most severe alligator cracking is located south of the arcuate cracks, in the east-bound lane, and is connected to the arcuate cracking by the most severe transverse crack. Transverse cracking was interpreted to be associated with concrete panels below the asphalt, which were found under the west-bound lane during drilling.

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 GENERAL

Based on our field exploration program and site reconnaissance, the project alignment is underlain by fill and recessional outwash with alluvial soils near the base of the slope. The pavement along the alignment is experiencing distress due to areas of slope instability, poor quality utility backfill compaction, and reflective cracking associated with the presence of concrete panels under portions of the roadway. Specific geotechnical mitigation measures will need to be implemented to address the following conditions along the alignment.

The saturated coarse-grained recessional outwash is expected to liquefy during the design earthquake and could experience settlement and/or lateral displacement as a result. Therefore, foundations and retaining wall structures should consider the loads and deformations that could occur as a result of liquefaction-induced settlements.

July 22, 2024

HWA Project No. 2023-049-21

Placement of sidewalks along the southern edge of the roadway alignment will require the construction of two retaining wall structures. These walls will consist of a fill wall between Stations 12+11 and 13+74 and a cut wall between Stations 15+23 and 17+34. We anticipate that the cut wall will consist of a soldier pile wall, where cuts are required in close proximity to the residential structure at the top of the slope, and structural earth walls (SEW) where the required cut is not in close proximity to residential structures. Slope stability analysis indicates that the soldier pile wall will require a minimum embedment depth of 20 feet below the proposed roadway surface to satisfy slope stability requirements. We expect the proposed fill wall condition will consist of a SEW.

It is our understanding that a new sewer line and water line will be installed as part of the proposed improvements. Based on our subsurface explorations, we anticipate that the native soils are suitable to support the new pipes.

Proposed improvements include installation of luminaires along the project alignment. We expect that utilization of WSDOT Standard Plans for Luminaire Foundations will be desirable. Based on our subsurface explorations, we anticipate that the majority of the luminaires can be designed utilizing the WSDOT luminaire standard plans assuming a Type B foundation, with 1,500 pounds per square foot (psf) of allowable lateral bearing pressure. However, the near-surface soils to the west of Station 14+00 are unsuitable for utilization of the standard plans. Therefore, non-standard design is recommended for any luminaires in this segment of the project alignment.

We understand onsite infiltration is being considered along the project alignment. A required setback of 50 feet from the crest of the steep slope will significantly limit the use of onsite infiltration along most of the alignment. The subsurface soils and groundwater conditions east of approximately Station 14+00 are conducive to the use of onsite infiltration. Therefore, where the required setback of 50 feet from the crest of the steep slope can be achieved, onsite infiltration can be used east of Station 14+00. West of Station 14+00, the seasonal high groundwater table provides a separation of approximately 9 feet from the existing ground surface. The proposed infiltration pond will be constructed at grade with a berm system to allow for maximum separation. Based on the anticipated facility elevation and the encountered groundwater elevation, we anticipate a suitable amount of separation will be achieved.

A cattle undercrossing structure exists below the roadway between approximate Stations 22+50 and 23+00. The project will include removal of the undercrossing structure lid and portions of the walls.

Based on the observed pavement distress and existing pavement section geometry, pavement rehabilitation will be required along the project alignment. Where existing PCC panels were observed below the HMA, we recommend milling 3 inches of HMA and placing back 3 inches of fiber-reinforced HMA. Outside of the area where PCC panels are expected, we recommend

July 22, 2024  
HWA Project No. 2023-049-21

the existing pavement section be completely removed and replaced with a new section consisting of 7 inches of HMA over 7 inches of CSBC.

Pavement distress and slope displacements were observed between Stations 15+50 and 16+00. We recommend that the pavement, subgrade soils, and near-surface soils along the slope be reconstructed in this area to prevent continued displacements in this area.

## 4.2 SEISMIC CONSIDERATIONS

### 4.2.1 Design Parameters

Earthquake loading for the project corridor was developed in accordance with the General Procedure provided in Section 3.4 of the *AASHTO Guide Specifications for LRFD Seismic Bridge Design*, 2<sup>nd</sup> Edition (AASHTO, 2020a) and the WSDOT amendments to the AASHTO *Guide Specifications* provided in the *Bridge Design Manual (LRFD)* (WSDOT, 2022b). For seismic analysis, the Site Class is required to be established and is determined based on the average soil properties in the upper 100 feet below the ground surface. Based on our characterization of the subsurface conditions, the site class designation has been determined based on the assumption that the consistency of the soils below the maximum depth of the borings are consistent or denser than the soil within the 61.5 feet of depth explored.

For this project, SPT blow counts obtained from the borings were utilized to classify the subject site as Seismic Site Class D. This would require a site-specific seismic analysis to be performed to determine the seismic coefficients; however, guidance provided in Chapter 6 of the WSDOT *Geotechnical Design Manual (GDM)* (WSDOT, 2022c) indicates that specification-based site coefficients can be used for structures with fundamental periods less than 1.0 second. We understand the proposed improvements being analyzed have fundamental periods below 1.0 second; therefore, the specification-based site coefficients for Site Class D can be used and a site-specific seismic analysis is not required.

The mapped seismic design coefficients for the design level event, which has a probability of exceedance of 7 percent in 75 years (equal to a return period of 1,033 years), were obtained using BridgeLink, a program developed by WSDOT to incorporate the probabilistic seismic hazard parameters from the *2014 Updates to the National Hazard Maps* (Peterson et al., 2014) as well as adopt the site coefficients provided in ASCE 7-16. The recommended seismic coefficients for the design event are provided for the project site in [Table 2](#). The spectral acceleration coefficient at 1-second period ( $S_{D1}$ ) is between 0.5 and 0.3; therefore, Seismic Design Category C, as given by AASHTO Table 3.5-1 (AASHTO, 2020a), should be used.

**Table 2.**  
**Seismic Coefficients Using AASHTO Guide Specifications**  
**Calculated by USGS Seismic Hazard Map**

Site Class	Peak Horizontal Bedrock Acceleration PBA, (g)	Spectral Bedrock Acceleration at 0.2 sec $S_s$ , (g)	Spectral Bedrock Acceleration at 1.0 sec $S_1$ , (g)	Site Coefficients			Peak Horizontal Acceleration PGA ( $A_s$ ), (g)
				$F_{pga}$	$F_a$	$F_v$	
D	0.317	0.718	0.215	1.283	1.226	2.170	0.407

#### 4.2.2 Near Fault Ground Motion Considerations

As required by the AASHTO *Guide Specifications*, near fault effects should be considered for projects that are within 6 miles of a known fault. The project alignment is located about 10.5 miles south of the Darrington-Devils Mountain Fault. Therefore, near-fault effects were not considered for design analyses of the proposed improvements.

#### 4.2.3 Liquefaction Susceptibility

Liquefaction is a temporary loss of soil shear strength due to earthquake shaking. Loose, saturated, cohesionless soils are the most susceptible to earthquake-induced liquefaction; however, experience and research has shown that certain silts and low-plasticity clays are also susceptible. Primary factors controlling the development of liquefaction include the intensity and duration of strong ground motions, the characteristics of subsurface soils, in-situ stress conditions and the depth to groundwater. Based on the WSDOT *GDM* (WSDOT, 2022c), the liquefaction susceptibility of the soils along the project intersection was determined utilizing the simplified procedure originally developed by Seed and Idriss (1971) and updated by Youd et al. (2001) and Idriss and Boulanger (2004, 2006).

The simplified procedure is a semi-empirical approach that compares the cyclic resistance ratio (CRR) required to initiate liquefaction of the material to the cyclic shear stress ratio (CSR) induced by the design earthquake. The factor of safety relative to liquefaction is the ratio of the CRR to the CSR; where this ratio is computed to be less than 1, the analysis would indicate that liquefaction is likely to occur during the design earthquake. The CRR is primarily dependent on soil density, with the current practice being to base it on the SPT N-value, corrected for energy consideration, fines content, and earthquake magnitude. CSR is generally determined by the formulation developed by Seed and Idriss (1971) and relates equivalent shear stress caused in the soil at any depth to the effective stress at that depth and the peak ground acceleration at the surface.

July 22, 2024

HWA Project No. 2023-049-21

Our analyses indicate that the saturated, loose to medium dense, recessional outwash deposits observed along the project alignment are potentially liquefiable during the design earthquake. In general, this corresponds with the groundwater elevation, which is assumed to be at an elevation of 60 feet for design. Where identified, the effects of liquefaction should be considered and accounted for in the design of proposed improvements.

#### **4.2.4 Liquefaction Settlement Analysis**

For liquefaction susceptible soil deposits, excess pore water pressure builds up during the earthquake excitation, leading to loss of strength. After the shaking stops, excess pore water pressures dissipate toward a zone where water pressure is relatively lower, usually the ground surface. The dissipation is accompanied by a reconsolidation of the loose sand (Ishihara and Yoshimine, 1992; Tokimatsu and Seed, 1987). The reconsolidation is manifested at the ground surface as vertical settlement, usually termed as liquefaction-induced settlement or seismic settlement.

The potential for liquefaction-induced settlement at each boring was evaluated. The methodologies used to estimate the magnitude of liquefaction-induced settlement were developed by Idriss and Boulanger (2008) and are generally based on the relationship between cyclic stress ratio, corrected SPT blow counts, and volumetric strain. Using these methods, liquefaction-induced settlement within the recessional outwash soils across the project alignment is estimated to be between 2 and 10 inches. This settlement is expected to be differential in nature and could result in damage to the proposed improvements founded above or within potentially liquefiable materials. We expect that during the design earthquake, these anticipated differential settlements will result in deformation of the proposed improvements including the wall, utilities, and pavement section.

In general, mitigation of the onset of liquefaction is expensive and not implemented unless the onset of liquefaction is expected to result in a threat to life safety of the traveling public. Although we expect that liquefaction-induced settlement could result in damage to proposed improvements, we do not expect the damage to result in a threat to life safety of the traveling public. Therefore, we do not recommend implementation of measures to prevent liquefaction from occurring. Rather, we recommend that the anticipated liquefaction-induced settlement be considered when designing proposed improvements and repairs of proposed improvements.

#### **4.2.5 Post Liquefaction Residual Shear Strengths**

Upon initiation of liquefaction, the shear strength of the liquefiable soils will be reduced to a residual shear strength while the excess pore pressure within the soil dissipates. For this project, residual shear strengths were estimated using a weighted average of the results of the Tokimatsu and Seed (1987), Seed and Harder (1990), Olson and Stark (2002), Idriss and Boulanger (2006) and Kramer and Wang (2007) relationships. The residual shear strengths were assigned as

July 22, 2024

HWA Project No. 2023-049-21

reduced friction angle materials and are estimated as a function of the equivalent clean sand SPT value,  $(N_1)_{60cs}$ , the potential for void redistribution, and the initial effective overburden stress. The residual shear strengths were then used to evaluate the potential for liquefaction-induced slope failures beneath the project alignment and for the roadway embankment.

### 4.3 SLOPE STABILITY OF EXISTING ROADWAY

The roadway alignment is positioned at the crest of a steep slope. Evidence of varying amounts of slope distress was observed during our site reconnaissance. Based on our observations, the critical slope geometry along the project alignment is located between Stations 15+50 and 16+00. This corresponds to the location of an observed slope/pavement failure along the outside of the westbound travel lane. Slope stability analysis of the existing slopes was performed along Cross Section A-A' (Figure 2C). The slope geometry and soil conditions along Cross Section A-A' are shown on Figure 3. It should be noted that the location of Cross Section A-A' represents the location that HWA expects the slope stability factor of safety to be lowest along the entire roadway alignment. These analyses were performed to determine the expected performance of the existing roadway configuration under static and seismic loading conditions.

Global slope stability was evaluated using limit equilibrium methods for three scenarios: (1) static loading, (2) pseudo-static earthquake loading, and (3) post-liquefaction earthquake loading. In the static loading case, a uniform traffic live load of 250 psf was applied across the top of the roadway. In the pseudo-static earthquake loading analysis, a constant horizontal acceleration of 0.2035g was applied to the slope and wall. In the post-liquefaction earthquake loading analysis, post-liquefaction residual shear strengths were used.

Limit equilibrium analyses were performed using the computer program SLIDE2 9.023 to calculate the global factor of safety with respect to potential deep-seated failure surfaces. The factor of safety computed is the ratio of the summation of the driving forces to the summation of the resisting forces. Where the factor of safety is less than 1.0, instability is predicted. For global slope stability design, the minimum acceptable factors of safety under static loading conditions are commonly taken as 1.5 for slopes supporting structures or walls. For slopes adjacent to structures or minor walls where slope instability would have a lesser effect in terms of safety considerations, the factor of safety may be taken as 1.3. The minimum acceptable factor of safety for the pseudo-static case is 1.1.

#### 4.3.1 Slope Stability (Existing Conditions, Static)

The stability of Cross Section A-A' under static loading conditions, was evaluated with Spencer's method and GME/Morgenstern-Price method using circular failure planes. Our analysis showed that the slope geometry was marginally stable under the static loading condition with a factor of safety of 1.16. The failure surface associated with this factor of safety extended through the near-surface soil and propagated to the roadway surface at a location closely

July 22, 2024

HWA Project No. 2023-049-21

matching that of the observed pavement distress in this area. This indicates that the northern edge of the existing roadway, in the immediate vicinity of Cross Section A-A' is marginally stable under static loading conditions and can be expected to continue to undergo slow and episodic movements when the traffic loads exceed the resistance available from the subsurface soils. Unmitigated, we expect the slope/pavement failure, located between Stations 15+50 and 16+00 to continue to undergo slow and episodic displacements that will result in continued pavement distress. We recommend that the slope/pavement failure between Stations 15+50 and 16+00 be mitigated to prevent continued failure.

Although slope stability analyses were not completed along the entire length of the project alignment, our analysis of Cross Section A-A' suggests that the static slope stability of the roadway embankment, when in close proximity to the crest of the steep slope, is marginal. Observations along the roadway alignment suggest that reconstruction of the slope crest is not required to increase static slope stability, outside of Stations 15+50 to 16+00. However, we suggest that the proposed improvements be designed to not add additional loads to the subsurface soils or move the roadway any closer to the slope than its current configuration.

#### **4.3.2 Slope Stability (Existing Conditions, Pseudo-Static)**

Under pseudo-static earthquake loading, the slope in the vicinity of Cross Section A-A' was found to be unstable with a factor of safety of 0.78. Therefore, in its current state, the slope underlying the roadway, in the vicinity of Cross Section A-A' is expected to experience slope instability due to seismic shaking under the design seismic event. Our analysis indicate that the pseudo-static slope failures could extend on the order of 18 feet from the slope crest in the vicinity of Cross Section A-A' under pseudo-static loading.

Although slope stability analyses were not completed along the entire length of the project alignment, our analysis of Cross Section A-A' suggests that the portion of the roadway, when in close proximity to the crest of the steep slope, may become unstable as a result of pseudo-static earthquake loading. The magnitude of expected displacement is expected to depend on the proximity of the roadway to the crest of the steep slope. However, displacements within 18 feet of the crest of the slope are possible. We expect that reconstruction of portions of the roadway will be required after the design earthquake.

Mitigating the expected pseudo-static slope failures would require construction of significant soldier pile and lagging walls along the crest of the adjacent slope. It is our understanding that construction of soldier pile and lagging walls along the crest of the adjacent steep slope is not within the scope of this project. Therefore, we recommend that the design of the proposed improvements not add any additional loads to the subsurface soils and the alignment of the roadway remain the same. This will ensure that the proposed improvements will not reduce the stability of the slope and contribute to any anticipated slope displacements during a design

July 22, 2024  
HWA Project No. 2023-049-21

seismic event. Under this approach, reconstruction of the roadway should be expected after the design earthquake.

### **4.3.3 Slope Stability (Existing Conditions, Post Liquefaction)**

Potentially liquefiable soils are present below the project alignment. Our analyses suggest that the slope in the vicinity of Cross Section A-A' has a factor of safety of approximately 1.1 under the post-liquefaction condition. This indicates that post-liquefaction induced flow sliding is not expected. However, depending on the point at which liquefaction occurs during the strong shaking, liquefaction induced slope displacements could occur in the form of lateral spreading. If liquefaction occurs early during the strong shaking, we anticipate these displacements to range from 9 to 11 inches of lateral movement. If liquefaction occurs later during the strong shaking, we expect displacement would be negligible.

Mitigating the expected liquefaction-induced slope displacements would require construction of significant soldier pile and lagging walls along the crest of the adjacent slope. It is our understanding that construction of soldier pile and lagging walls along the crest of the adjacent steep slope is not within the scope of this project. Therefore, we recommend that the design of the proposed improvements not add any additional load to the subsurface soils and the alignment of the roadway stay the same. This will ensure that the proposed improvements will not reduce the stability of the slope and contribute to any anticipated slope displacements during a design seismic event. Under this approach, reconstruction of the roadway should be expected after the design earthquake.

## **4.4 RECOMMENDED SLOPE CREST REPAIRS**

HWA's site reconnaissance identified two areas where the pavement distress observed is believed to be caused by instability of the adjacent steep slope. The most predominant of these failure areas is located between Stations 15+50 and 16+00 and is identified by pavement cracking and vertical settlement of the edge of the pavement. HWA recommends that this area be repaired per the recommendations provided in [Section 4.10.3](#) of this report. The second area of observed pavement distress is located along the outside edge of the westbound travel lane between Stations 24+50 and 26+50. The pavement distress in this area consists of minor longitudinal cracking along the outside edge of the roadway. Leaning utility poles are also observed in this area, suggesting slow creep of the near surface soils along the slope. The pavement distress in this area is much less than the distress observed between Stations 15+50 and 16+00. Repair of the slope and associated pavement between Stations 24+50 and 26+50 would increase the longevity of the proposed pavement in this area but should be considered optional, as the distress has not progressed to the point of requiring an immediate repair. If the City chooses to repair this area, the repairs should be completed per the recommendations provided in [Section 4.10.3](#) of this report.

July 22, 2024  
HWA Project No. 2023-049-21

## 4.5 RETAINING WALLS

Based on the 100 percent plans, we understand that one retaining wall is to be constructed along the project alignment, designated Wall 2. However, previous plan sets included a second wall, designated Wall 1, which has been removed from design. For the sake of consistency, the wall designations have been maintained.

- Retaining Wall 2 is to consist of a partial cut- and fill-wall along the south side of the roadway, between Stations 15+23 and 17+34. Retaining Wall 2 is to be constructed as an SEW between Stations 15+23 and 15+47. Due to the proximity to an existing residential structure at the top of the proposed wall, Wall 2 is to be constructed as a soldier pile and lagging wall between Station 15+47 and 15+78. Between Stations 15+78 and 17+34, Wall 2 is to transition back to an SEW.

### 4.5.1

#### 4.5.1 Wall 2: Structural Earth Walls

We anticipate that the retaining wall designated Wall 2 will have sections that will be constructed with conventional SEWs. Based on our review of the 100 percent plans, the SEW sections extend from Station 15+23 to 15+47 and from Station 15+83 to 17+34. The SEWs will have maximum retained heights of up to 10 feet. The SEWs will consist of a proprietary wall system that the wall supplier will design for internal stability. The walls should be designed in accordance with the AASHTO *LRFD Bridge Design Specifications* (AASHTO, 2020b) and Section 6-13.3(2)A of the 2024 WSDOT *Standard Specifications*.

We recommend that SEW walls be embedded at least 2 feet below the finished grade in front of the wall. A coefficient of friction of 0.5 times the effective stress at the base of the wall can be used for sliding resistance. SEW walls should be designed per the design parameters provided in [Table 3](#). For the Extreme Event I Limit State, the wall should be designed for a horizontal seismic acceleration coefficient  $k_h$  of one-half the peak ground acceleration or 0.2035g and a vertical seismic acceleration coefficient  $k_v$  of 0.0g (assuming the wall is free to move during a seismic event).

**Table 3.**  
**Recommended SEW Design Parameters for Wall 2**

<b>Soil Properties</b>	<b>Reinforced Fill*</b>	<b>Retained Soil*</b>	<b>Foundation Soil</b>
Unit Weight (pcf)	130	120	120
Friction Angle (deg)	38	34	34
Cohesion (psf)	0	0	0
		<b>AASHTO Load Group 1</b>	<b>AASHTO Load Group 2</b>
Ultimate Bearing Capacity (psf)		2,500	2,500
Resistance Factors ( $\phi$ )		0.65	1.0
Horizontal Seismic Acceleration Coefficient		N/A	0.2035

\* Gravel Borrow for Structural Earth Walls, as specified in Section 9-03.14(4).

Drainage should be provided behind all walls and should consist of 6-inch diameter, perforated, rigid plastic pipes, bedded and backfilled with Gravel Backfill for Drains, as specified in Section 9-03.12(4) of the *WSDOT Standard Specifications* (WSDOT, 2024). The pipes should slope to drain to a suitable outlet.

#### **4.5.1.1 Subgrade Preparation**

Subgrade preparation is important to limit differential settlement of walls and maintain global stability. Any unsuitable soil should be removed from beneath the entire footprint of the wall, including the entire reinforced zone for SEWs. Loose or soft soil, as identified by the geotechnical representative, should be removed and replaced with Structural Backfill in accordance with [Section 4.11.1](#) or be suitably compacted native material.

We recommend an HWA geotechnical engineer, or their representative, be present during construction to verify the assumptions made for the foundations of the walls are met. The depth and extent of excavation will be directed by the geotechnical engineer on site.

A leveling pad consisting of crushed rock backfill should be placed over the subgrade as a leveling course for support of the walls. This leveling course should be at least 12 inches thick and should consist of materials meeting the requirements for Crushed Surfacing Base Course, as described in Section 9-03.9(3) of the *Standard Specifications* (WSDOT, 2024). It should be compacted to a dense condition and determined by HWA, or to at least 95 percent of its Modified Proctor maximum density (ASTM D 1557).

#### **4.5.1.2 Structural Earth Wall 2 Global Slope Stability**

HWA completed global slope stability analysis in the vicinity of the proposed SEW sections of the wall based on the soil conditions shown in Cross Section A-A' and the wall geometry shown in the 100 percent plans. Our analysis indicates that the proposed walls should possess a static factor of safety greater than 1.5 and a pseudo static factor of safety greater than 1.1 with a wall

July 22, 2024

HWA Project No. 2023-049-21

embedment of 2 feet. Pseudo-static slope failures associated with the steep slope north of the roadway are not expected to extend to the location of the proposed SEW wall foundations. Under post-liquefaction conditions, we expect that displacement at the toe of the wall could occur. The magnitude of displacement will depend on when liquefaction occurs during the strong shaking. If liquefaction occurs early in the earthquake strong shaking, displacements as large as 9 inches, could occur. If liquefaction occurs late during the strong shaking, displacement could be negligible. Expected liquefaction induced displacements could result in damage to the wall structure but are not expected to result in collapse of the structure or represent a threat to life safety. However, reconstruction of the wall may be required after the design earthquake.

#### **4.5.2 Wall 2: Soldier Pile and Lagging**

It is our understanding that a short segment of Wall 2 will consist of a Soldier Pile Wall from Station 15+47 to 15+83 to avoid impacts to the residential structure located at the top of the proposed wall. Soldier pile and lagging systems rely on embedment below the retained portion of the wall to support the lateral earth pressures exerted by the retained soil. For soldier pile and lagging wall systems, steel H-piles are generally placed in drilled shafts, spaced at approximately 6- to 8-foot centers. The diameter of typical soldier pile shaft excavations is on the order of 2 to 3 feet and the H-piles are embedded below the bottom of the excavations. Once the H-piles are installed, the drilled shafts are filled with concrete or controlled density fill (CDF). Typically, conventional concrete is only used to fill the holes below the base of the wall as a structural toe. Excavation occurs from the top down, and lagging members are placed between the installed H-piles as the excavation progresses. Lagging would likely consist of treated timber (typically 4 x 12 timber beams) and would extend on the order of 2 to 3 feet below the adjacent exposed surface of the downslope face.

The proposed soldier pile wall will have an approximate retained height of 10 feet. Based on assumed subsurface conditions and wall geometry, it is not anticipated that the soldier pile wall will require the use of tieback anchors. However, if tieback anchors are determined to be necessary to ensure suitable wall design, HWA should be notified to provide suitable recommendations. To satisfy slope stability, the proposed soldier pile shafts will need to extend at least 20 feet below the roadway grade.

##### **4.5.2.1 Soldier Pile Wall Design Parameters**

The soldier pile wall should be designed to resist lateral earth pressures shown on [Figure 5](#). The pressure diagram assumes that tieback anchors will not be required. However, if tiebacks are determined to be necessary to meet wall stability, HWA should be notified to provide suitable earth pressure diagrams. The diagram also assumes that the presence of a residential property will apply a distributed surcharge at the top of the wall; this surcharge should be determined by the design team and included in the design of the wall.

July 22, 2024

HWA Project No. 2023-049-21

The provided pressure diagram assumes that the proposed wall will be free to deflect under static loading conditions and, therefore, active lateral earth pressure conditions were assumed. Active earth pressure conditions are also assumed under seismic loading conditions. Passive earth pressures are assumed to act over two shaft diameters for Strength and Service Limit State and Extreme (Seismic) Limit State. Active earth pressures are assumed to act over one shaft diameter, below the base of the excavation, and over the width of the lagging for the retained portion of the wall. A resistance factor  $\phi$  of 0.75 should be applied to the passive earth pressures for Strength and Service Limit State Design. For Extreme (Seismic) Limit State Design, a resistance factor  $\phi$  of 1.0 should be applied to the passive earth pressures.

#### **4.5.2.2 Wall Drainage Recommendations**

Adequate drainage behind the soldier pile wall is critical for long-term performance. We recommend prefabricated geosynthetic drain panels meeting the requirements of the WSDOT Special Provisions be placed on the wood lagging before casting the permanent fascia and tight lined into the drainage at the base of the wall. Drainage at the base of the wall should consist of a minimum 6-inch-diameter perforated pipe, surrounded in free-draining material meeting the requirements of Section 9-03.12(4) Gravel Backfill for Drains of the WSDOT *Standard Specifications* (WSDOT, 2024). The drain rock should be wrapped in geotextile filter fabric meeting the requirements of Section 9-33.2(1) Tables 1 and 2 of the WSDOT *Standard Specifications* (WSDOT, 2024). The drain should be sloped to a storm drain system or another appropriate outlet. We recommend that any conveyance pipes consist of fused HDPE or equivalent material such that separation of the tightline pipe does not occur in the event of near-surface slope movement.

#### **4.5.2.3 Soldier Pile and Lagging Wall Global Slope Stability**

HWA completed global slope stability analysis in the vicinity of the proposed soldier pile section of the wall based on the soil conditions shown in Cross Section A-A' and the wall geometry shown in the 100 percent plans. Our analysis indicates that the proposed wall will possess a static factor of safety greater than 1.5 and a pseudo static factor of safety greater than 1.1 with a minimum soldier pile embedment of 20 feet below the proposed roadway grade. Pseudo-static slope failures associated with the steep slope north of the roadway are not expected to extend to the location of the proposed soldier pile wall. Under post-liquefaction conditions, we expect that displacement at the toe of the proposed wall could occur. The magnitude of displacement will depend on when liquefaction occurs during the strong shaking. If liquefaction occurs early in the earthquake strong shaking, displacements as large as 9 inches, could occur. If liquefaction occurs late during the strong shaking, displacement could be negligible. Expected liquefaction induced displacements could result in damage to the wall structure but are not expected to result in collapse of the structure or represent a threat to life safety. However, reconstruction of the wall may be required after the design earthquake. Furthermore, our analysis indicates that construction of the proposed soldier pile wall will significantly reduce anticipated post

July 22, 2024  
HWA Project No. 2023-049-21

liquefaction displacements at the location of the adjacent residential structure, compared to the current configuration.

#### **4.5.2.4 Soldier Pile Wall Construction**

Very loose to medium dense recessional outwash soils were encountered across the project site. These soils may experience caving during drilling of the proposed soldier pile elements. Therefore, we recommend that the contract documents require the contractor to assume that the use of temporary casing will be required from the proposed roadway grade to the design embedment depth of the soldier pile elements.

We expect that groundwater seepage into the shaft excavations may occur and standing water may be present at the base of the excavations prior to placement of the soldier pile elements and concrete. To facilitate displacement of the standing water, concrete should be pumped to the base of the excavation rather than end-dumped from the surface.

## **4.6 UTILITY DESIGN**

### **4.6.1 General**

Based on our subsurface investigation and the provided 100 percent plans, we understand that a variety of utilities are currently situated along the project alignment. Trenching and excavations are planned to be conducted in support of the installation of a new water line, catch basins for stormwater management, and a 2-foot-wide joint utility trench for underground fiber and cable utilities. Additionally, a sanitary sewer system extending between 67<sup>th</sup> Drive NE and 67<sup>th</sup> Avenue NE has been added between the previously submitted 60 percent plans and the current 100 percent plans. HWA understands that the improvements will run under the shared use path proposed on the south side of the roadway. Design and construction considerations for proposed utilities are provided below.

### **4.6.2 Temporary Shoring Considerations**

Based on typical construction practices, we expect that temporary shoring will likely consist of conventional trench boxes. However, it should be noted that trench boxes are designed to protect the life and safety of the workers within the excavation but may not effectively apply sufficient pressure against the excavation walls necessary to mitigate cave-ins and undermining of adjacent pavements, utilities, or other structures.

### **4.6.3 Utility Line Trenching Obstructions**

While not observed during our explorations, excavations may encounter scattered cobbles and boulders. The project specifications and cost estimate should account for the potential for encountering (and the need to remove) obstructions during utility installation.

July 22, 2024  
HWA Project No. 2023-049-21

#### **4.6.4 Utility Line Trench Caving**

Very loose to medium dense, fill and recessional outwash soils are present across the project alignment. These materials are generally unstable and will readily slough into the trench and may undermine adjacent pavements, utilities, and other structures without proper shoring. The potential for trench sidewall caving should be accounted for in the design of utilities and excavations.

#### **4.6.5 Trench Dewatering**

Limited groundwater seepage into trench excavations is expected. We expect that dewatering of any groundwater that seeps into the excavations will be able to be controlled with the use of sumps and pumps. The highest potential for encountering groundwater during utility excavation is anticipated west of Station 14+00.

We anticipate that water levels encountered at the time of excavation may be different than shown on the boring logs and will fluctuate with time of year, local rainfall, and other factors. If groundwater seepage observed is greater than anticipated, HWA should be notified to provide suitable dewatering recommendations.

#### **4.6.6 Utility Bedding Recommendations**

The bottom of utility trenches should be free of debris and standing water. If subgrade soils are disturbed, the disturbed materials should be removed down to undisturbed soils and replaced with properly placed and compacted bedding material. To minimize trench subgrade disturbance during excavation, the excavator should use a smooth-edged bucket rather than a toothed bucket. If poor-quality soils are encountered at the bottom of utility trenches, the geotechnical engineer should be notified to evaluate the conditions and provide recommendations.

Once the utility trench subgrade soils are properly prepared, pipe zone bedding should be placed. Pipe bedding should consist of Gravel Backfill for Pipe Zone Bedding, meeting the requirements of Section 9-03.12(3) of the *WSDOT Standard Specifications* (WSDOT, 2024).

Pipe bedding should provide a firm uniform cradle for support of the pipes. A minimum 12-inch thickness of bedding material beneath the pipe should be provided. Prior to installation of the pipe, the pipe bedding should be shaped to fit the lower part of the pipe exterior with reasonable closeness to provide uniform support along the pipe. Pipe bedding material should be used as pipe zone backfill and placed in layers and tamped around the pipe to obtain complete contact. To protect the pipe, bedding material should extend at least 12 inches above the top of the pipe.

July 22, 2024  
HWA Project No. 2023-049-21

#### **4.6.7 Trench Backfill Recommendations**

The native recessional outwash soils and near surface fill soils are expected to be suitable for reuse as trench backfill material along the majority of the alignment. However, near surface alluvium expected west of approximate Station 14+00 is not recommended for reuse as trench backfill. We recommend trench backfill for trenches west of Station 14+00 consist of imported backfill material.

Where imported backfill material is required, trench backfill should consist of imported, clean, free-draining, granular soils free from organic matter or other deleterious materials. Such materials should be less than 4 inches in maximum particle dimension, with less than 7 percent fines (portion passing the U. S. Standard No. 200 sieve), as specified for Gravel Borrow in Section 9-03.14(1) of the WSDOT *Standard Specifications* (WSDOT, 2024). The fine-grained portion of structural fill soils should be non-plastic.

#### **4.6.8 Trench Backfill Placement and Compaction**

Proper preparation, placement, and compaction of the trench backfill is extremely important to limit future settlement of the ground surface around structures and along trenches. Given the depth of the proposed trench, failure to achieve proper compaction could result in significant settlement on the order of several inches, resulting in distress to pavements, utilities, and other structures along the trench.

Trench backfill should be uniformly moisture conditioned to within about 3 percent of optimum moisture content prior to placement in the trench. Properly prepared backfill should be placed in successive layers with the minimum cover to be determined based on the pipe material utilized, and the following layers not exceeding 12 inches in loose thickness with each layer being compacted in a systematic manner using appropriately sized compaction equipment to achieve at least 95 percent of the maximum dry density as determined using ASTM D 1557. Smaller loose lifts may be necessary to achieve compaction where handheld compaction equipment such as jumping jacks, hoe-packs, or plate compactors are used. The contractor should develop compaction methods that consistently produce adequate compaction levels.

Full-time observation and testing of trench backfill by a representative of the geotechnical engineer is recommended to help the contractor achieve proper backfill preparation and uniform moisture conditioning, loose-lift thickness control, and application of appropriate compactive effort.

During placement of the initial lifts, the trench backfill material should not be bulldozed into the trench or dropped directly on the pipe.

July 22, 2024  
HWA Project No. 2023-049-21

#### 4.6.9 Water Main Thrust Blocks

It is our understanding that thrust blocks will be required at various locations along the water main alignment. Based on review of the subsurface soils along the water main alignment, at the depths of 3 to 6 feet bgs anticipated for the depth of the water main, we anticipate loose to medium dense fill and recessional outwash soils will be encountered. Based on the average SPT blow counts of this material, an allowable bearing pressure of 1,500 psf will be appropriate for the thrust blocks. However, unsuitable soil conditions may be encountered along the alignment including poor-quality soils. These soils would reduce the allowable bearing pressure of the thrust blocks, if left in place. We recommend that all unsuitable soils be removed from the vicinity of proposed thrust blocks.

#### 4.7 LUMINAIRE FOUNDATION RECOMMENDATIONS

We understand that proposed improvements include installation of luminaire structures and that the design would likely use the 2023 WSDOT *Standard Plans* (WSDOT, 2023) for Luminaire Foundations as shown on Sheet J-28.30-03, which consist of a 3-foot diameter shaft constructed as a drilled shaft or cast within a corrugated metal pipe that is backfilled with structural fill around the outside.

Near-surface fill soils and recessional outwash soils to the east of approximate Station 14+00 were observed to have loose to medium dense conditions that will allow for the utilization of WSDOT standard plan foundations for luminaire poles. We anticipate these deposits will provide an allowable lateral bearing pressure of 1,500 psf, such that Type B foundations could be used. However, the subsurface conditions to the west of Station 14+00 consist of very loose to loose deposits extending to 7.5 feet bgs that are not suitable for the use of WSDOT standard plan foundation designs. As a result, a non-standard design will be required. Where non-standard design is required, the estimated friction angle and the passive pressure to assume when using the Brom's method recommended in the *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* (AASHTO, 2022) are provided below in [Table 4](#).

**Table 4.**  
**Recommended Design Parameters for Luminaire Pole Foundations**  
**West of Station 14+00**

Boring	Condition	Soil Type	Depth (ft)	$\Phi$ (deg)	Kp	Moist Unit Weight (pcf)	Buoyant Unit Weight (pcf)	Factor of Safety
BH-1	Static/Pseudo-Static	Fill	0' – 3'	32	3.25	120	57.6	3
		Alluvium	3' – 10'	28	2.77	105	42.6	3
		Recessional Outwash	10' – 21.5'	36	3.85	120	57.6	3
	Post-Liquefaction	Fill	0' – 3'	32	3.25	120	57.6	3
		Alluvium	3' – 10'	28	2.77	105	42.6	3
		Recessional Outwash	10' – 21.5'	10	1.42	120	57.6	3

It should be noted that liquefiable soils exist at the proposed foundation locations near boring BH-1. The onset of liquefaction will result in the reduction in the shear strength of the potentially liquefiable soils. Therefore, additional parameters are provided for luminaries to the west of Station 14+00 for the post-liquefaction condition.

#### 4.7.1 General Construction Considerations

While not encountered in any of our explorations, the contractor should anticipate and make allowance for potential obstructions during advancement of the shaft excavations. The shaft excavations for the proposed luminaire pole locations will extend through loose soils for the various proposed locations along the project. The contractor should be prepared to case the shaft excavations. Should caving occur in shaft excavations, it may be necessary to recover ground loss through the immediate backfilling of the caved areas with CDF, followed by re-drilling of the shaft(s) after the CDF has set sufficiently.

Near surface fill soils varied greatly in their composition and consistency. We recommend that the near surface soils within the vicinity of the proposed luminaires be compacted in accordance with [Section 4.11.2](#) and be verified by a representative of the geotechnical engineer.

Drilled shaft bottoms should be cleaned to the extent practical using appropriate methods. Minor groundwater flows in the form of perched groundwater may seep into shaft excavations throughout the project alignment. Where groundwater seepage is encountered and standing water is present at the base of the excavation, concrete should be pumped directly to the base of the excavation rather than end-dumped from the surface, to facilitate displacement of the standing water.

July 22, 2024  
HWA Project No. 2023-049-21

## 4.8 EVALUATION OF INFILTRATION POTENTIAL OF SITE SOILS

### 4.8.1 Feasibility of Using Infiltration

The feasibility of using infiltration as part of the stormwater management for this site was evaluated in accordance with Chapter 3 of the 2008 City of Arlington *Design and Construction Standards and Specifications* (CoA, 2008), which utilizes the 2019 Washington State Department of Ecology *Stormwater Management Manual for Western Washington (SWMMWW: DOE, 2019)* for design of infiltration systems. The use of infiltration in the design of these facilities is outlined below.

### 4.8.2 Design Infiltration Rate

The method of estimating infiltration rates based on material properties, adopted from the WSDOT publication, *A Design Manual for Sizing Infiltration Ponds* (Massmann, 2003), uses grain size distribution data to determine initial saturated hydraulic conductivity.

The correction factors used are based on the recommendations from the 2019 *SWMMWW* and are summarized below:

- Test Method ( $F_t$ ) – 0.4 for the grain-size analysis method:
- Variability ( $F_v$ ) – 0.33 based on number of locations and site variability: and
- Clogging ( $F_m$ ) – 0.9 for degree of influent control to prevent siltation and bio-buildup.

The results of the grain size method to determine the design infiltration rate are shown below in [Table 5](#).

July 22, 2024

HWA Project No. 2023-049-21

**Table 5.**  
**Results of Preliminary Grain Size Screening**

Boring		BH-1	BH-1	BH-5	BH-5	BH-6	BH-6
Depth	ft	3.2	5	2.5	5	2.5	5
USCS Classification		SM	SM	SM	SM	SW-SM	SM
CF <sub>i</sub> <sup>1</sup>		0.4	0.4	0.4	0.4	0.4	0.4
CF <sub>v</sub> <sup>2</sup>		0.33	0.33	0.33	0.33	0.33	0.33
CF <sub>m</sub> <sup>3</sup>		0.9	0.9	0.9	0.9	0.9	0.9
Correction Factor		0.1188	0.1188	0.1188	0.1188	0.1188	0.1188
K <sub>sat</sub>	in/hr	1.96	2.61	2.39	10.29	5.35	13.84
	cm/s	0.0014	0.0018	0.002	0.007	0.004	0.010
K <sub>des</sub>	in/hr	<b>0.233</b>	0.310	<b>0.284</b>	1.223	<b>0.635</b>	1.644
D <sub>10</sub>	mm	0.010	0.009	0.007	0.020	0.011	0.029
D <sub>60</sub>	mm	0.072	0.080	0.078	0.231	0.232	0.276
D <sub>90</sub>	mm	0.138	0.144	0.183	0.789	1.075	0.837
f <sub>finest</sub>	%	62.9%	56.8%	58.4%	28.8%	41.5%	23.5%
Notes:		1 – Testing: Uncertainty of Test Method					
		2 – Geometry: Site Variability and Number of Locations Tested Factor					
		3 – Clogging: Degree of influent control to prevent siltation and bio-buildup <b>BOLD - Limiting infiltration rate at each boring</b>					

#### 4.8.2.1 Infiltration Feasibility Near Steep Slopes

The majority of the project alignment is positioned along the crest of a steep slope. Introduction of infiltration stormwater near the crest of the steep slope could result in the development of groundwater seepage along the slope and lowering of the stability of the steep slope. Therefore, we do not recommend the use of onsite infiltration within close proximity of the steep slopes. We recommend that all proposed infiltration facilities be set back a minimum of 50 feet from the crest of all steep slopes, per the City of Arlington standards. This setback requirement precludes the construction of infiltration facilities along the northern side of the roadway for the entire length of the alignment. It also precludes the construction of infiltration facilities within the roadway ROW between Stations 12+00 and 17+00.

#### 4.8.2.2 Infiltration Feasibility Near SR 530

Explorations and laboratory testing associated with soils near SR 530 (BH-1) showed infiltration rates of approximately 0.23 in/hr. However, the 2008 City of Arlington Design and Construction Standards and Specifications states that the rates need to be at least 0.5 in/hr; a deviation would need to be requested from the City if infiltration is desired to be used at this location.

July 22, 2024  
HWA Project No. 2023-049-21

Furthermore, boring BH-1 was drilled during the dry summer months and the groundwater table was observed at a height of approximately 11.5 ft. bgs.

According to the City of Arlington *Design and Construction Standards and Specifications*, a minimum of 3 feet of separation needs to be maintained between the base of the facility and the maximum seasonal high water level. Based on our collected groundwater readings during the wet weather season, we anticipate a minimum of 4.5 feet of separation will be maintained. Therefore, we do not anticipate a mounding analysis will need to be conducted.

#### **4.8.2.3 Infiltration Feasibility along Upland Portions of the Alignment**

Our explorations, laboratory testing, and analysis suggest that the recessional outwash soils east of Station 17+00 are conducive to the use of onsite infiltration. The near-surface fill soils possess limited infiltration capacity. We recommend that any proposed infiltration facility installed in this area be installed with the base of the facility at a minimum depth of 5- to 7-feet below ground surface. Our explorations suggest that this minimum depth would place the base of the proposed facilities below the bottom of the fill soils. The depth of infiltration facilities should be verified in the field to ensure that the fill soils have been fully penetrated and the facility is constructed with the base in the recessional outwash soils. Additionally, to avoid adverse impacts to the adjacent steep slope, we recommend that infiltration facilities not be installed within 50 feet of the crest of the steep slope. Therefore, we expect infiltration facilities would need to be constructed on the south side of the existing roadway. Infiltration facilities installed below a depth of 5- to 7-feet bgs and on the south side of the roadway can be designed using a design infiltration rate of 1.25 in/hr.

#### **4.8.3 Subgrade Preparation for Infiltration Facilities**

Prior to installation of infiltration facilities, the subgrade should be cut to the base of the infiltration facility. Once the soil is cut to the base of the facility, the exposed soils should be observed by the geotechnical engineer, or their representative, to confirm that they are similar to materials tested for the infiltration analyses. Given the variability of site soils, the depth of the receptor soil may differ across the alignment. The existing subgrade under areas used for infiltration **should not** be compacted or subjected to excessive construction equipment traffic prior to placement of coarse aggregate bed. Where erosion of subgrade occurs during construction and has caused accumulation of fine materials and/or surface ponding, this material shall be removed with light equipment and the underlying soils scarified to a minimum depth of 8 inches. Once prepared, the geotechnical engineer should inspect the subgrade to verify that it is suitable to provide the recommended infiltration rates.

July 22, 2024  
HWA Project No. 2023-049-21

#### **4.8.4 Design Considerations for Infiltration Facilities**

It is our understanding that bioswales are being considered for infiltration facilities. Based on the *SWMMWW*, grain size analysis is allowed for non-glacially consolidated soils. Due to the presence of recessional outwash, which is not considered glacially consolidated, the use of grain size analysis to determine the design infiltration rate is appropriate for this project site.

#### **4.9 CATTLE UNDERCROSSING**

A cattle undercrossing of 211<sup>th</sup> Place exists below the roadway between approximate Stations 22+50 and 23+00. The undercrossing structure extends under the roadway at a slight skew and the ends of the structure have been filled. We understand that city staff uncovered a portion of the northern entrance to the structure and observed it was partially filled with debris. HWA is unsure if the cattle undercrossing was installed prior to the construction of the original concrete roadway or if a portion of the concrete roadway was removed to install the undercrossing. HWA did not drill directly over the undercrossing structure, as we did not expect to be able to drill through the structure or get useful geometric information. Therefore, we do not know if concrete pavement panels are present over the structure. Existing subsurface utilities are present along the east bound travel lane in the vicinity of the undercrossing structure. This suggests that portions of the southern end of the undercrossing structure may have already been removed to allow for utility installation.

We expect that construction of the proposed improvements will result in some special conflicts with the undercrossing structure. Therefore, addressing the presence of the structure and ensuring it does not negatively affect the longevity of the proposed improvements will be required.

##### **4.9.1 Cattle Crossing Options**

There are several options with respect to how to address the presence of the existing cattle undercrossing. These options include doing nothing, filling the structure with CDF and leaving it in place, removing the structure lid and filling it with CDF, and completely removing the structure. Each of these options is described below.

###### **4.9.1.1 Do Nothing**

The City and the design team could choose to leave the undercrossing structure in its current condition. This option would leave the structure and associated void below the roadway. Leaving the structure in place would be the cheapest option but could result in deterioration (up to collapse) sometime in the future. We expect that portions of the southern half of the structure have already been modified to allow for past subsurface utility installation. The extent of these modifications is not known. It is possible that additional modifications will be required to install utilities proposed as part of this project. Planning to leave the structure in place could result in

July 22, 2024  
HWA Project No. 2023-049-21

unforeseen conflicts and additional cost during installation of the proposed utilities. We would not recommend leaving the undercrossing in its current configuration.

#### **4.9.1.2 Fill the Structure with Controlled Density Fill**

This option would involve exposing one of the ends of the structure and pumping CDF into the void space of the undercrossing structure. To estimate the volume of CDF, the geometry of the structure would need to be determined. This option would prevent future catastrophic collapse of the structure. However, it is possible that the debris filling the structure could deteriorate over time and result in additional voids. With this option, the undercrossing structure would remain in place, no excavation work would be required, and no traffic lane closures would be needed. This option would be better than doing nothing with the undercrossing structure. However, it could result in some challenges during construction of proposed utilities.

#### **4.9.1.3 Remove the Lid and Fill Void**

This option would involve exposing the lid of the structure, breaking the structure open, and filling the void with CDF or structural fill. This option would require a full closure of the roadway but would make filling the structure easier than the previous option. Two available options are to saw cut the structure or simply break it open using an excavator. We would recommend that the lid of the structure and the walls of the structure, down to a depth that would allow for future utility installation, be removed. Existing debris within the structure should be removed prior to backfilling with CDF or structural fill. This option would still maintain a portion of the structure but would eliminate any voids that may be causing the pavement issues.

#### **4.9.1.4 Completely Remove the Structure**

This option would excavate around the structure and demolish it completely. This would require the largest excavation and the most structural fill import. However, this option would result in no structure remaining that could be in conflict with future improvements along the corridor.

### **4.9.2 Preferred Option**

It is our understanding that the design team and the City have chosen to remove the lid and upper portion of the undercrossing structure and backfill the excavation. This will require the contractor to expose the upper portions of the structure, saw cut or break up the structure lid and portion of the walls, remove debris from within the structure, and backfill the excavation and structure with compacted structural fill. With this option, the undercrossing foundations will remain in place. We recommend the design team identify the geometry and thickness of the structure walls and lid to provide prospective contractors with the most information possible. We also recommend that the structure be removed to a depth that is below the elevation of possible future utility installation. This will prevent the foundations being encountered during future construction projects.

July 22, 2024  
HWA Project No. 2023-049-21

#### 4.10 PAVEMENT REPAIR RECOMMENDATIONS

The existing pavement along the project alignment is deteriorating. The cause of the deterioration is due to a combination of the age of the HMA wearing surface, isolated failures associated with the adjacent steep slope, and poor subgrade conditions caused by insufficient compaction along utility trenches. We recommend a multipronged approach to addressing the pavement reconstruction along the alignment. We recommend the following improvements be made.

- **Above the Existing Concrete Panels:** HWA evaluated the findings from our pavement cores and site reconnaissance and have determined PCC panels are present below portions of the roadway alignment. Our explorations encountered PCC panels that extend through the westbound lane into the very inner edge of the eastbound lane. The exact extent of the PCC panels is not known. However, we have inferred that the extent is likely similar along the alignment.

In areas of existing PCC panels, we recommend a 3-inch grind of the existing HMA and an inlay of 3-inches of Kevlar fiber-reinforced HMA. The Kevlar fiber-reinforced HMA will help mitigate the occurrence of reflective cracking from the underlying PCC panels. This is further discussed in [Section 4.10.1](#).

- **Pavement Outside the Existing Concrete Panels:** Pavement outside of the limits of the existing concrete panels will require complete reconstruction due to the severity of existing distresses and the insufficient thickness to accommodate the anticipate traffic. We recommend the reconstructed pavement section consists of 7 inches of HMA over 7 inches of CSBC. This is further discussed in [Section 4.10.2](#).
- **Areas of Slope-Related Distress:** In the area of observed slope-related distress, stabilization of the slope crest will be required. This corresponds to approximate Stations 15+50 to 16+00. Stabilization of the slope crest will include removal of the existing pavement section, removal of the failing subgrade soils and soils extending down the slope, placement of high shear-strength aggregate, and reconstruction of the pavement section. This is further discussed in [Section 4.10.3](#).

##### 4.10.1 Pavement Grind and Overlay Above Existing Concrete Panels

Based on the results of pavement coring, we recommend that pavement rehabilitation in areas underlain by existing concrete panels consist of grinding 3 inches of HMA and replacing with 3 inches of Kevlar fiber-reinforced HMA to minimize reflective cracking and provide a longer-lasting pavement surface. It is extremely important that a proper bond be provided between the new overlay and HMA below by sweeping the surface after grinding and the proper application of tack coat prior to paving. We recommend that HMA for reconstruction and rehabilitation consist of HMA Class ½-inch and PG 58H-22 binder.

July 22, 2024  
HWA Project No. 2023-049-21

#### **4.10.1.1 HMA Design Considerations**

The following design considerations should be noted and implemented:

- The longitudinal joints in the HMA wearing course should coincide with a lane line or an edge line.
- Where pavement repair is called for in conjunction with the HMA overlay, construction of the wearing course for both the HMA overlay and repair areas should be placed as the final stage of the paving operation.
- The pavement will likely require a functional overlay after about 15 years because of non-structural associated distress caused by environmental factors such as degradation of the asphalt surface.
- HMA pavements are susceptible to shoving and rutting from heavy vehicles, such as buses and heavy delivery trucks, particularly at intersections. In these areas, more frequent maintenance and even premature reconstruction of the pavement may be required; however, the use of fiber-reinforced HMA will help mitigate this.

#### **4.10.2 Pavement Design Recommendations Outside of Concrete Panels**

The HMA pavement outside of the area underlain by PCC panels, or areas where the concrete panels have been removed as part of construction, will require a new pavement section. We recommend that the proposed pavement section be constructed using HMA. The following sections present our design recommendations for new HMA pavement.

##### **4.10.2.1 Design Traffic Parameters**

Traffic design parameters were provided by SCJ Alliance, consisting of Average Daily Traffic (ADT) values from August 28 to September 11, 2020 and number of vehicles per FHWA vehicle classification between August 28, 2020 and September 15, 2020 (15 days of counts). The data was separated into the 13 FHWA vehicle classification and appears to consist of a summation of both eastbound and westbound lanes. We assigned a typical ESAL/vehicle classification to develop design parameters and used a 2% traffic volume growth rate per year and a 15-year design life as recommended by the city.

Using these parameters, an ESAL value of 3,423,334 ESALs was calculated. A value of 3,500,000 ESALs was used for design.

The pavement recommendations presented in this report are based on these traffic calculations. If additional traffic count information is obtained that varies appreciably from these values, the recommendations given in this report should be reviewed and revised as necessary.

July 22, 2024

HWA Project No. 2023-049-21

#### 4.10.2.2 New Hot Mix Asphalt Pavement Design

Table 6 provides our new HMA design recommendations, assuming the traffic loading described above. This pavement design is based on the design method presented in the 1992 AASHTO Design Guide (AASHTO, 1992) using the following parameters:

- Reliability = 90%
- Initial Serviceability = 4.5
- Terminal Serviceability = 3.0
- Overall Standard Deviation = 0.50
- Subgrade Resilient Modulus = 10 ksi

These values result in a required AASHTO Structural Number (SN) of 4.0.

**Table 6.**  
**Structure Requirements for New HMA Pavement – 15-Year Design Life**

Material Description	Minimum Layer Thickness (inches)	WSDOT Standard Specification
HMA	7	5-04 & 9-02.1
CSBC	7	9-03.9(3)

We recommend that the asphaltic layers consist of HMA Class ½-inch. Recommendations are presented below for subgrade preparation and structural fill placement and compaction for pavement reconstruction.

The pavement will likely require periodic maintenance. Cracks larger than 1/4-inch in width should be sealed periodically. The pavement will likely require a functional overlay after about 15 years because of non-structural distresses caused by environmental factors such as degradation of the asphalt surface.

#### 4.10.3 Pavement Design Recommendations in Areas of Slope-Related Pavement Distressed

Where slope failures can be observed through the existing pavement surface, slope reconstruction will be required. During our site reconnaissance, extensive pavement distress indicative of a slope failure was observed along the outside edge of the westbound travel lane between Station 15+50 to 16+00. Reconstruction of this area will be required to prevent future pavement failures.

##### 4.10.3.1 Subgrade Preparation in Areas of Distressed Pavement

Once the existing pavement section has been removed, an additional 3 feet of subgrade material should be excavated below the roadway surface. The excavation should extend down the slope to the maximum extent that the excavator can reach. The base of the excavation, extending

July 22, 2024  
HWA Project No. 2023-049-21

down the slope, should be benched. The excavation should be monitored by an HWA geotechnical engineer to verify that all failing soil has been removed.

Once the excavation is completed, the sloped portion of the excavation and the lower 1-foot of the roadway excavation should be backfilled with 4- to 8-inch quarry spalls meeting the requirements of Section 9-13.1(5) of the *WSDOT Standard Specifications* (WSDOT, 2024). Once the quarry spalls are in place, a geosynthetic separator fabric, meeting the requirements of Section 9-33.2(1), Table 3, of the *WSDOT Standard Specifications* should be placed across the top of the spalls underlying the roadway. The separator fabric will prevent migration of CSBC fill into the voids of the quarry spalls. CSBC should be placed over the separator fabric, to the base of the new pavement section.

#### **4.10.3.2 New HMA Pavement Design**

The pavement section in the area of observed slope distress should be constructed in accordance with the recommendations for the Areas Outside of Concrete Panels, as specified in [Section 4.10.2](#).

#### **4.10.4 General Pavement Construction Considerations**

We recommend that the pavement rehabilitation start with the excavation of the existing pavement section outside of the concrete panel. This will allow the contractor to excavate below the depth of the panel and find the lateral extent along the alignment. After the new pavement section is placed, the contractor will continue with the grind and overlay of the HMA over the PCC as well as the replacement of the concrete panels in the areas of slope-related pavement distress.

##### **4.10.4.1 Construction of New Pavement Section Adjacent to Existing Section**

Per the recommendations provided in this report, the areas outside of the concrete panels will be excavated to depths of approximately 14 inches below proposed roadway surface. Based on our subsurface explorations and pavement cores, we observed a gravel subgrade layer placed below the HMA but above the PCC panels, with thickness up to 12.5 inches. We anticipate that the excavation for the new pavement section will extend below the depth of this gravel layer and will cause unraveling of this gravel material, resulting in the undermining of the existing HMA pavement section, as shown on [Figures 6A through 6D](#). If this section is undermined, the proposed grind and overlay will not be considered suitable. Therefore, we recommend that a portion of the HMA be excavated beyond the joint and replaced with the new pavement section, per recommendations in [Section 4.10.2](#).

The extent of the setback is dependent on the thickness of the gravel subgrade layer. We anticipate the site can be divided into areas in which no setback is required and which a 2-foot setback is required. The gravel material present between the base of the existing HMA and existing PCC should be sloped at a maximum of a 1H:1V (horizontal:vertical). A schematic

July 22, 2024  
HWA Project No. 2023-049-21

detail showing the existing and proposed cross sections at each of our core locations is shown on [Figures 6A through 6D](#). Based on our pavement cores and subsurface explorations, we anticipate the roadway to the east of Station 21+50 will not require a setback and to the west of Station 21+50 will require a 2-foot setback. It should be noted that the transition in gravel thickness may be gradual or immediate. Therefore, the exact location where the setback changes between no setback and 2-foot may differ from anticipated. Therefore, a representative of the geotechnical engineer should be present during excavation to verify the setback required.

#### **4.10.4.2 HMA Binder Selection**

The selection of the optimum asphalt binder type for the prevailing climate is critical to ensure long-term pavement performance. Use of the wrong binder can result in low temperature cracking or permanent deformation at high temperatures.

Based on the climate in Arlington and traffic loading, we recommend Superpave Performance Grade binder PG 58H-22 be used for pavement reconstruction and pavement overlays in order to provide greater resistance to potential pavement distresses.

#### **4.10.4.3 Placement of HMA**

Placement of HMA should be in accordance with Section 5-04 of the WSDOT *Standard Specifications* (WSDOT, 2024). Particular attention should be paid to the following:

- HMA should not be placed until the engineer has accepted the previously constructed pavement layers.
- HMA should not be placed on any frozen or wet surface.
- HMA should not be placed when precipitation is anticipated before the pavement can be compacted, or before any other weather conditions that could prevent proper handling and compaction of HMA.
- HMA should not be placed when the average surface temperatures are less than 45° F.
- HMA temperature behind the paver should be in excess of 240° F. Compaction should be completed before the mix temperature drops below 180° F. Comprehensive temperature records should be kept during the HMA placement.
- Sufficient tack coat must be applied uniformly and allowed to break and set before placing HMA above an existing HMA layer in order to create a strong bond between layers. The surface of the pavement should be thoroughly cleaned prior to tack coat application. Improper tack coat application can cause unbonded layers and will lead to premature pavement distress/failure.

July 22, 2024

HWA Project No. 2023-049-21

- For cold joints, tack coat should be applied to the edge to be joined and the paver screed should be set to overlap the first mat by 1 to 2 inches.

#### **4.10.4.4 Subgrade Preparation**

Site preparation for pavement repair areas should begin with the excavation of all existing materials down to a depth sufficient to accommodate the new structure. The exposed soils should be thoroughly compacted and evaluated by a geotechnical engineer or qualified earthworks inspector. If loose, pumping, or otherwise unsuitable soils are encountered at the bottom of the pavement section, they should be over-excavated as directed by the geotechnical engineer and backfilled using CSBC per the recommendations in the following section.

#### **4.10.4.5 Pavement Base Course and Compaction**

Imported structural fill for pavement base course and areas of over-excavation, should consist of CSBC, as described in Section 9-03.9(3) of the *Standard Specifications* (WSDOT, 2024).

Pavement base course and over-excavation backfill should be placed in loose, horizontal, lifts of not more than 8 inches in thickness and compacted to at least 95% of the maximum dry density, as determined using test method ASTM D 1557 (Modified Proctor). At the time of placement, the moisture content of structural fill should be at or near optimum. The procedure required to achieve the specified minimum relative compaction depends on the size and type of compaction equipment, the number of passes, thickness of the layer being compacted, and the soil moisture-density properties.

When the first fill is placed in a given area, and/or anytime the fill material changes, the area should be considered a test section. The test section should be used to establish fill placement and compaction procedures required to achieve proper compaction. The geotechnical engineer should observe placement and compaction of the test section to assist in establishing an appropriate compaction procedure. Once a placement and compaction procedure is established, the contractor's operations should be monitored, and periodic density tests performed to verify that proper compaction is being achieved.

Generally, loosely compacted soils result from poor construction technique or improper moisture content. Soils with a high percentage of silt or clay content are particularly susceptible to becoming too wet, and coarse-grained materials easily become too dry, for proper compaction. Silty or clayey soils with a moisture content too high for adequate compaction should be dried, as necessary, or moisture conditioned by mixing with drier materials, or other treatment methods. For coarse-grained structural fill soils, moisture conditioning by sprinkling before and during compaction is sometimes required to achieve the required relative compaction.

#### **4.10.4.6 Pavement Drainage**

It is essential to the satisfactory performance of the roadway that good drainage is provided to prevent water ponding on or alongside, or accumulating beneath, the pavement. Water ponding

July 22, 2024  
HWA Project No. 2023-049-21

can cause saturation of the pavement and subgrade layers and lead to premature failure. The base layers and subgrade surface should be graded to prevent water being trapped within the layer. The surface of the pavement should be sloped to convey water from the pavement to appropriate drainage facilities.

## **4.11 GENERAL EARTHWORK**

### **4.11.1 Structural Fill**

We anticipate that the onsite native soils can be reused as structural fill for this project. However, due to the depositional nature of the near-surface soils, the composition may vary from those encountered in our explorations. If the native soils are observed to not meet the requirements provided below, imported structural fill may be required. Structural fill should consist of imported clean, free-draining, granular soils free from organic matter or other deleterious materials. Such materials should be less than 4 inches in maximum particle dimension, with less than 7 percent fines (portion passing the U.S. Standard No. 200 sieve), as specified for Gravel Borrow in Section 9-03.14(1) of the 2024 WSDOT *Standard Specifications*. The fine-grained portion of structural fill soils should be non-plastic.

### **4.11.2 Compaction**

Structural fill soils should be moisture conditioned and compacted to the requirements specified in Section 2-03.3(14), Method C, of the 2024 WSDOT *Standard Specifications*, except that maximum dry densities should be obtained using ASTM D 1557 (Modified Proctor). Achievement of proper density of a compacted fill depends on the size and type of compaction equipment, the number of passes, thickness of the layer being compacted, and soil moisture-density properties. In areas where limited space restricts the use of heavy equipment, smaller equipment can be used, but the soil must be placed in thin enough layers to achieve the required relative compaction.

### **4.11.3 Temporary Excavation**

We expect that excavations completed onsite can be accomplished with conventional excavating equipment such as trackhoes. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. In accordance with Part N of Washington Administrative Code (WAC) 296-155, latest revisions, all temporary cuts in excess of 4 feet in height must be either sloped or shored prior to entry by personnel.

Fill, Alluvium, and Recessional Outwash soils are generally classified as Type C Soils per WAC 296-155. Where no temporary shoring is used, excavations in Type C Soil should be sloped no steeper than 1.5H:1V. Flatter slopes will be required where groundwater seepage exists.

July 22, 2024  
HWA Project No. 2023-049-21

The contractor should be responsible for control of groundwater and surface water and should employ sloping, slope protection, ditching, sumps, dewatering, and other measures as necessary to prevent sloughing of soils.

#### **4.11.4 Wet Weather Earthwork**

During periods of wet weather, even the most permeable soils can become difficult to work and compact. We anticipate considerable variability in the fines content of the native soils. Soils with higher fines content will be difficult to work and compact when wet. If fill is to be placed or earthwork is to be performed in wet weather or under wet conditions, the following recommendations apply:

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation of unsuitable and/or softened soil should be followed promptly by placement and compaction of clean structural fill. The size and type of construction equipment used may need to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic.
- Material used as excavation backfill in wet weather should consist of clean granular soil with less than 5 percent passing the U.S. No. 200 sieve, based on wet sieving the fraction passing the ¾-inch sieve. The fines should be non-plastic. It should be noted this is an additional restriction on the structural fill materials specified.
- The ground surface within the construction area should be graded to promote surface water run-off and to prevent ponding.
- Within the construction area, the ground surface should be sealed on completion of each shift by a smooth drum vibratory roller, or equivalent, and under no circumstances should soil be left uncompacted and exposed to moisture infiltration.
- Excavation and placement of backfill materials should be monitored by a geotechnical engineer experienced in wet-weather earthwork to determine that the work is being accomplished in accordance with the project specifications and the recommendations contained herein.

## **5.0 CONDITIONS AND LIMITATIONS**

We have prepared this final geotechnical report for the City of Arlington and SCJ Alliance for use in design for this project. The conclusions and interpretations presented in this report should not be construed as our warranty of subsurface conditions at the site. Experience has shown that soil and groundwater conditions can vary significantly over small distances and with time.

July 22, 2024  
HWA Project No. 2023-049-21

Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study of this scope and nature. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HWA should be notified for review of the recommendations of this report, and revision of such if necessary.

Within the limitations of scope, schedule and budget, HWA attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology in the area at the time the report was prepared. No warranty, express or implied, is made.

HWA does not practice or consult in the field of safety engineering. We do not direct the contractor's operations and cannot be responsible for the safety of personnel other than our own on the site. As such, the safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered unsafe.



We appreciate the opportunity to provide geotechnical services on this project. Should you have any questions or comments, or if we may be of further service, please do not hesitate to call.

Sincerely,

HWA GEOSCIENCES INC.

Steven R. Wright, P.E.  
Geotechnical Engineer, Vice President



Sean Schlitt, P.E.  
Geotechnical Engineer

July 22, 2024  
HWA Project No. 2023-049-21

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July 22, 2024

HWA Project No. 2023-049-21

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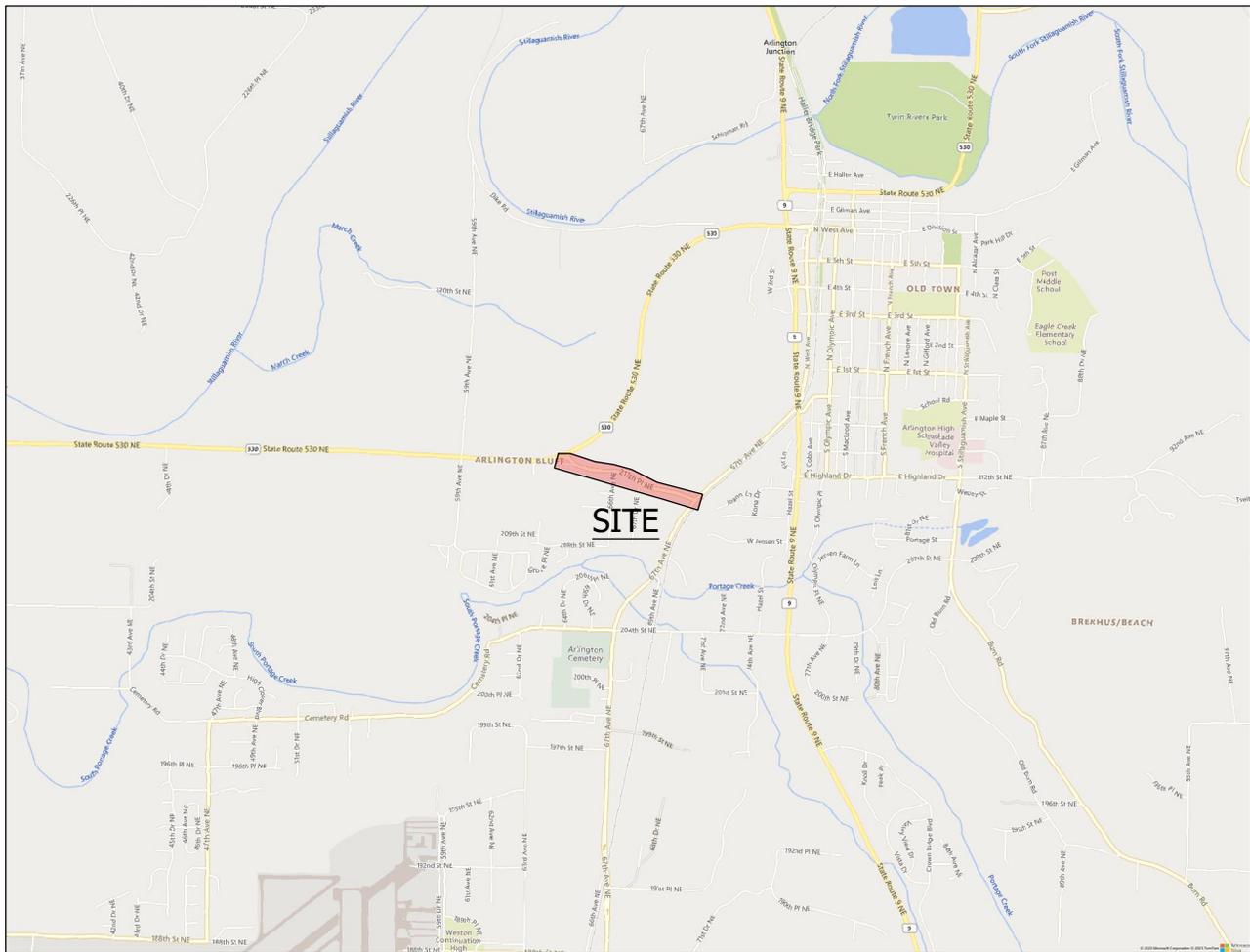
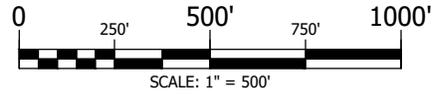
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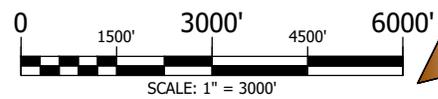
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SITE MAP



VICINITY MAP



SITE AND VICINITY MAP

211TH PLACE CORRIDOR IMPROVEMENTS PROJECT  
ARLINGTON, WASHINGTON

FIGURE NO.:

1

DRAWN BY: CHECK BY:  
CF SKS

PROJECT #  
2023-049-21



MATCHLINE SEE 2B



211TH PL NE  
Scale: 1" = 40'-0"

**EXPLORATION LEGEND**

- BH-6  BOREHOLE DESIGNATION AND APPROXIMATE LOCATION
- C-4  CORE DESIGNATION AND APPROXIMATE LOCATION



211TH PLACE CORRIDOR  
IMPROVEMENTS PROJECT  
ARLINGTON, WASHINGTON

SITE &  
EXPLORATION PLAN

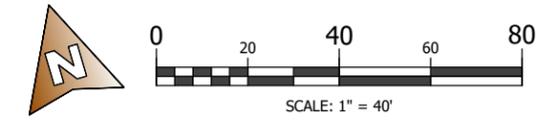
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**211TH PL NE**  
 Scale: 1" = 40'-0"

**EXPLORATION LEGEND**

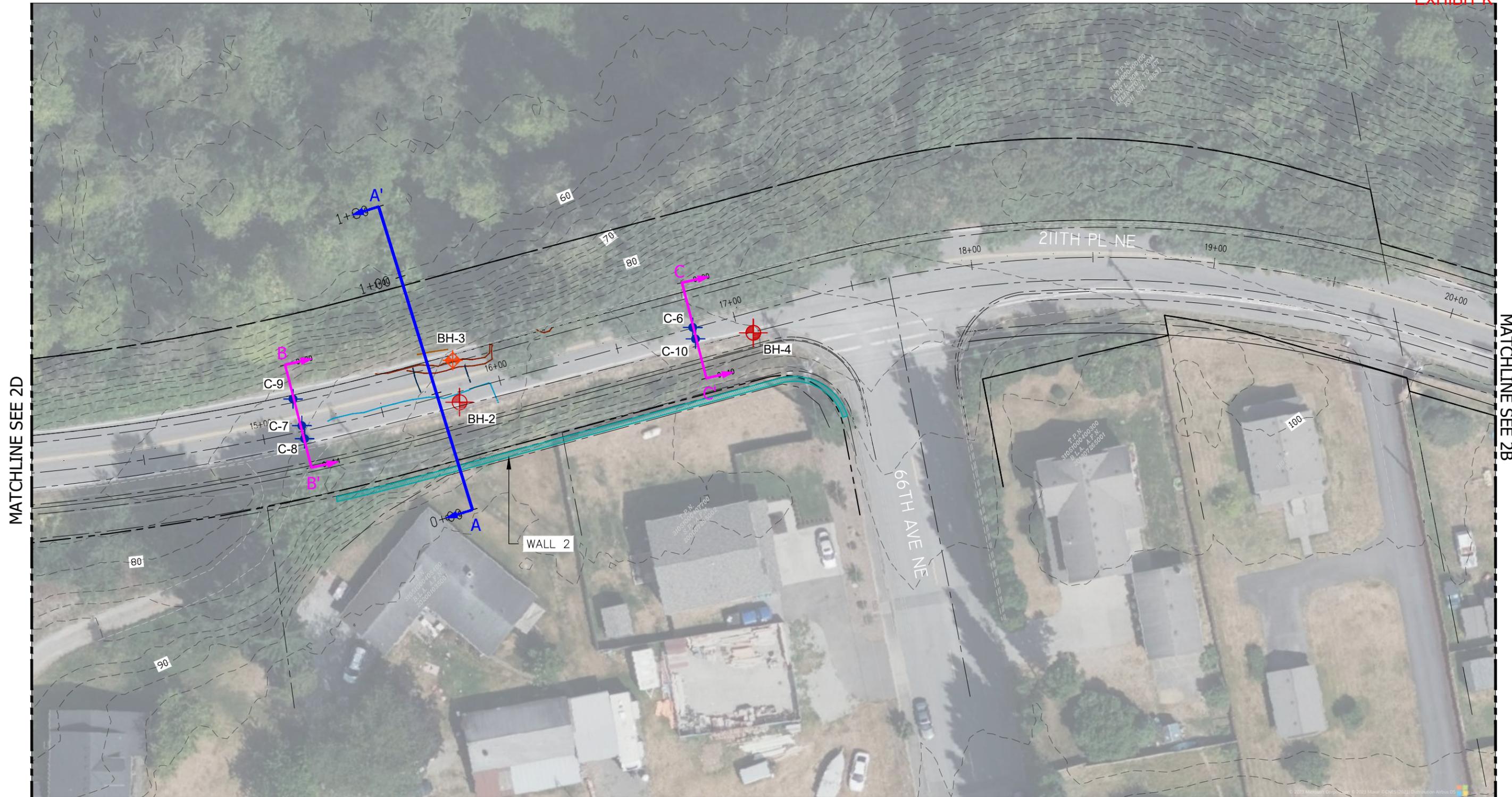
- BH-5 MONITORING WELL DESIGNATION AND APPROXIMATE LOCATION
- C-1 CORE DESIGNATION AND APPROXIMATE LOCATION



211TH PLACE CORRIDOR  
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SITE &  
 EXPLORATION PLAN

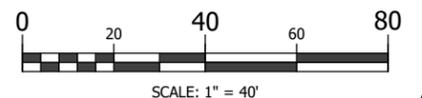
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**EXPLORATION LEGEND**

- BH-2 BOREHOLE DESIGNATION AND APPROXIMATE LOCATION
- BH-3 PROPOSED BOREHOLE DESIGNATION AND APPROXIMATE LOCATION
- C-6 CORE DESIGNATION AND APPROXIMATE LOCATION
- ARCUATE CRACKING
- TRANSVERSE CRACKING
- LONGITUDINAL & ALLIGATOR CRACKING
- EDGE OF OLD ROAD
- RETAINING WALL

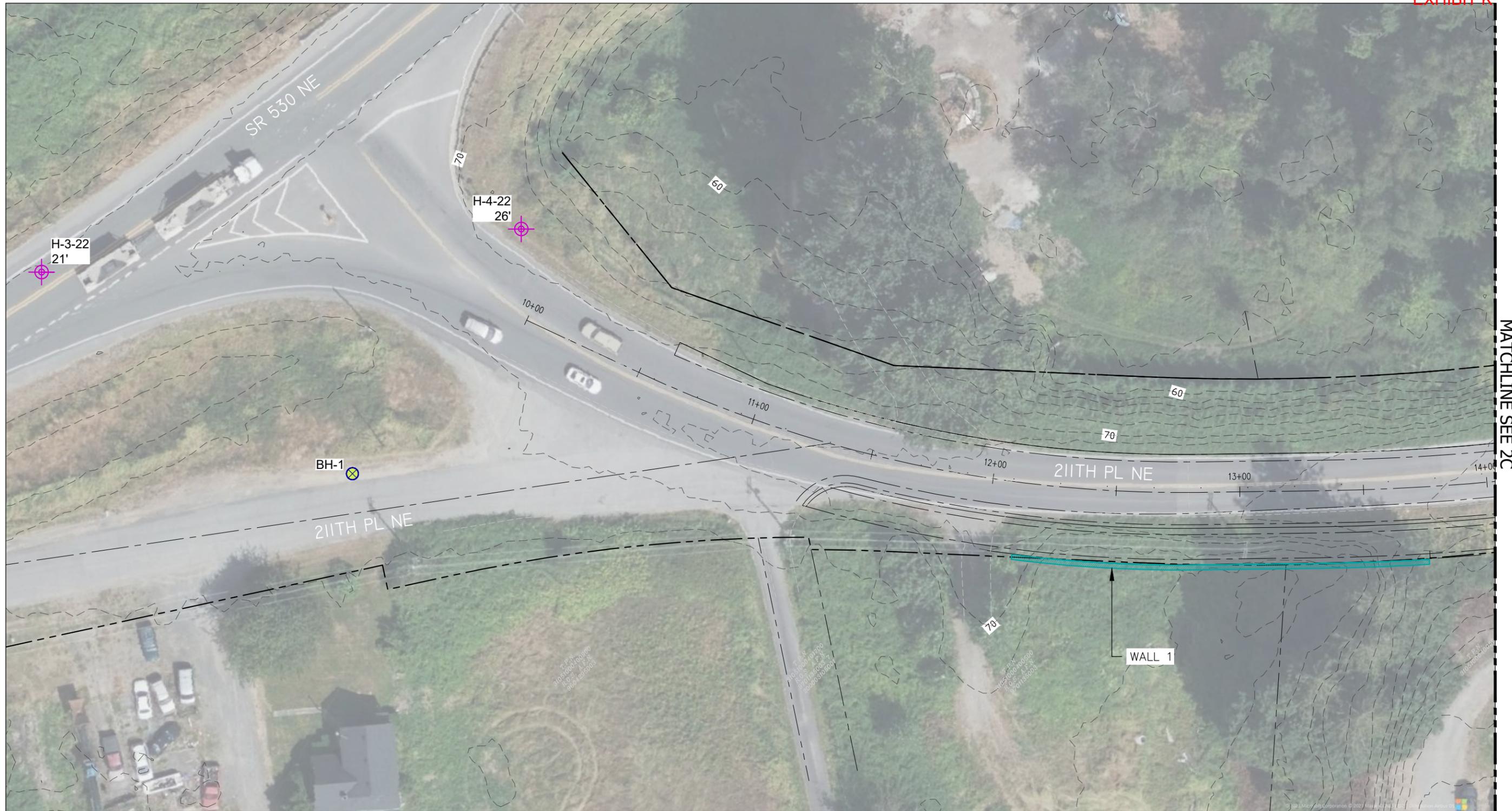
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**211TH PLACE CORRIDOR  
IMPROVEMENTS PROJECT  
ARLINGTON, WASHINGTON**

**SITE &  
EXPLORATION PLAN**

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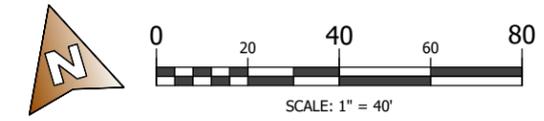


MATCHLINE SEE 2C

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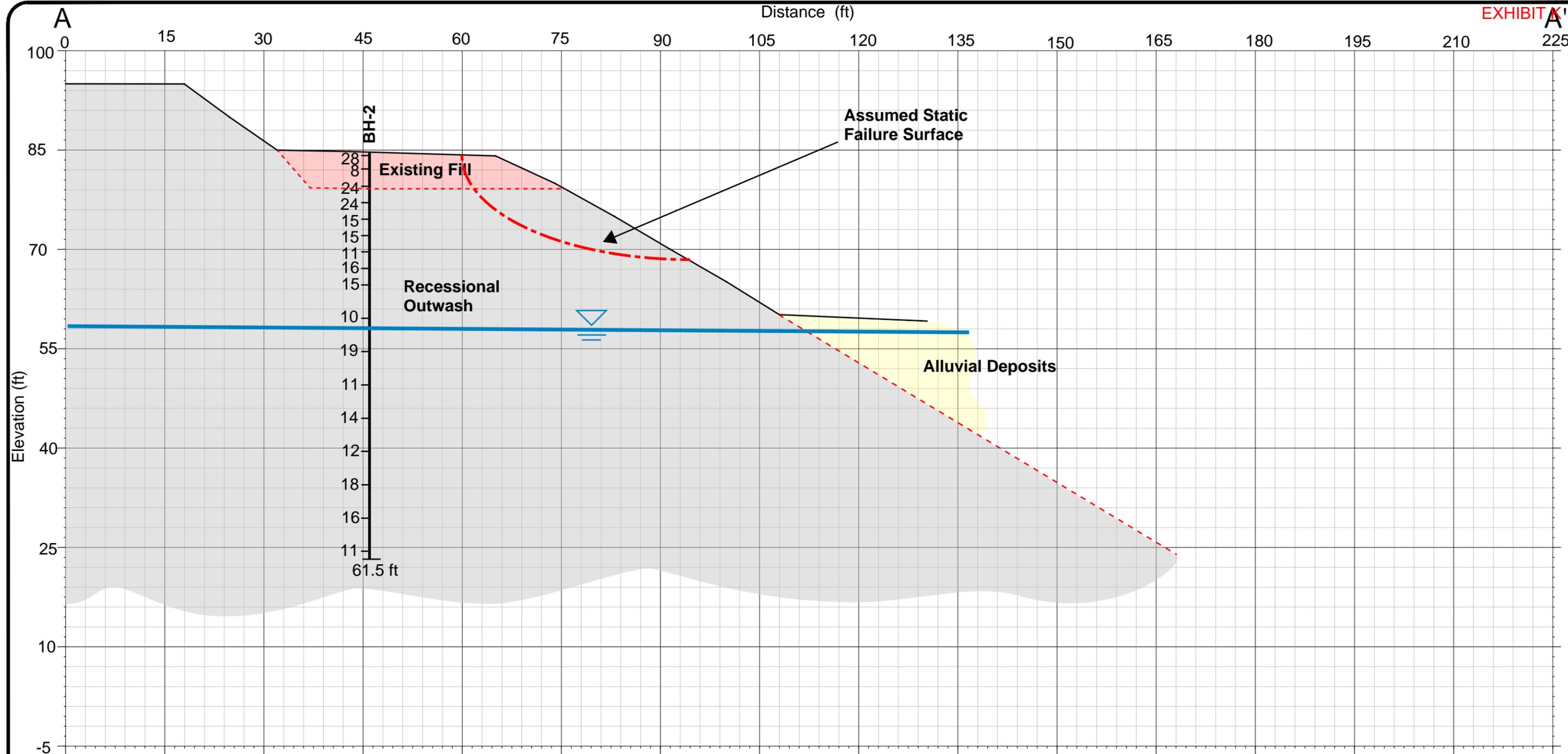
- BH-1  MONITORING WELL DESIGNATION AND APPROXIMATE LOCATION
- H-3-22 21'  BOREHOLE DESIGNATION AND APPROXIMATE LOCATION (WSDOT, 2022)
-  RETAINING WALL



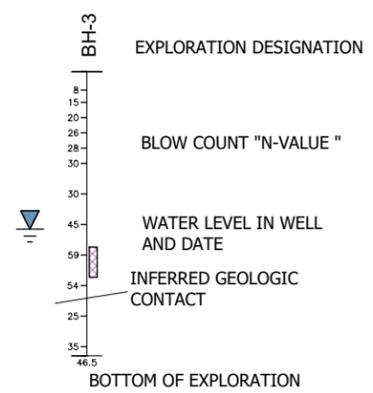
211TH PLACE CORRIDOR  
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SITE &  
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**BORE LEGEND**

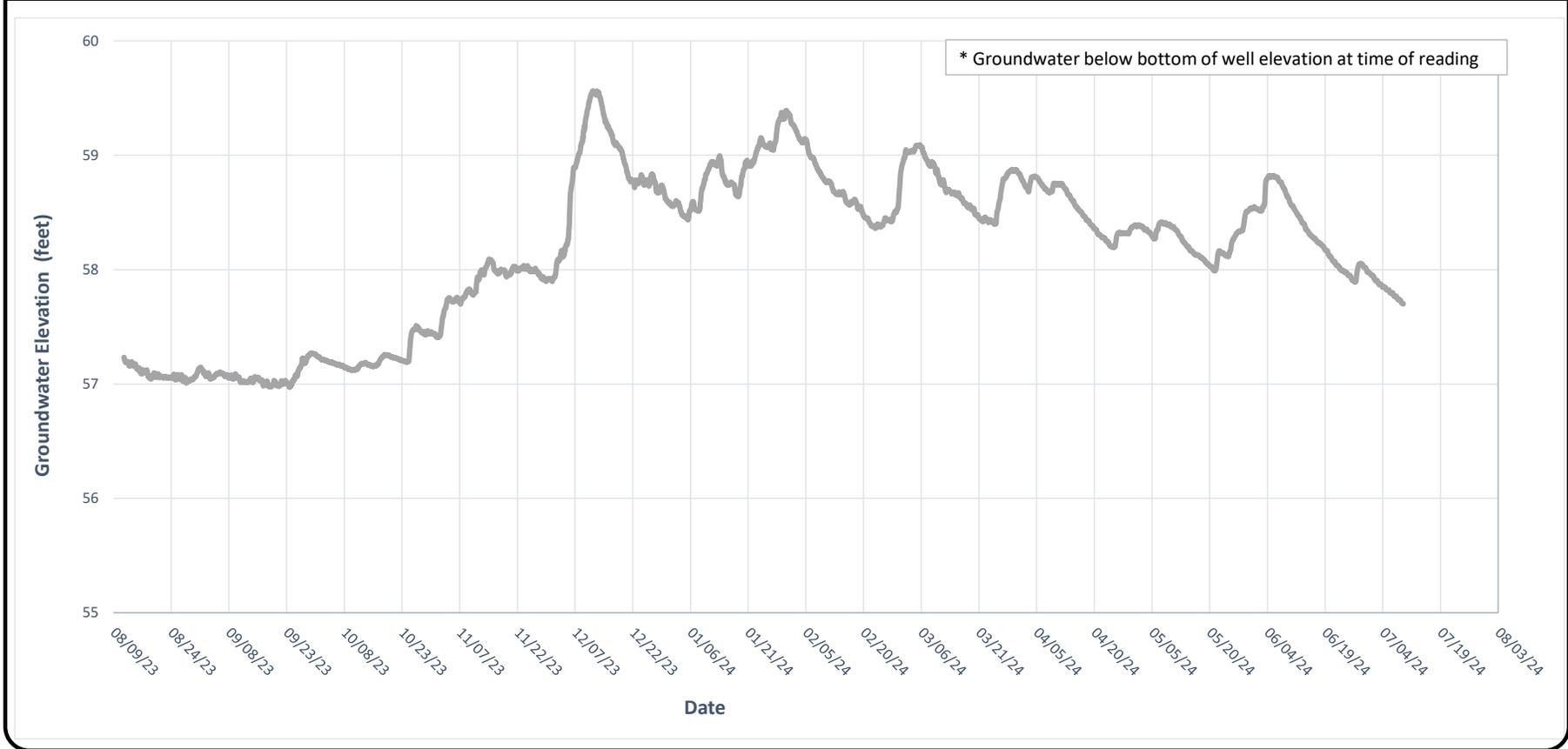


211TH PLACE CORRIDOR IMPROVEMENTS PROJECT  
ARLINGTON, WASHINGTON

GEOLOGIC PROFILE  
A-A'

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AHF	3
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SKS	2023-049-21

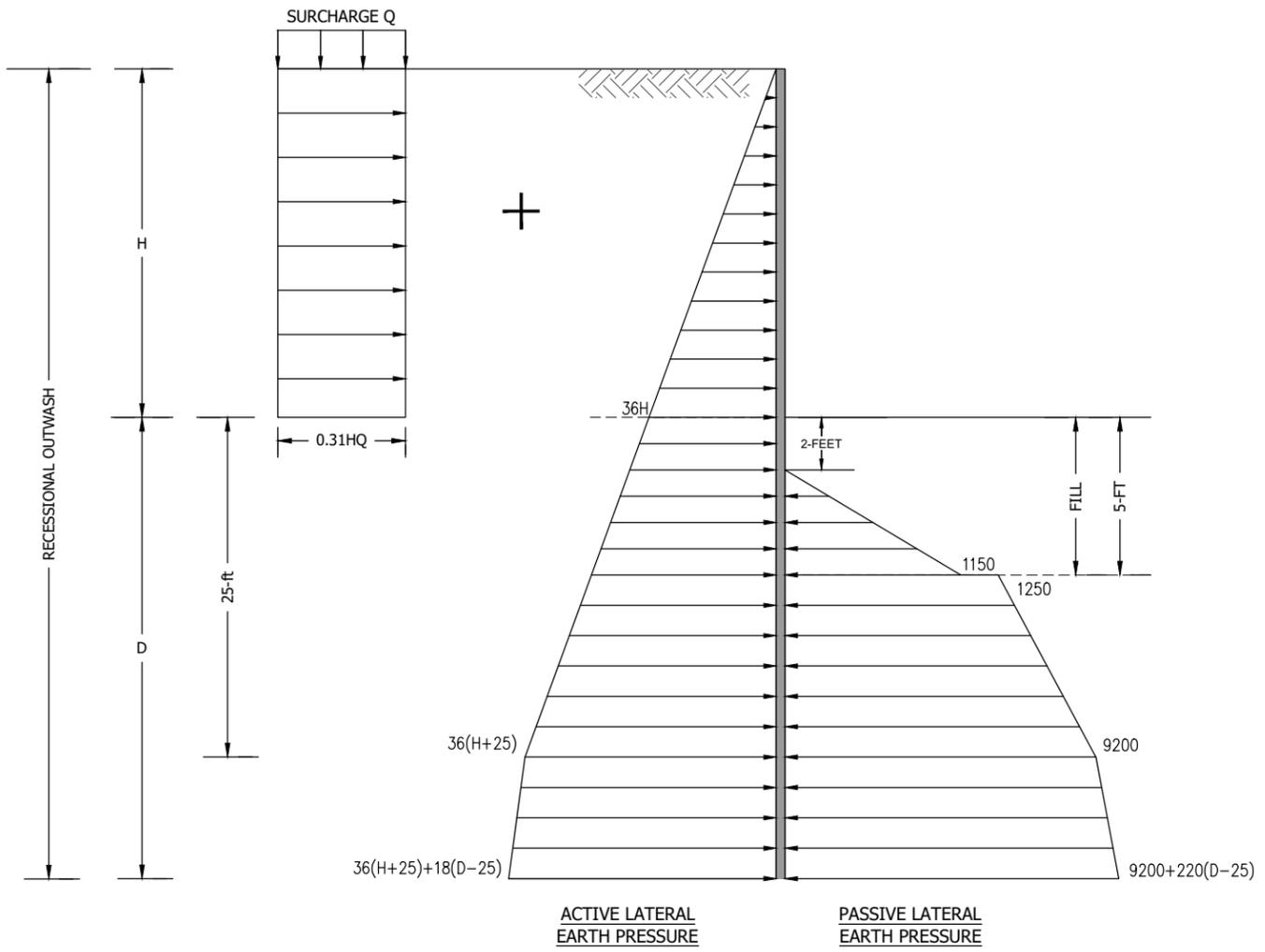
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	BH-5	99	Dry*	Dry*	8/11/2023	7/9/2024	48.18713	-122.13888	NAD83 (NF)	L. Cressler



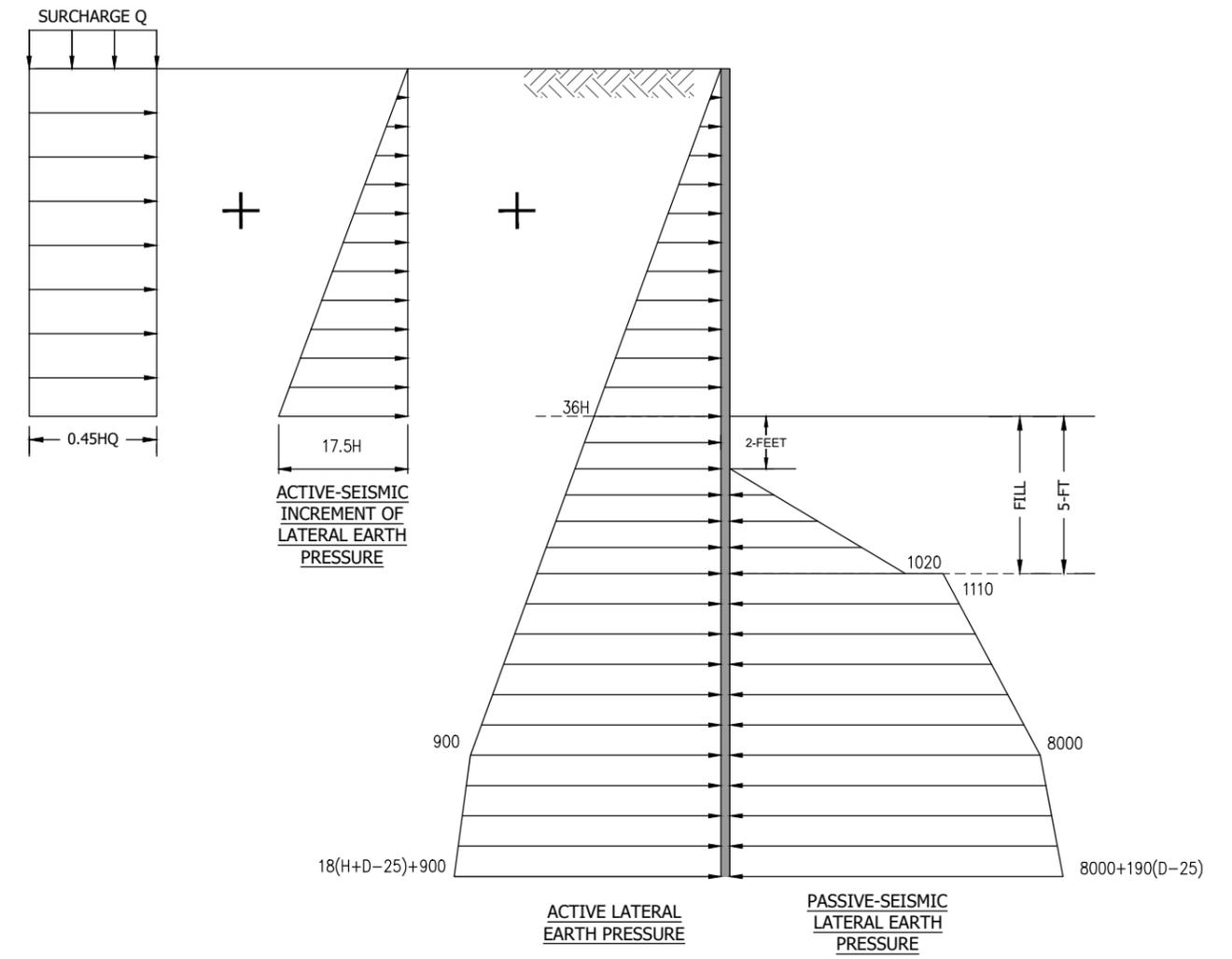
GROUNDWATER ELEVATION DATA

211<sup>TH</sup> PLACE CORRIDOR IMPROVEMENTS PROJECT  
ARLINGTON, WASHINGTON

FIGURE NO. **4**  
PROJECT NO.  
2023-049-21



**STRENGTH & SERVICE LIMIT STATE (STATIC)**



**EXTREME (EQ) LIMIT STATE (SEISMIC)**

**General**

1. All the pressures shown are in the units of pounds per square foot (psf).
2. Lateral earth pressures provided herein are based on active earth pressures and should be used for the design of the retaining walls where the wall is free to displace laterally at least 0.001H, where H is the retained height of the wall.
3. All the earth pressures provided are ultimate (unfactored), the appropriate load and resistance factors should be applied for each load state.
4. All earth pressures assumed no back slope.
5. All active earth pressures acting on the retained portion of the wall (above the base of the wall) should be applied across the pile spacing.
6. All active earth pressures acting below the retained portion of the wall (below the base of the wall) should be applied over one pile shaft diameter.
7. Fill extends approximately 5-feet below roadway grade in front of the wall. No fill is anticipated behind the wall profile.
8. Soldier pile elements should embed a minimum of 20-feet below roadway surface.
9. Groundwater anticipated approximately 25-feet below roadway grade (in front of wall face).
10. Surcharge Q applied at the top of the wall consist of any existing structures or anticipated traffic loading. The design team will need to verify this surcharge.

**Strength and Service State Design**

1. For strength limit state design, a resistance factor ( $\phi$ ) of 0.75 should be applied to the passive earth pressures shown.
2. For service limit state design, a resistance factor ( $\phi$ ) of 1.0 should be applied to the passive earth pressures shown.
3. All passive earth pressures should be applied over two shaft diameters.

**Extreme Limit State Design**

1. All passive earth pressures should be applied over two shaft diameters.
  2. Lateral earth pressures presented under Extreme Limit State include active plus seismic on the retained side and passive-seismic on the cut side of the wall.
- \* Traffic surcharge pressure under seismic conditions is based on commentary in AASHTO 9th Edition, Section 3.4.1.

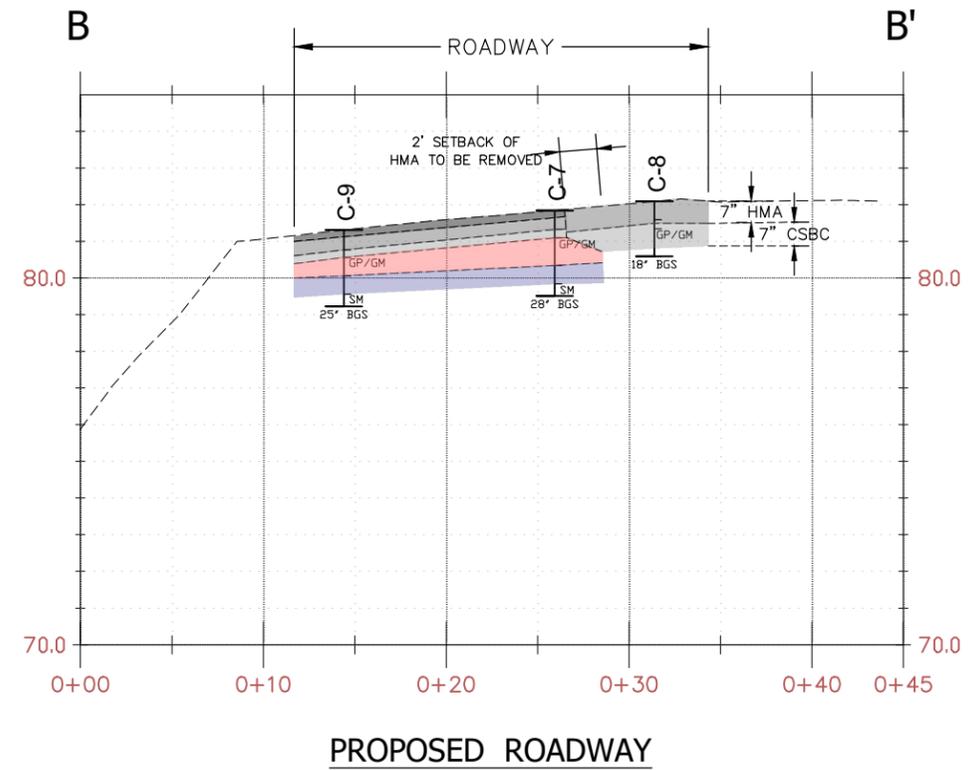
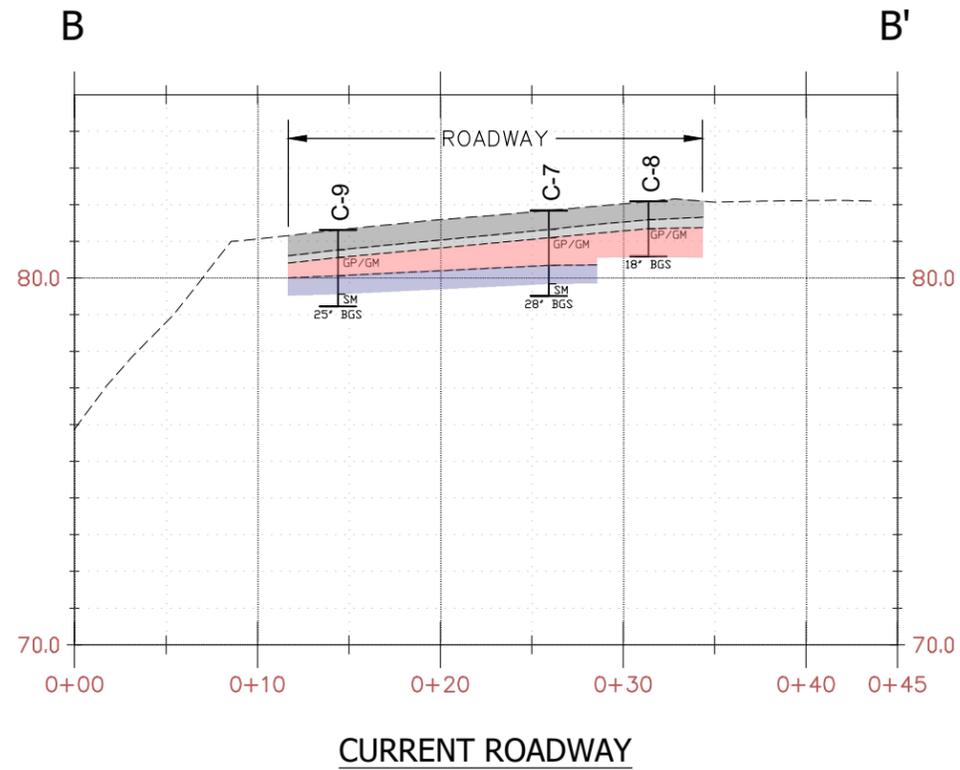
NOT TO SCALE



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LATERAL EARTH PRESSURES

DRAWN BY:	FIGURE NO.:
CF	5
CHECK BY:	PROJECT NO.:
SKS	2023-049-21

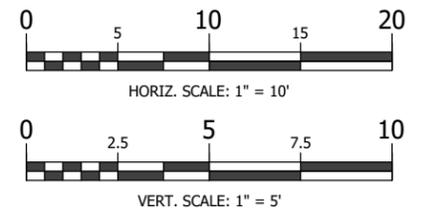


**CORE LEGEND**

- EXPLORATION DESIGNATION
- USCS SOIL CLASS
- INFERRED GEOLOGIC CONTACT
- BOTTOM OF EXPLORATION

**SOILS LEGEND**

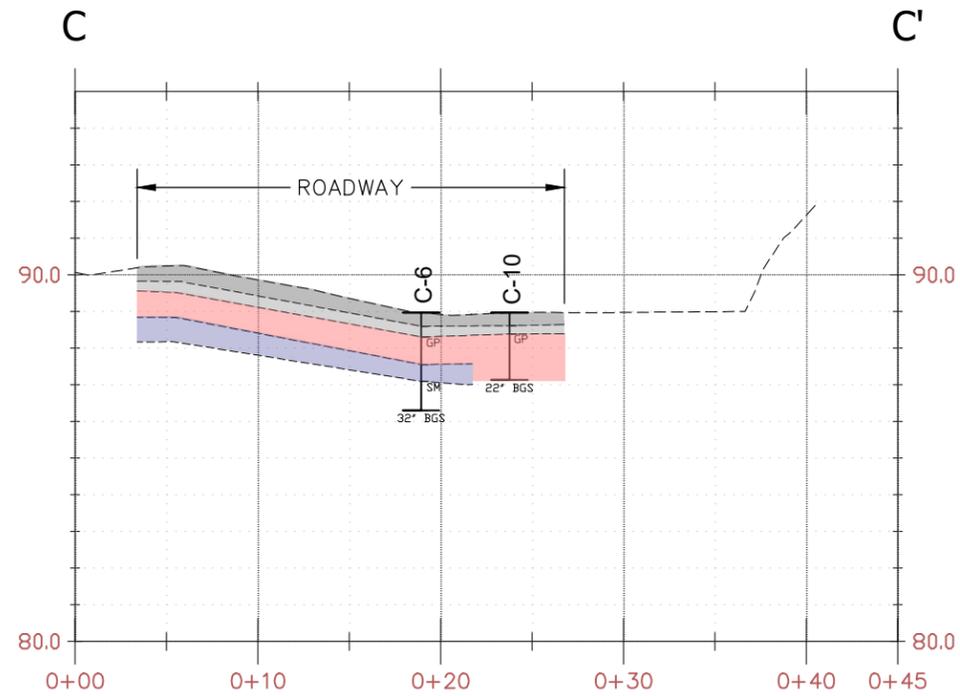
- HMA
- CSTC
- PCC
- FILL
- FIBER-REINFORCED HMA GRIND AND OVERLAY



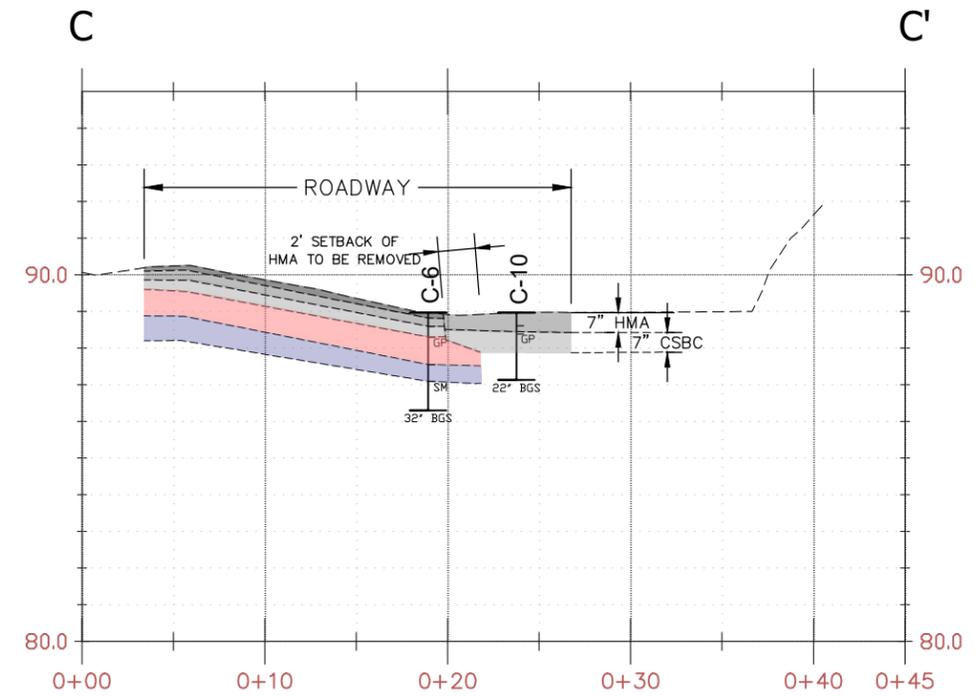
211TH PLACE CORRIDOR  
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ROADWAY SECTION  
B-B'

DRAWN BY:	FIGURE NO.:
CF	<b>6A</b>
CHECK BY:	PROJECT NO.:
SKS	2023-049-21



CURRENT ROADWAY



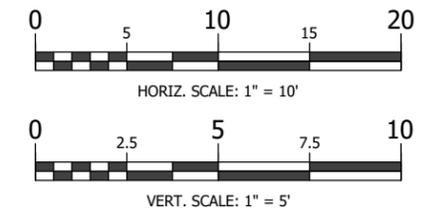
PROPOSED ROADWAY

**CORE LEGEND**

- EXPLORATION DESIGNATION
- USCS SOIL CLASS
- INFERRED GEOLOGIC CONTACT
- BOTTOM OF EXPLORATION

**SOILS LEGEND**

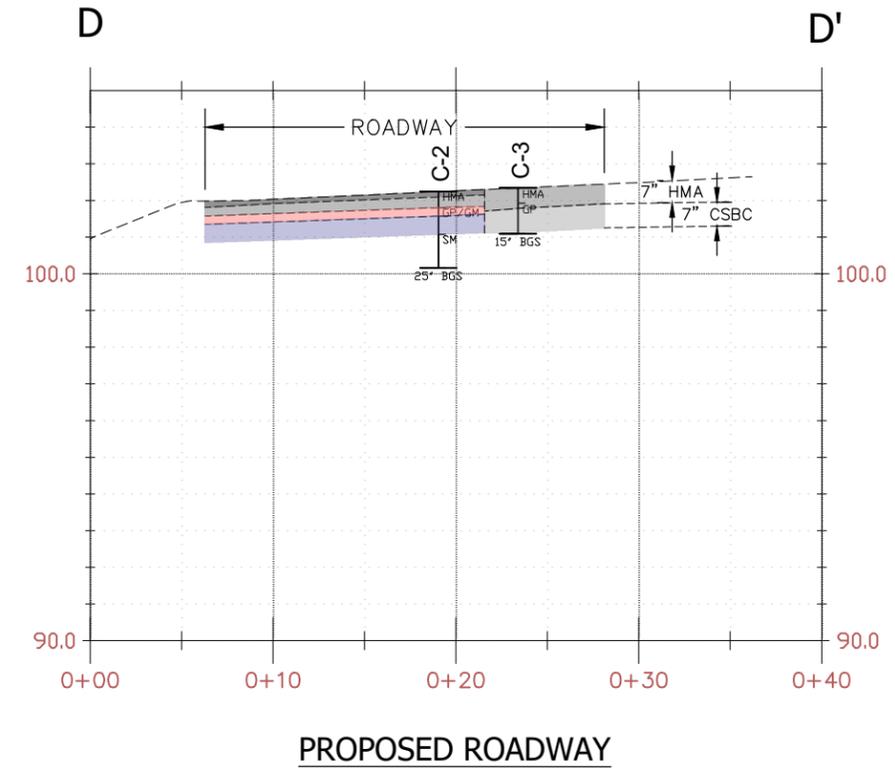
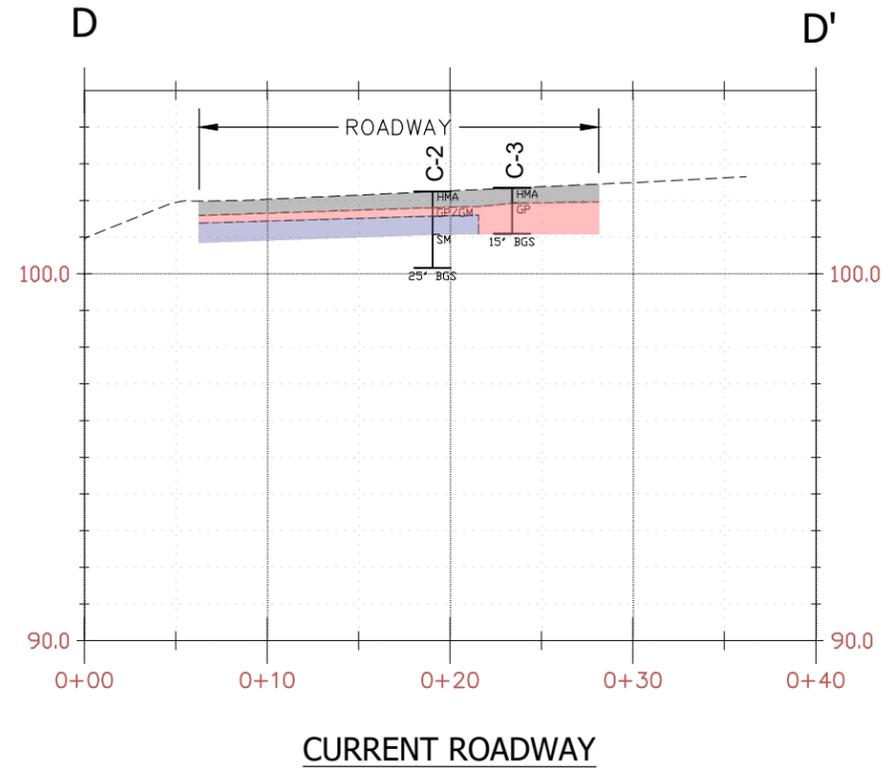
- HMA
- CSTC
- PCC
- FILL
- FIBER-REINFORCED HMA GRIND AND OVERLAY



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ROADWAY SECTION  
C-C'

DRAWN BY:	FIGURE NO.:
CF	<b>6B</b>
CHECK BY:	PROJECT NO.:
SKS	2023-049-21

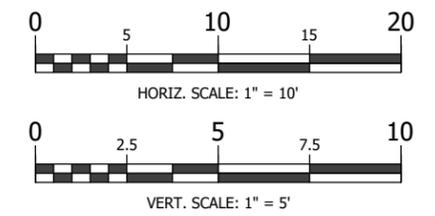


**CORE LEGEND**

- EXPLORATION DESIGNATION
- USCS SOIL CLASS
- INFERRED GEOLOGIC CONTACT
- BOTTOM OF EXPLORATION

**SOILS LEGEND**

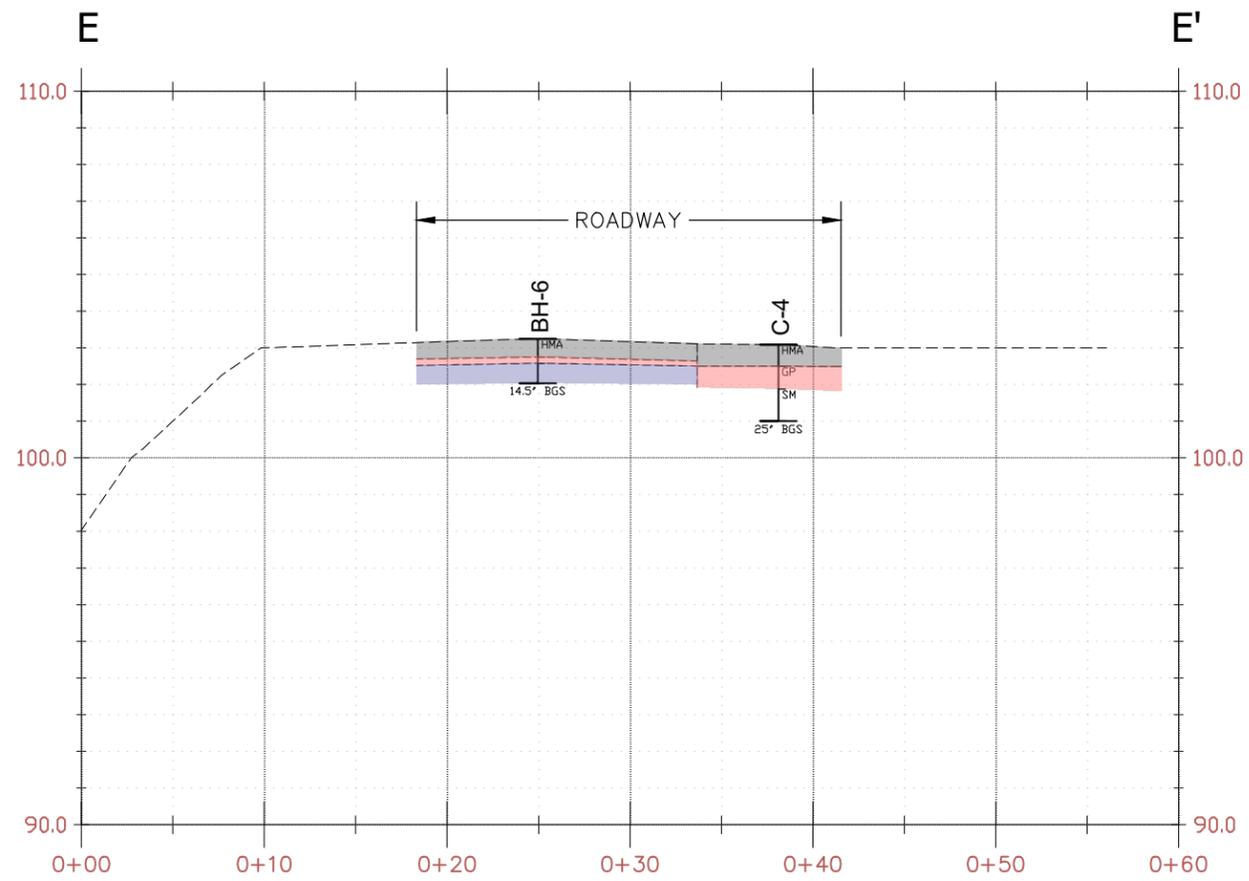
- HMA
- CSTC
- PCC
- FILL
- FIBER-REINFORCED HMA GRIND AND OVERLAY



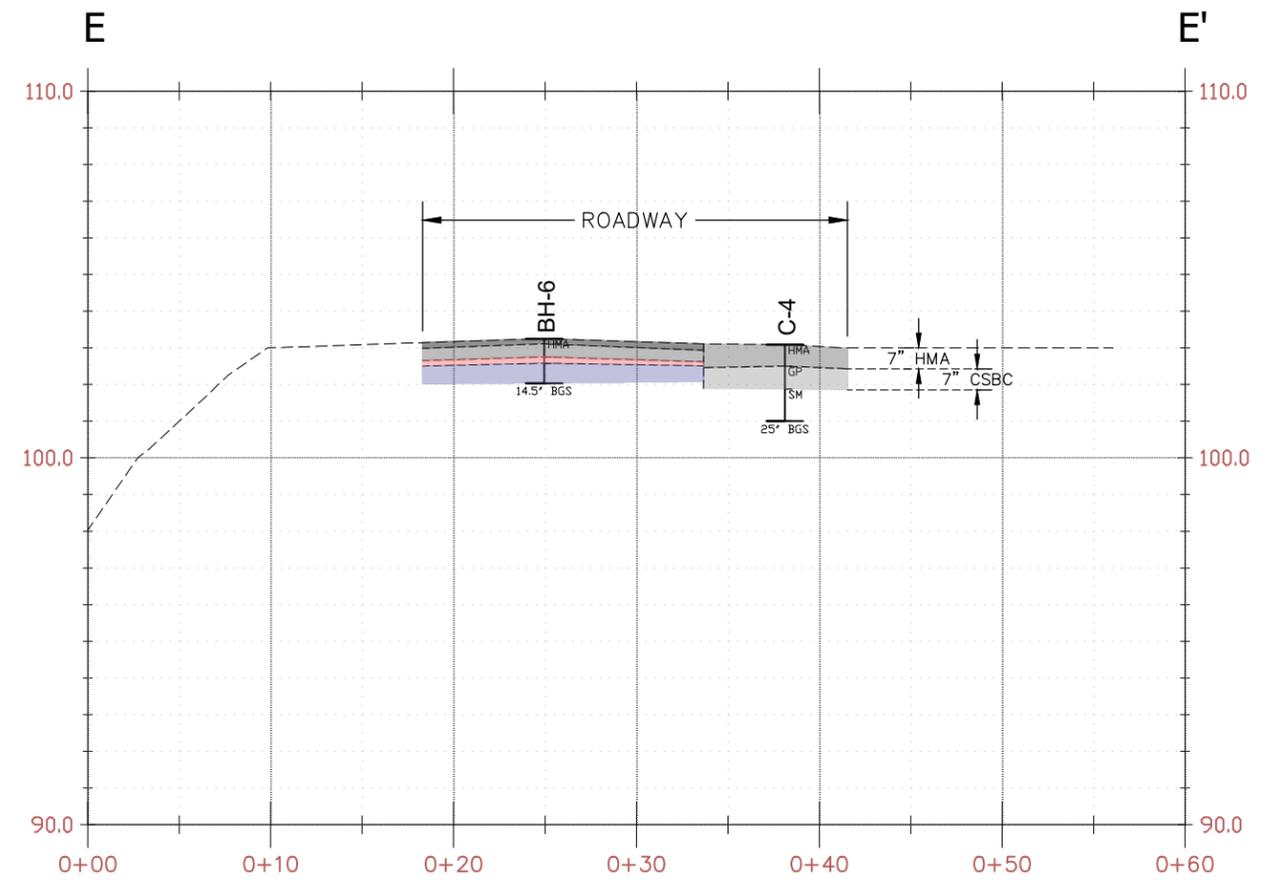
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ROADWAY SECTION  
D-D'

DRAWN BY:	FIGURE NO.:
CF	<b>6C</b>
CHECK BY:	PROJECT NO.:
SKS	2023-049-21



CURRENT ROADWAY



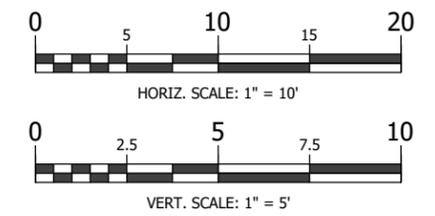
PROPOSED ROADWAY

CORE LEGEND

- EXPLORATION DESIGNATION
- USCS SOIL CLASS
- INFERRED GEOLOGIC CONTACT
- BOTTOM OF EXPLORATION

SOILS LEGEND

- HMA
- CSTC
- PCC
- FILL
- FIBER-REINFORCED HMA GRIND AND OVERLAY



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ROADWAY SECTION  
E-E'

DRAWN BY:	FIGURE NO.:
CF	<b>6D</b>
CHECK BY:	PROJECT NO.:
SKS	2023-049-21

# APPENDIX A

## FIELD INVESTIGATION

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)		GW Well-graded GRAVEL	
		Gravel with Fines (appreciable amount of fines)		GP Poorly-graded GRAVEL	
	Sand and Sandy Soils	Clean Sand (little or no fines)		GM Silty GRAVEL	
		Sand with Fines (appreciable amount of fines)		GC Clayey GRAVEL	
More than 50% Retained on No. 200 Sieve Size	50% or More of Coarse Fraction Passing No. 4 Sieve	Clean Sand (little or no fines)		SW Well-graded SAND	
		Sand with Fines (appreciable amount of fines)		SP Poorly-graded SAND	
	Silt and Clay	Liquid Limit Less than 50%			SM Silty SAND
					SC Clayey SAND
		Liquid Limit 50% or More			ML SILT
					CL Lean CLAY
Highly Organic Soils	Silt and Clay			OL Organic SILT/Organic CLAY	
				MH Elastic SILT	
				CH Fat CLAY	
				OH Organic SILT/Organic CLAY	
				PT PEAT	

- TEST SYMBOLS
- %F Percent Fines
  - AL Atterberg Limits: PL = Plastic Limit, LL = Liquid Limit
  - CBR California Bearing Ratio
  - CN Consolidation
  - DD Dry Density (pcf)
  - DS Direct Shear
  - GS Grain Size Distribution
  - K Permeability
  - MD Moisture/Density Relationship (Proctor)
  - MR Resilient Modulus
  - OC Organic Content
  - pH pH of Soils
  - PID Photoionization Device Reading
  - PP Pocket Penetrometer (Approx. Comp. Strength, tsf)
  - Res. Resistivity
  - SG Specific Gravity
  - CD Consolidated Drained Triaxial
  - CU Consolidated Undrained Triaxial
  - UU Unconsolidated Undrained Triaxial
  - TV Torvane (Approx. Shear Strength, tsf)
  - UC Unconfined Compression

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- Non-standard Penetration Test (3.0" OD Split Spoon with Brass Rings)
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- 3-1/4" OD Split Spoon

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

*Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)*

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.



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LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

DRILLING COMPANY: Geologic Drill Partners

SURFACE ELEVATION: ± feet

± feet

DATE STARTED: 8/10/2023

DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID

CASING ELEVATION ± feet

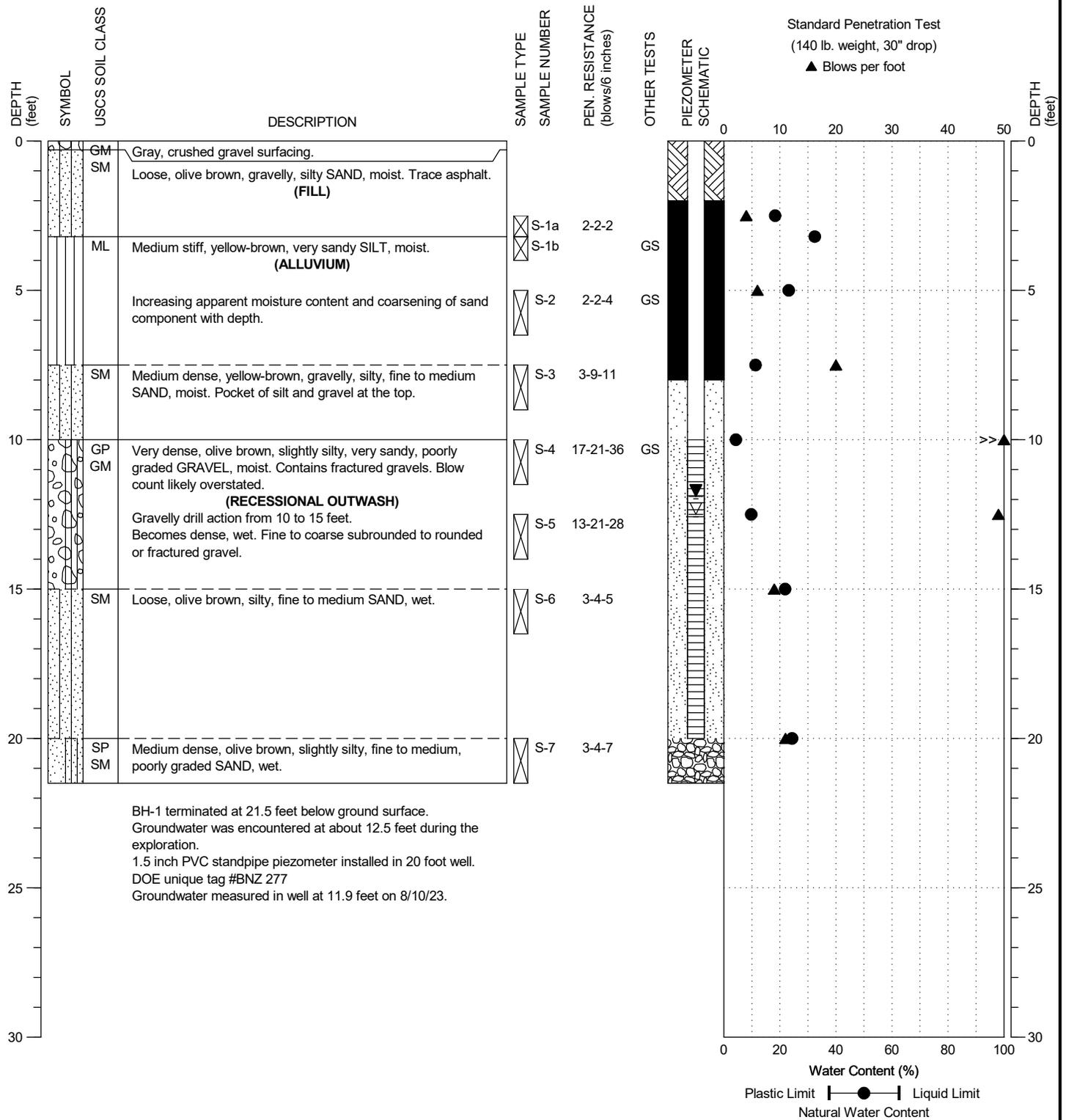
± feet

DATE COMPLETED: 8/10/2023

SAMPLING METHOD: SPT w/Autohammer

LOGGED BY: A. Heinze Fry

LOCATION: See Figure 2



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



211th Place Corridor Improvements Project  
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BORING:  
BH-1

PAGE: 1 of 1

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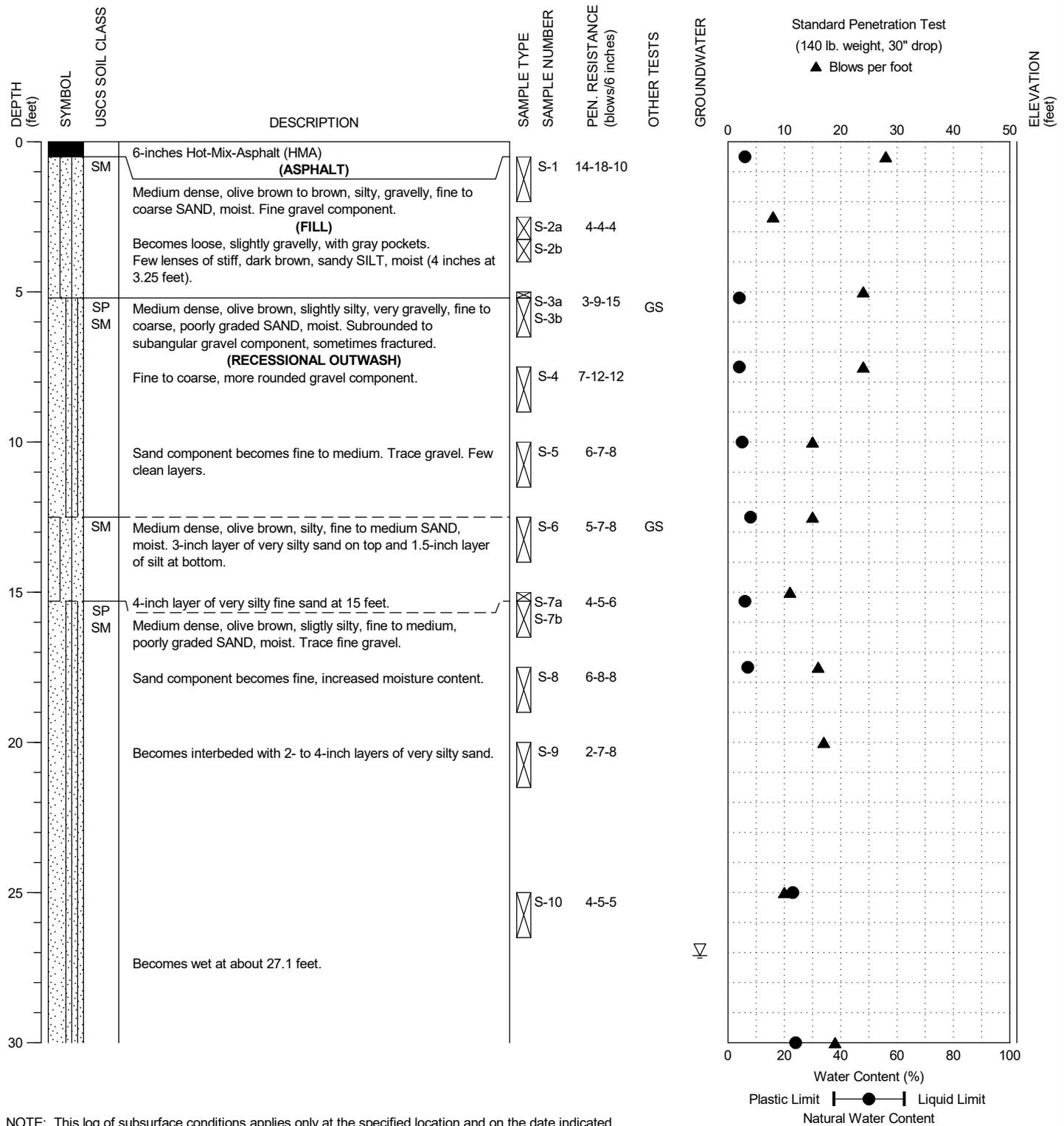
PROJECT NO.: 2023-049-21

FIGURE:

A-2

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/10/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/10/2023  
 LOGGED BY: A. Heinze Fry



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



211th Place Corridor Improvements Project  
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BORING:  
 BH-2

PAGE: 1 of 3

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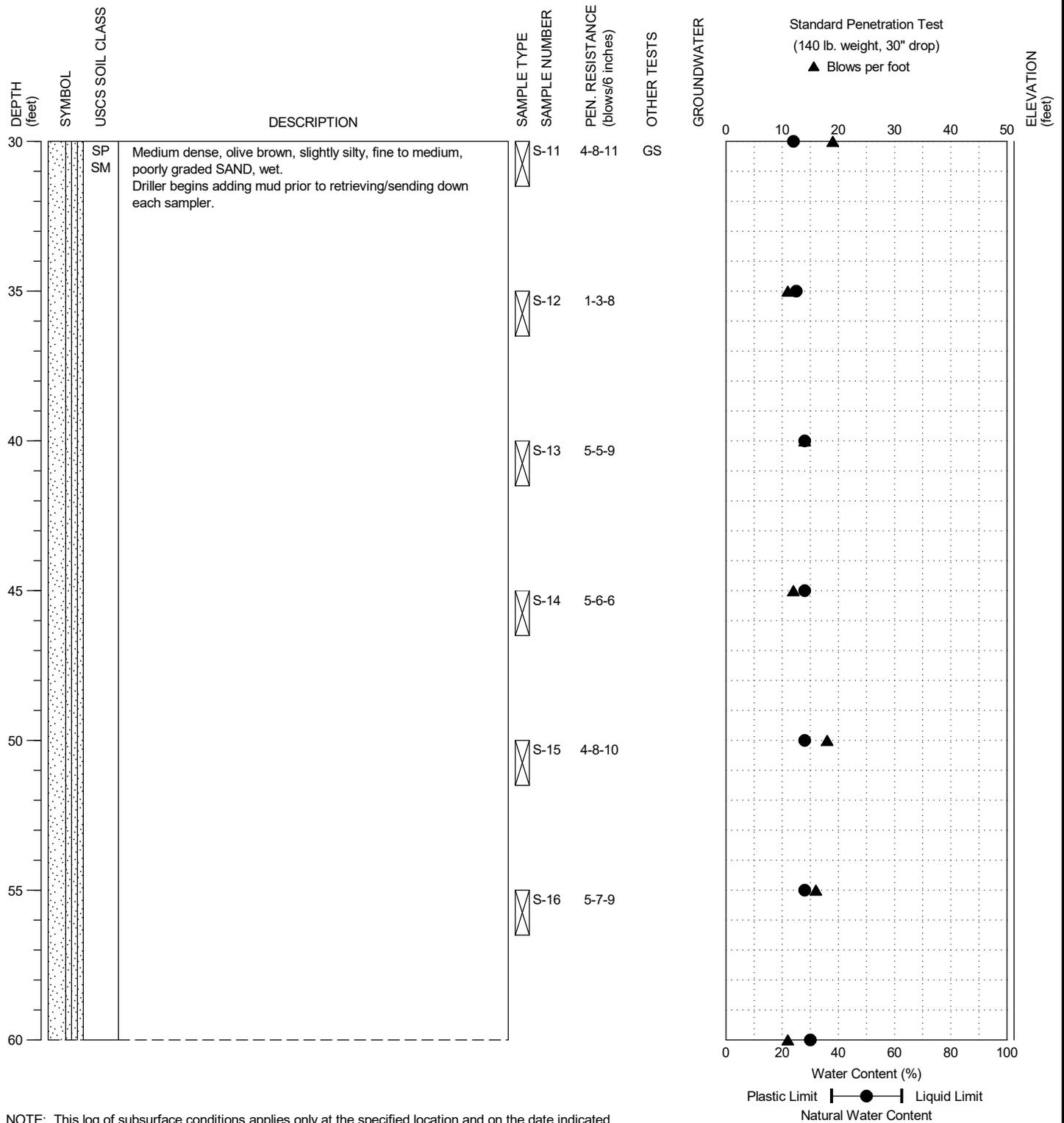
PROJECT NO.: 2023-049-21

FIGURE:

A-3

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/10/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/10/2023  
 LOGGED BY: A. Heinze Fry



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



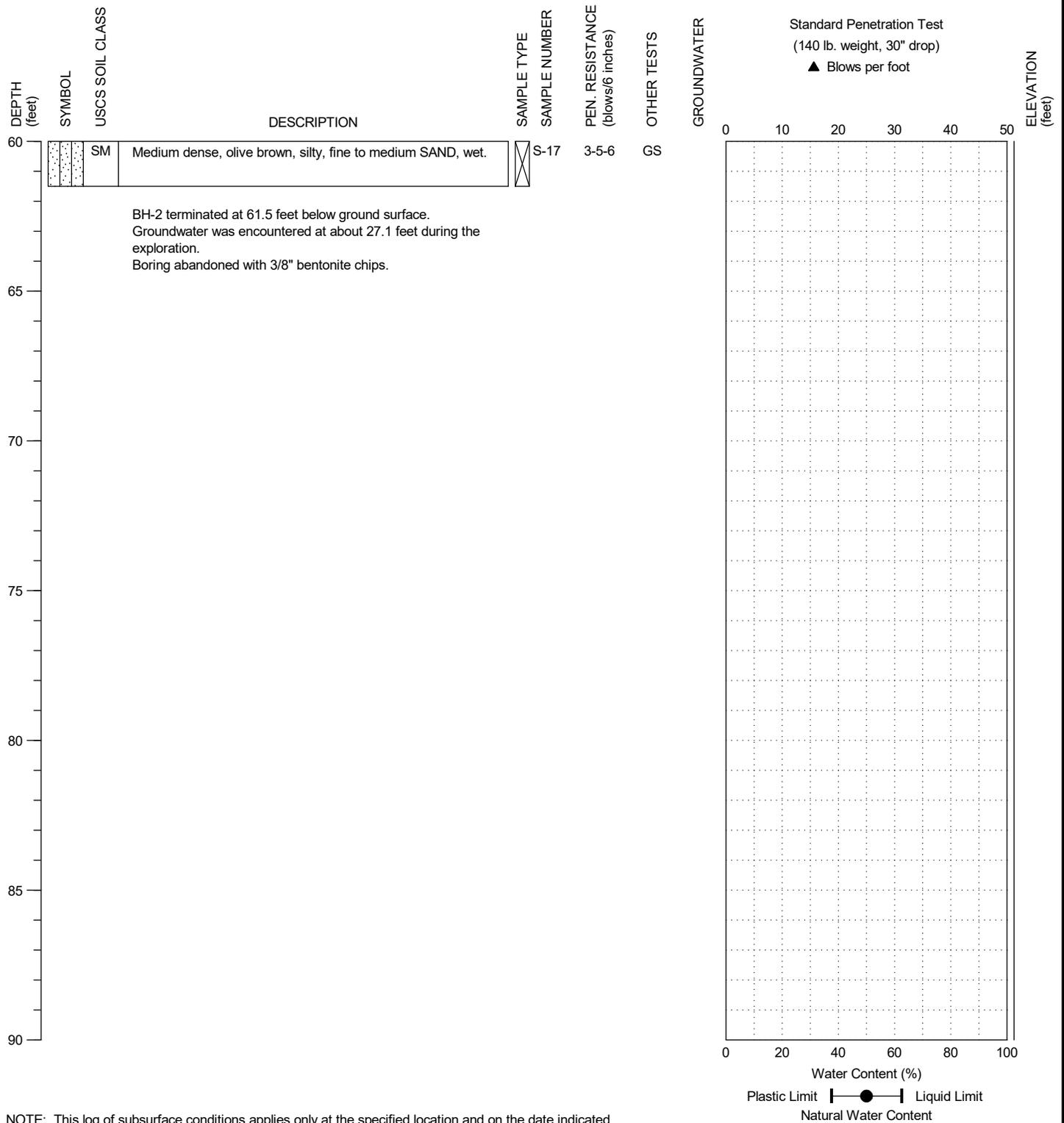
211th Place Corridor Improvements Project  
 Arlington, Washington

BORING:  
 BH-2

PAGE: 2 of 3

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/10/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/10/2023  
 LOGGED BY: A. Heinze Fry



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BORING:  
 BH-2

PAGE: 3 of 3

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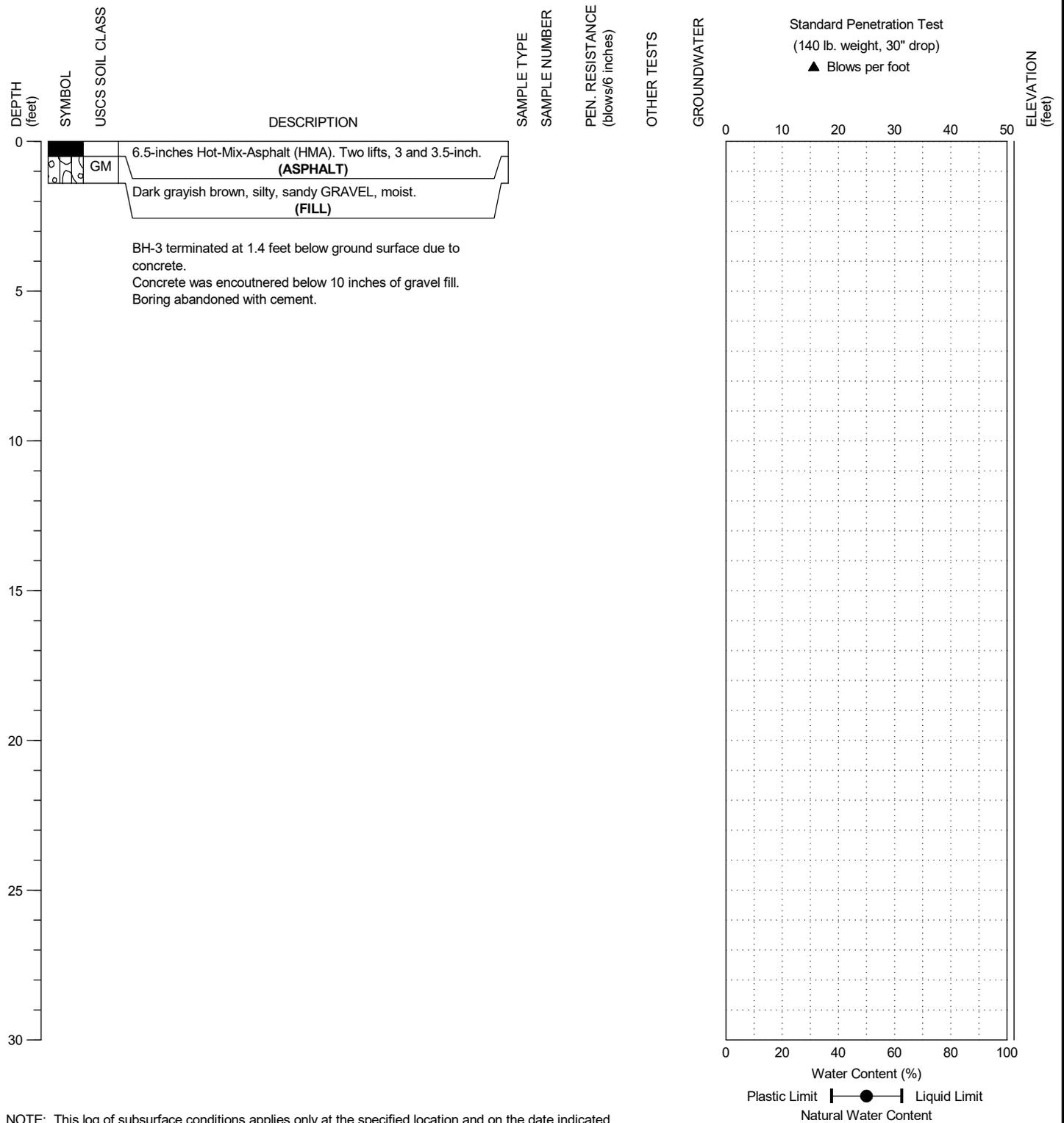
PROJECT NO.: 2023-049-21

FIGURE:

A-3

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/11/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/11/2023  
 LOGGED BY: M.A. Benson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



211th Place Corridor Improvements Project  
 Arlington, Washington

BORING:  
 BH-3

PAGE: 1 of 1

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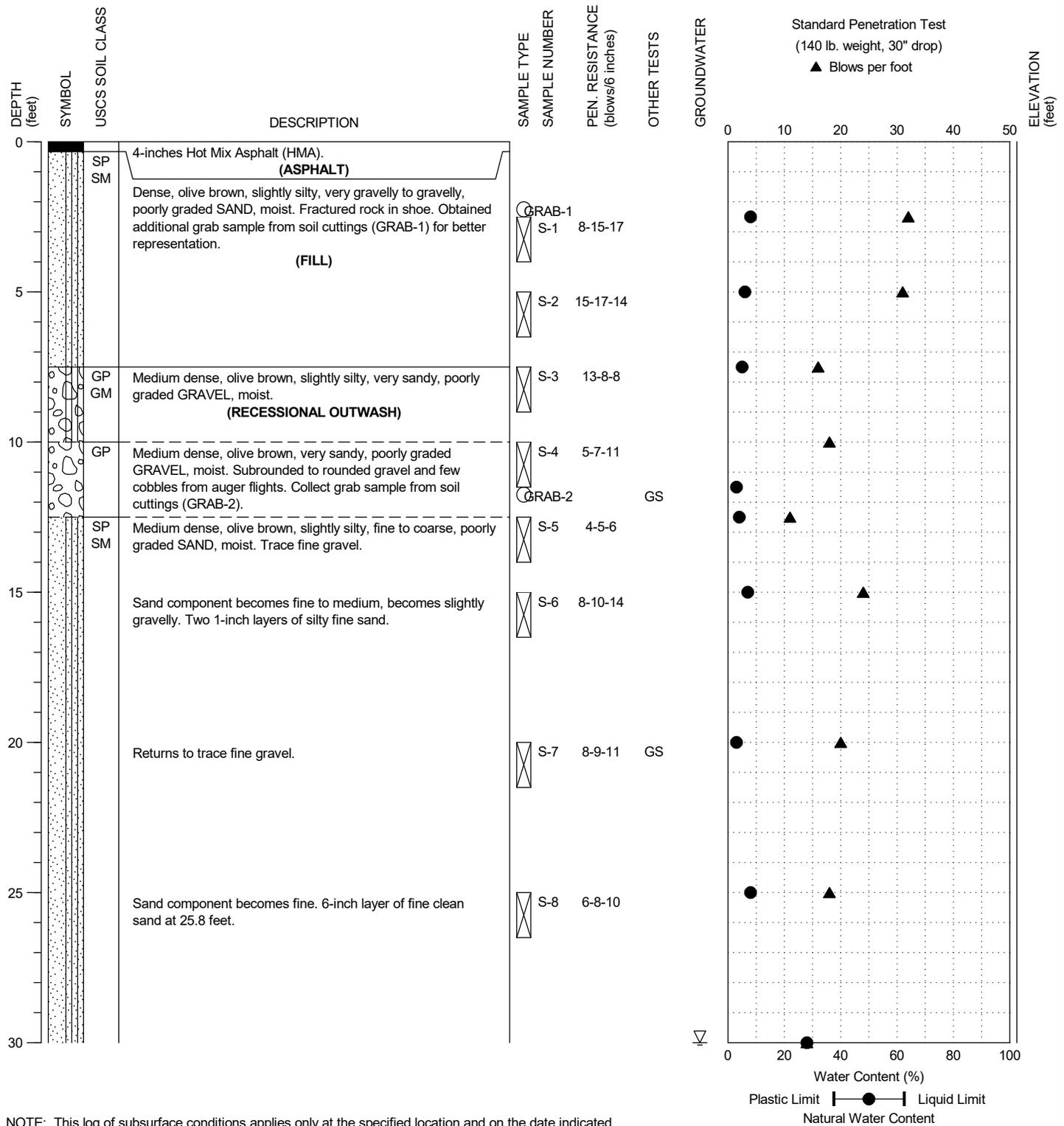
PROJECT NO.: 2023-049-21

FIGURE:

A-4

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/10/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/10/2023  
 LOGGED BY: A. Heinze Fry



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



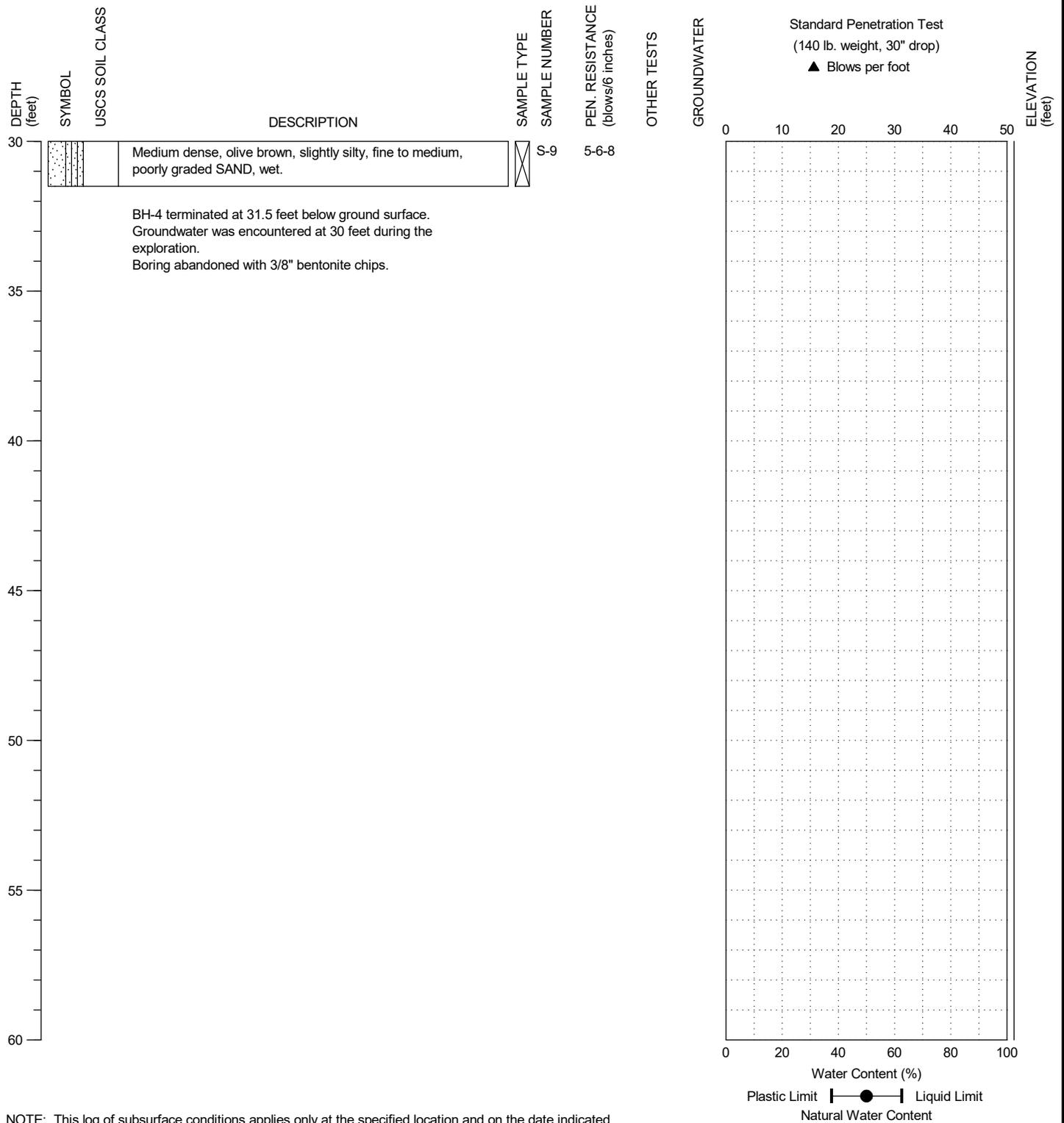
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BORING:  
 BH-4

PAGE: 1 of 2

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/10/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/10/2023  
 LOGGED BY: A. Heinze Fry



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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BORING:  
 BH-4

PAGE: 2 of 2

GEOSCIENCES INC.

PROJECT NO.: 2023-049-21

FIGURE:

A-5

DRILLING COMPANY: Geologic Drill Partners

SURFACE ELEVATION: ± feet

DATE STARTED: 8/10/2023

DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID

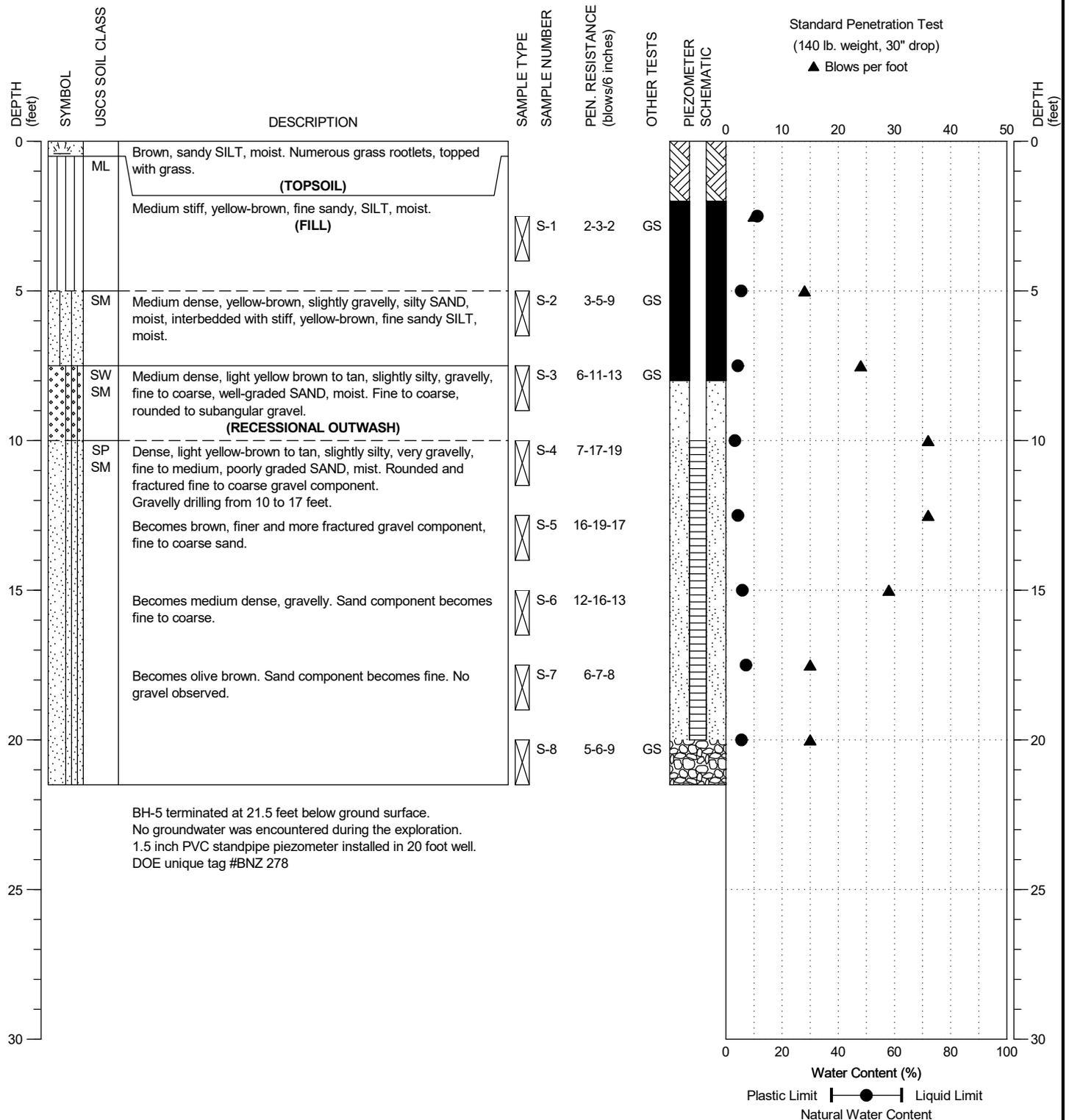
CASING ELEVATION: ± feet

DATE COMPLETED: 8/10/2023

SAMPLING METHOD: SPT w/Autohammer

LOGGED BY: A. Heinze Fry

LOCATION: See Figure 2



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



211th Place Corridor Improvements Project  
Arlington, Washington

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BH-5

PAGE: 1 of 1

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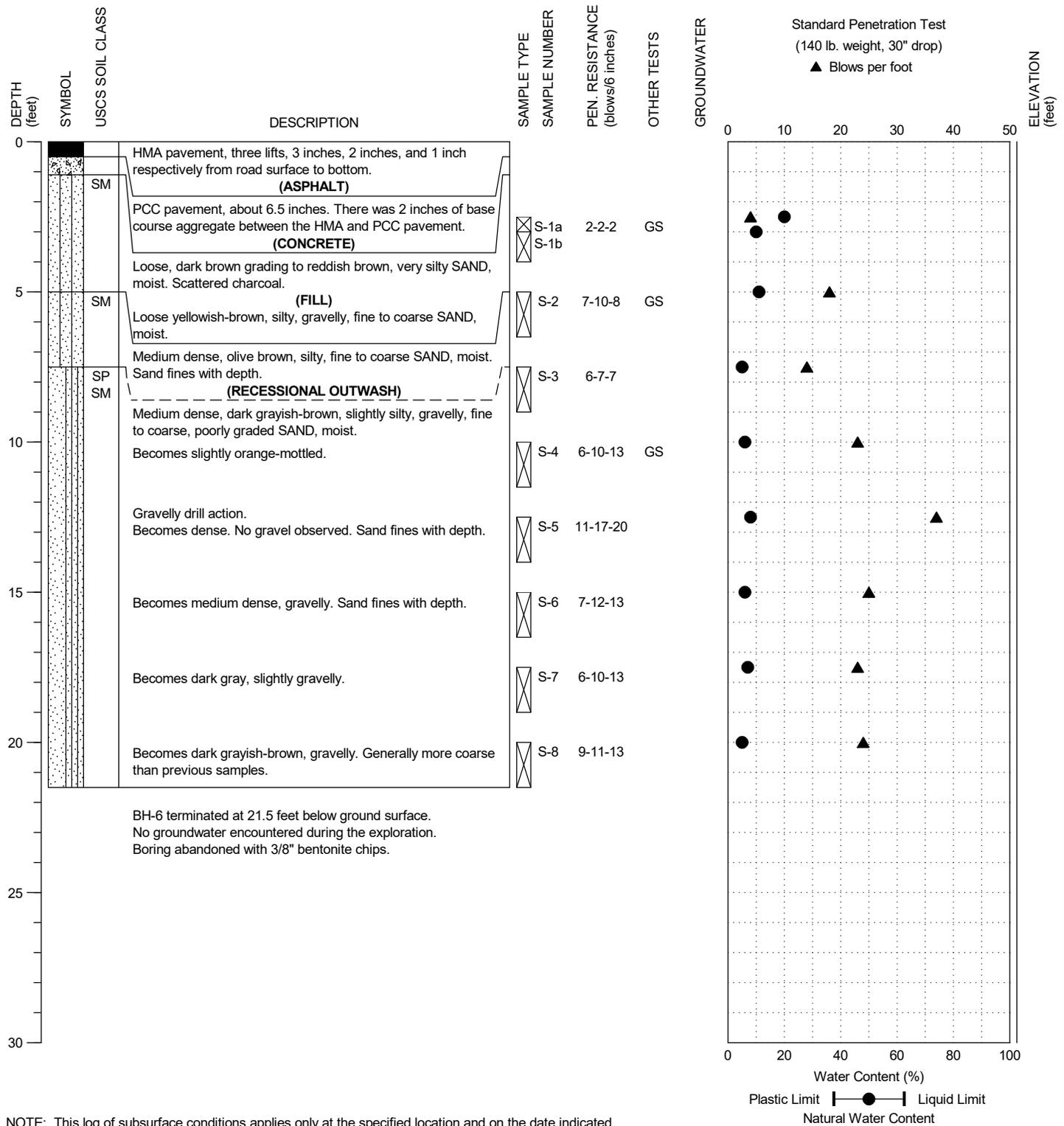
PROJECT NO.: 2023-049-21

FIGURE:

A-6

DRILLING COMPANY: Geologic Drill Partners  
 DRILLING METHOD: HSA, Acker Recon Tracked Rig w/3.25" ID  
 SAMPLING METHOD: SPT w/Autohammer  
 LOCATION: See Figure 2

DATE STARTED: 8/11/2023 **EXHIBIT K**  
 DATE COMPLETED: 8/11/2023  
 LOGGED BY: M.A. Benson



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



211th Place Corridor Improvements Project  
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BORING:  
 BH-6

PAGE: 1 of 1

GEOSCIENCES INC.

PROJECT NO.: 2023-049-21

FIGURE:

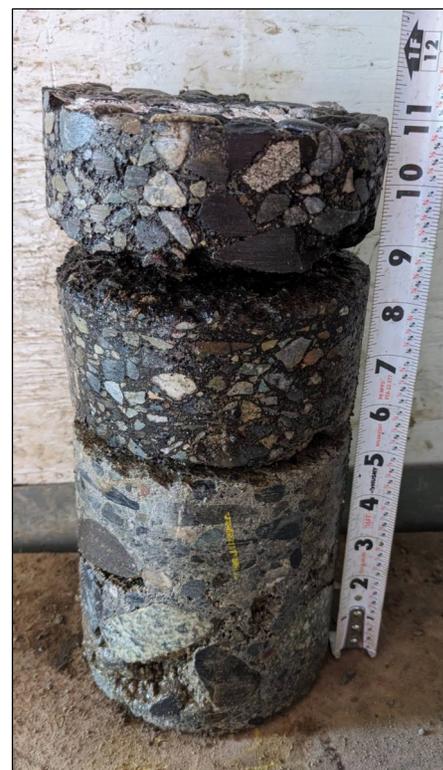
A-7

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, WB, 7.5' from CL.

LOCATION: See Figure 2B  
 DATE COMPLETED: 10/16/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			5.5 inches Hot Mix Asphalt. 2 lifts: 2.5" x 3". No cracking at coring location. Longitudinal cracking 10 feet from CL. Lifts are unbonded. Class 1" Mix. <b>(HMA)</b>				
3	SM		2.5 inches Crushed Surfacing Top Course. Dense, brown, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			5 inches Portland Cement Concrete. <b>(PCC)</b>				
6			Dense, brown, silty SAND with gravel, moist. <b>(FILL)</b>				
Corehole was terminated at 18 inches BGS. No groundwater seepage was encountered during the exploration.							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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211th Place Corridor Improvements Project  
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PAVEMENT CORE  
 C- 1

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-8

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 4' from CL.

LOCATION: See Figure 2B  
 DATE COMPLETED: 10/16/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS
0			5.25 inches Hot Mix Asphalt. 2 lifts: 2.25" x 3".				
	GP		No cracking in coring location. Cracks in outside wheel-path. Lifts are unbonded with degraded asphalt or gravel between lifts. Class 1" Mix. <b>(HMA)</b>				
	GM						
	SM						
3			2.75 inches Gravel Backfill. Dense, brown, poorly graded GRAVEL with silt and sand, moist. <b>(FILL)</b>				
6			6 inches Portland Cement Concrete. <b>(PCC)</b>				
9			Medium dense, orange-brown, silty SAND with gravel and rootlets, moist. <b>(FILL)</b>				

Corehole was terminated at 25 inches BGS. No groundwater seepage was observed during the exploration.

PAVEMENT CORE PHOTO



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211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C- 2

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-9

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 9' from CL.

LOCATION: See Figure 2B  
 DATE COMPLETED: 10/16/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS
0	GP		5 inches Hot Mix Asphalt. 2 lifts: 2" x 3". Cored on high severity alligator cracking in outside wheel-path. Upper lift is cracked through and unbonded. Lower lift crumbled at bottom of core, lost 1/2". Class 1" Mix. Edge of PCC appears to be 5.5-6.0' from CL. <b>(HMA)</b>				
3			Dense, olive gray, poorly graded GRAVEL with sand, moist. <b>(FILL)</b>				
6			Corehole was terminated at 15 inches BGS. No groundwater seepage was observed during the exploration.				
9							
12							
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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211th Place Corridor Improvements Project  
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PAVEMENT CORE  
 C- 3

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-10

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 8.5' from CL.

LOCATION: See Figure 2A  
 DATE COMPLETED: 10/16/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			7 inches Hot Mix Asphalt. 3 lifts: 1.5" x 2" x 3.5". Cored on medium severity longitudinal cracking. Cracked through full depth. All lifts are unbonded. Class 1" Mix. <b>(HMA)</b>				
3	GP		Dense, brown, fine GRAVEL with sand, moist. <b>(FILL)</b>				
	SM		Becomes medium dense. Medium dense, orange-brown, silty SAND with gravel, moist. Becomes yellow-brown.				
6			Corehole was terminated at 25 inches BGS. No groundwater seepage was observed during the exploration.				
9							
12							
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



GEOSCIENCES INC.

211th Place Corridor Improvements Project  
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PAVEMENT CORE  
 C- 4

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-11

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 8' from CL.

LOCATION: See Figure 2B  
 DATE COMPLETED: 10/16/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			5.25 inches Hot Mix Asphalt. 2 lifts: 2.5" x 2.75". Cored on high severity alligator cracking in outside wheel-path. Upper lift is unbonded and cracked through. Class 1" Mix. <b>(HMA)</b>				
3			2.75 inches Crushed Surfacing Top Course. Dense, brown, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			Dense, olive gray, poorly graded GRAVEL with silt and sand, wet. <b>(FILL)</b>				
			Corehole was terminated at 13 inches BGS due to surface water intrusion into hole. No groundwater seepage was observed during the exploration.				
9							
12							
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C- 5

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-12

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 2.75' from CL.

LOCATION: See Figure 2C  
 DATE COMPLETED: 10/17/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS
0			4.5 inches Hot Mix Asphalt. 2 lifts: 2.5" x 2". Cored on high severity alligator cracking along the inside wheel-path. High severity raveling. Upper lift is cracked through and unbonded. Class 1 <sup>st</sup> Mix. <b>(HMA)</b>				
	GP						
	SM						
3			3.5 inches Crushed Surfacing Top Course. Dense, olive brown, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			9 inches Gravel Backfill. Dense, brown, fine GRAVEL with sand, moist. <b>(FILL)</b>				
			5.5 inches Portland Cement Concrete. <b>(PCC)</b>				
9			Loose, brown, silty SAND with scattered, fine gravel and organics, moist. <b>(FILL)</b>				
12			Corehole was terminated at 32 inches BGS. No groundwater seepage was observed during the exploration.				
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C- 6

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-13

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 3.3' from CL.

LOCATION: See Figure 2C  
 DATE COMPLETED: 10/17/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			6.25 inches Hot Mix Asphalt. 2 lifts: 3" x 3.25". Medium to high severity longitudinal cracking along inside wheel-path. Not cored on crack. High severity raveling. Lifts are unbonded. Class 1" Mix. <b>(HMA)</b>				
3	GP GM SM		2.75 inches Crushed Surfacing Top Course. Dense, brown, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			9 inches Gravel Backfill. Dense, brown, poorly graded GRAVEL with silt, sand and scattered cobbles, moist. <b>(FILL)</b>				
			6.5 inches Portland Cement Concrete. <b>(PCC)</b>				
9			Medium dense, brown, silty SAND with gravel, moist. <b>(FILL)</b>				
12			Corehole was terminated at 28 inches BGS. No groundwater seepage was encountered during the exploration.				
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



GEOSCIENCES INC.

211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C- 7

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-14

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 10' from CL.

LOCATION: See Figure 2C  
 DATE COMPLETED: 10/17/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			6 inches Hot Mix Asphalt. 2 lifts: 3" x 3". Cored on low severity longitudinal cracking, adjacent to high severity alligator cracking. Lifts are unbonded. Cracking extends 1" into upper lift. Longitudinal cracking, likely from underlying PCC, lies 8' from CL. <b>(HMA)</b>				
3	GP GM		3 inches Crushed Surfacing Top Course. Medium dense, olive gray, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			Medium dense, brown, fine GRAVEL with silt and sand, moist. <b>(FILL)</b>				
9			Corehole was terminated at 18 inches BGS. No groundwater seepage was observed during the exploration.				
12							
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C- 8

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-15

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, WB, 9.25' from CL.

LOCATION: See Figure 2C  
 DATE COMPLETED: 10/17/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			6.5 inches Hot Mix Asphalt. 2 lifts: 2.75" x 3.75". No cracks in coring location. Lifts are unbonded. Class 1" Mix. Medium severity longitudinal and transverse cracking travels towards CL by approximately 1' and behind core. <b>(HMA)</b>				
3			2.5 inches Crushed Surfacing Top Course. Medium dense, olive gray, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			6 inches Gravel Backfill. Medium dense to dense, brown, fine, poorly graded GRAVEL with silt and sand, moist. <b>(FILL)</b>				
			6 inches Portland Cement Concrete. <b>(PCC)</b>				
			Medium dense, brown, silty SAND with gravel, moist. <b>(FILL)</b>				
9			Corehole was terminated at 25 inches BGS. No groundwater seepage was observed during the exploration.				
12							
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



GEOSCIENCES INC.

211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C- 9

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-16

EXCAVATION COMPANY: HWA GeoSciences Inc.  
 EXCAVATING EQUIPMENT: 6-inch Diameter Core Barrel  
 STREET: 211th Ave NE, EB, 9.3' from CL.

LOCATION: See Figure 2C  
 DATE COMPLETED: 10/17/23  
 LOGGED BY: S. Pemble

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			4.25 inches Hot Mix Asphalt. 2 lifts: 2" x 2.25". Cored on high severity alligator cracking and raveling. Upper lift is unbonded and cracked through. <b>(HMA)</b>				
3			2.75 inches Crushed Surfacing Top Course. Very dense, dark grayish brown, fine, crushed GRAVEL with silt and sand, moist. <b>(CSTC)</b>				
6			Dense, olive brown, fine GRAVEL with silt and sand, moist. <b>(FILL)</b>				
6			Medium dense, dark brown GRAVEL with silt and sand, moist.				
9			Corehole was terminated at 22 inches BGS. No groundwater seepage was observed during the exploration.				
12							
15							

PAVEMENT CORE PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



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211th Place Corridor Improvements Project  
 Arlington, Washington

PAVEMENT CORE  
 C-10

PAGE: 1 of 1

PROJECT NO.: 2023-049-21 FIGURE: A-17

## APPENDIX B

# LABORATORY INVESTIGATION

## APPENDIX B

### LABORATORY INVESTIGATION

Representative soil samples obtained from our explorations were placed in plastic bags to prevent loss of moisture and transported to our Bothell, Washington, laboratory for further examination and testing. Laboratory tests were conducted on selected soil samples to characterize relevant engineering and index properties of the site soils. Laboratory testing was conducted as described below. A Summary of Material Properties is provided on [Figures B-1 through B-3](#).

**MOISTURE CONTENT OF SOIL:** The moisture content of selected soil samples (percent by dry mass) was determined in general accordance with ASTM D 2216. The results are shown at the sampled intervals on the appropriate summary logs in [Appendix A](#) and on the Summary of Material Properties provided on [Figures B-1 through B-3](#).

**PARTICLE SIZE ANALYSIS OF SOILS:** Selected samples were tested to determine the particle (grain) size distribution of material in general accordance with ASTM D6913 and ASTM D7928/D6913. The results are summarized on the attached Particle Size Analysis of Soils report, [Figures B-4 through B-9](#), which also provide information regarding the classification of the sample, and the moisture content at the time of testing.

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
BH-1,S-1a	2.5	3.2	18.3									SM	Dark olive-brown, silty SAND
BH-1,S-1b	3.2	4.0	32.4						37.2	62.8		ML	Dark yellowish-brown, sandy SILT
BH-1,S-2	5.0	6.5	23.2						43.2	56.8		ML	Light olive-brown, sandy SILT
BH-1,S-3	7.5	9.0	11.3									SM	Yellowish-brown, silty SAND with gravel
BH-1,S-4	10.0	11.5	4.3					48.9	44.3	6.8		GP-GM	Olive-brown, poorly graded GRAVEL with silt and sand
BH-1,S-5	12.5	14.0	9.8									GP-GM	Olive, poorly graded GRAVEL with silt and sand
BH-1,S-6	15.0	16.5	21.9									SM	Olive-brown, silty SAND
BH-1,S-7	20.0	21.5	24.3									SP-SM	Olive-brown, poorly graded SAND with silt
BH-2,S-1	0.5	2.0	5.6									SM	Olive-brown, silty SAND with gravel
BH-2,S-3b	5.2	6.5	3.8					47.0	47.5	5.5		SP-SM	Olive-brown, poorly graded SAND with silt and gravel
BH-2,S-4	7.5	9.0	3.9									SP-SM	Olive-brown, poorly graded SAND with silt and gravel
BH-2,S-5	10.0	11.5	5.3									SP-SM	Olive, poorly graded SAND with silt
BH-2,S-6	12.5	14.0	7.6					0.4	87.2	12.4		SM	Olive-gray, silty SAND
BH-2,S-7b	15.3	16.5	5.6									SP-SM	Olive-gray, poorly graded SAND with silt
BH-2,S-8	17.5	19.0	7.0									SP-SM	Olive, poorly graded SAND with silt
BH-2,S-10	25.0	26.5	22.7									SP-SM	Dark olive-gray, poorly graded SAND with silt
BH-2,S-11	30.0	31.5	24.0					0.0	92.3	7.7		SP-SM	Olive-gray, poorly graded SAND with silt
BH-2,S-12	35.0	36.5	25.1									SP-SM	Olive-gray, poorly graded SAND with silt
BH-2,S-13	40.0	41.5	27.7									SP-SM	Olive-gray, poorly graded SAND with silt
BH-2,S-14	45.0	46.5	27.8									SP-SM	Olive-gray, poorly graded SAND with silt

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.  
 2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



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211th Place Corridor Improvements Project  
 Arlington, Washington

SUMMARY OF  
 MATERIAL PROPERTIES

PAGE: 1 of 3

PROJECT NO.: 2023-049-21

FIGURE: B-1

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
BH-2,S-15	50.0	51.5	28.1									SP-SM	Olive-gray, poorly graded SAND with silt
BH-2,S-16	55.0	56.5	27.9									SP-SM	Dark gray, poorly graded SAND with silt
BH-2,S-17	60.0	61.5	30.4					0.2	85.6	14.2		SM	Olive-gray, silty SAND
BH-4,S-1	2.5	4.0	8.3									SP-SM	Olive-brown, poorly graded SAND with silt and gravel
BH-4,S-2	5.0	6.5	5.9									SP-SM	Dark grayish-brown, poorly graded SAND with silt and gravel
BH-4,S-3	7.5	9.0	4.6									GP-GM	Very dark gray, poorly graded GRAVEL with silt and sand
BH-4,GRAB-2	11.5	12.0	2.8					72.4	23.5	4.1		GP	Olive-gray, poorly graded GRAVEL with sand
BH-4,S-5	12.5	14.0	3.9									SP-SM	Dark olive-gray, poorly graded SAND with silt
BH-4,S-6	15.0	16.5	7.3									SP-SM	Olive-gray, poorly graded SAND with silt
BH-4,S-7	20.0	21.5	3.4					0.6	91.0	8.3		SP-SM	Dark grayish-brown, poorly graded SAND with silt
BH-4,S-8	25.0	26.5	8.5									SP-SM	Dark grayish-brown, poorly graded SAND with silt
BH-4,S-9	30.0	31.5	27.6									SP-SM	Dark grayish-brown, poorly graded SAND with silt
BH-5,S-1	2.5	4.0	11.2					0.6	41.8	57.6		ML	Grayish-brown, sandy SILT
BH-5,S-2	5.0	6.5	5.4					12.4	63.9	23.7		SM	Grayish-brown, silty SAND
BH-5,S-3	7.5	9.0	4.2					19.4	73.6	6.9		SW-SM	Olive-brown, well-graded SAND with silt and gravel
BH-5,S-4	10.0	11.5	3.2									SP-SM	Olive-brown, poorly graded SAND with silt and gravel
BH-5,S-5	12.5	14.0	4.3									SP-SM	Olive-brown, poorly graded SAND with silt and gravel
BH-5,S-6	15.0	16.5	5.8									SP-SM	Olive-brown, poorly graded SAND with silt
BH-5,S-7	17.5	19.0	7.1									SP-SM	Dark olive-brown, poorly graded SAND with silt
BH-5,S-8	20.0	21.5	5.5						94.4	5.6		SP-SM	Dark olive-brown, poorly graded SAND with silt

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.  
 2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



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211th Place Corridor Improvements Project  
 Arlington, Washington

SUMMARY OF  
 MATERIAL PROPERTIES

PAGE: 2 of 3

PROJECT NO.: 2023-049-21

FIGURE: B-2

EXPLORATION DESIGNATION	TOP DEPTH (feet)	BOTTOM DEPTH (feet)	MOISTURE CONTENT (%)	ORGANIC CONTENT (%)	SPECIFIC GRAVITY	ATTERBERG LIMITS (%)			% GRAVEL	% SAND	% FINES	ASTM SOIL CLASSIFICATION	SAMPLE DESCRIPTION
						LL	PL	PI					
BH-6,S-1a	2.5	3.0	20.2						17.8	52.5	29.7	SM	Dark yellowish-brown, silty SAND with gravel
BH-6,S-1b	3.0	4.0	9.5									SM	Yellowish-brown, silty SAND
BH-6,S-2	5.0	6.5	10.7						2.3	76.8	20.9	SM	Light olive-brown, silty SAND
BH-6,S-3	7.5	9.0	4.7									SP-SM	Light olive-brown, poorly graded SAND with silt and gravel
BH-6,S-4	10.0	11.5	6.0						31.1	62.3	6.6	SP-SM	Olive-brown, poorly graded SAND with silt and gravel
BH-6,S-5	12.5	14.0	8.4									SP-SM	Olive-brown, poorly graded SAND with silt
BH-6,S-6	15.0	16.5	5.6									SP-SM	Dark gray, poorly graded SAND with silt and gravel
BH-6,S-7	17.5	19.0	6.6									SP-SM	Dark gray, poorly graded SAND with silt
BH-6,S-8	20.0	21.5	5.2									SP-SM	Very dark grayish-brown, poorly graded SAND with silt and gravel

Notes: 1. This table summarizes information presented elsewhere in the report and should be used in conjunction with the report test, other graphs and tables, and the exploration logs.  
 2. The soil classifications in this table are based on ASTM D2487 and D2488 as applicable.



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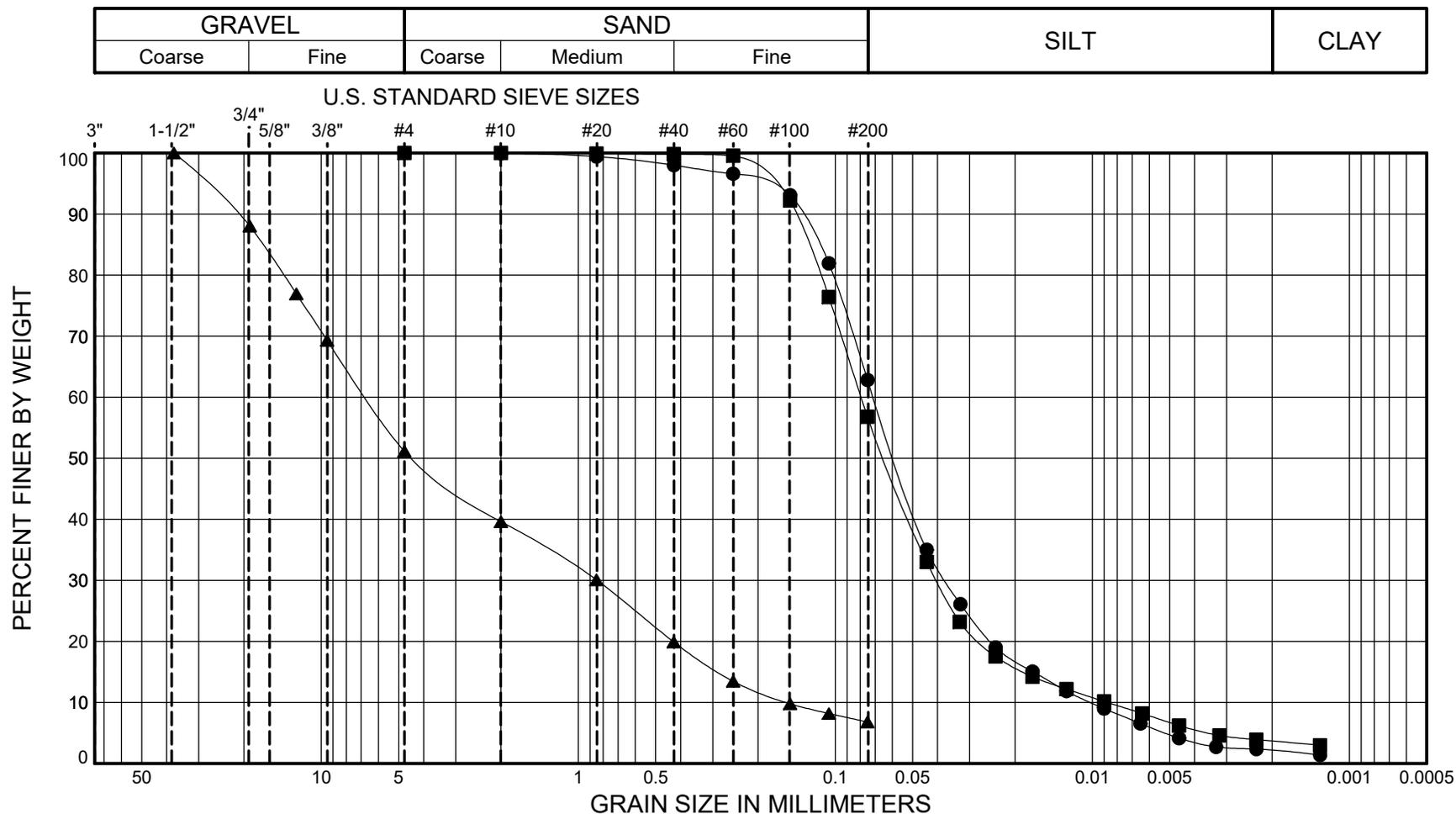
211th Place Corridor Improvements Project  
 Arlington, Washington

SUMMARY OF  
 MATERIAL PROPERTIES

PAGE: 3 of 3

PROJECT NO.: 2023-049-21

FIGURE: B-3



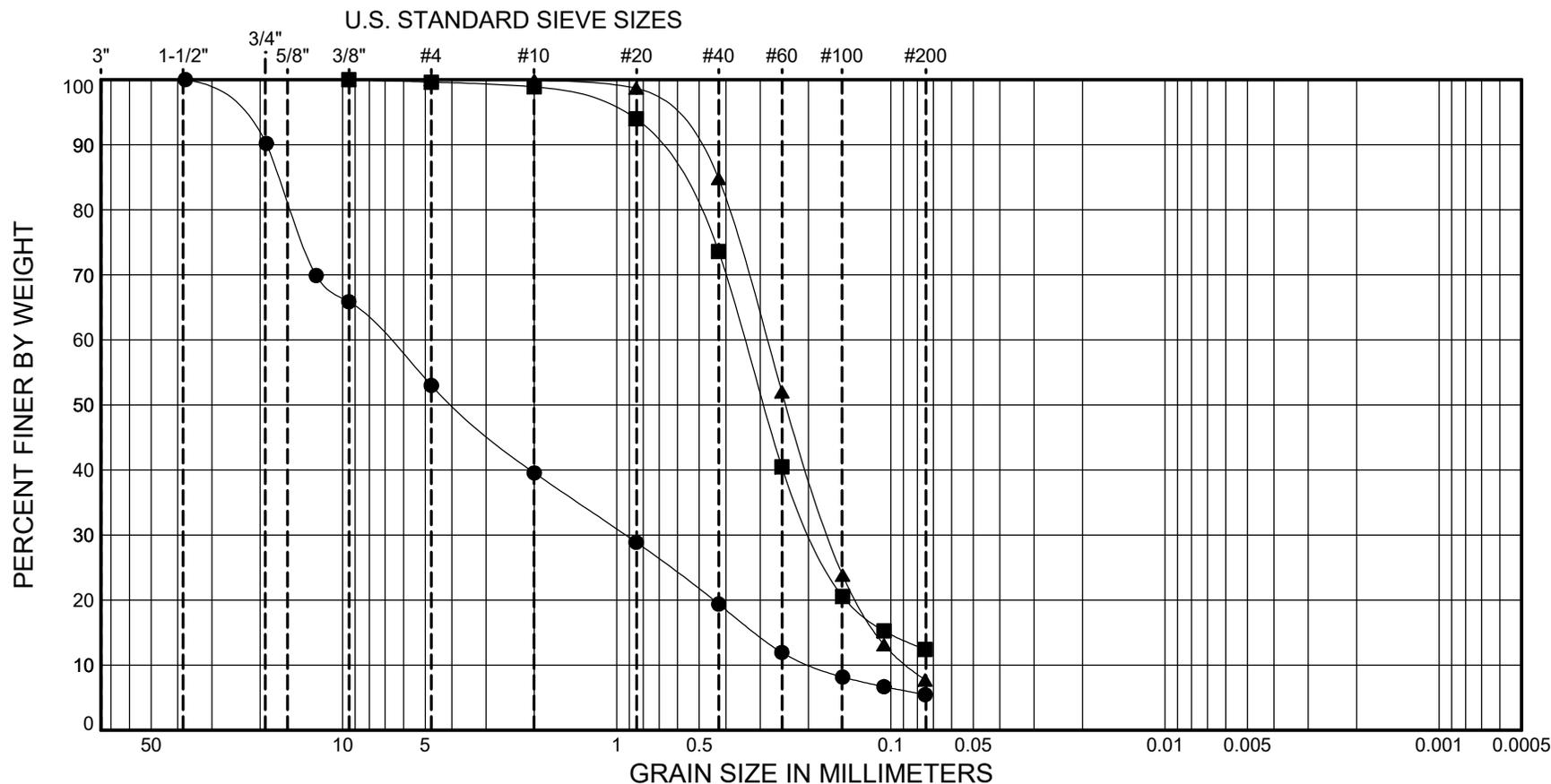
SYMBOL	SAMPLE	DEPTH ( ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	BH-1 S-1b	3.2 - 4.0	(ML) Dark yellowish-brown, sandy SILT	32					37.2	60.7	2.1	
■	BH-1 S-2	5.0 - 6.5	(ML) Light olive-brown, sandy SILT	23					43.2	53.1	3.7	
▲	BH-1 S-4	10.0 - 11.5	(GP-GM) Olive-brown, poorly graded GRAVEL with silt and sand	4				48.9	44.3			6.8



211th Place Corridor Improvements Project  
Arlington, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHODS ASTM D6913/D7928

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH ( ft. )	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	BH-2	S-3b	5.2 - 6.5 (SP-SM) Olive-brown, poorly graded SAND with silt and gravel	4				47.0	47.5			5.5
■	BH-2	S-6	12.5 - 14.0 (SM) Olive-gray, silty SAND	8				0.4	87.2			12.4
▲	BH-2	S-11	30.0 - 31.5 (SP-SM) Olive-gray, poorly graded SAND with silt	24				0.0	92.3			7.7



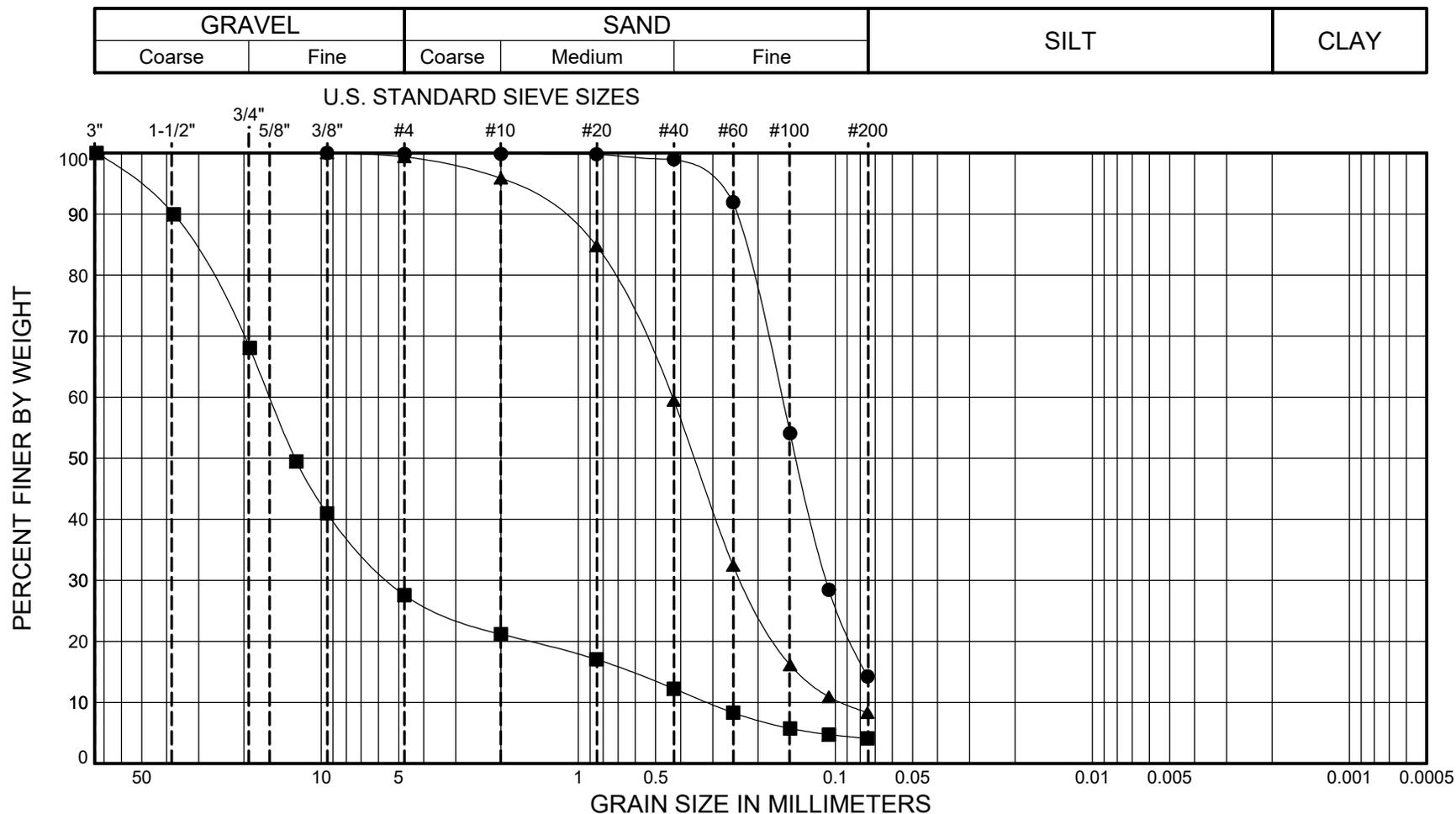
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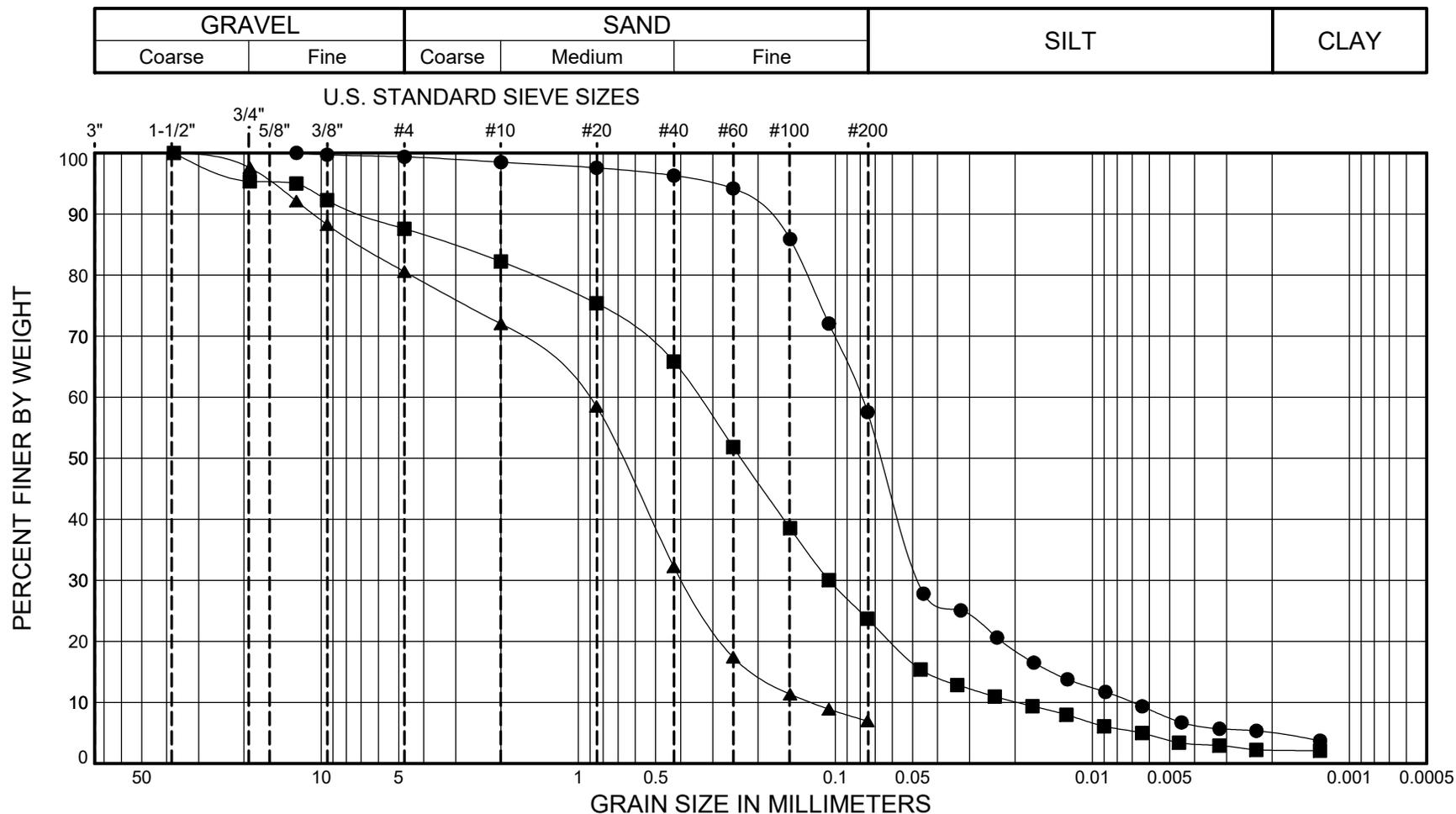
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PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-049-21

FIGURE: B-5





SYMBOL	SAMPLE	DEPTH ( ft. )	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	BH-5 S-1	2.5 - 4.0	(ML) Grayish-brown, sandy SILT	11				0.6	41.8	52.6	5.0	
■	BH-5 S-2	5.0 - 6.5	(SM) Grayish-brown, silty SAND	5				12.4	63.9	21.5	2.2	
▲	BH-5 S-3	7.5 - 9.0	(SW-SM) Olive-brown, well-graded SAND with silt and gravel	4				19.4	73.6			6.9

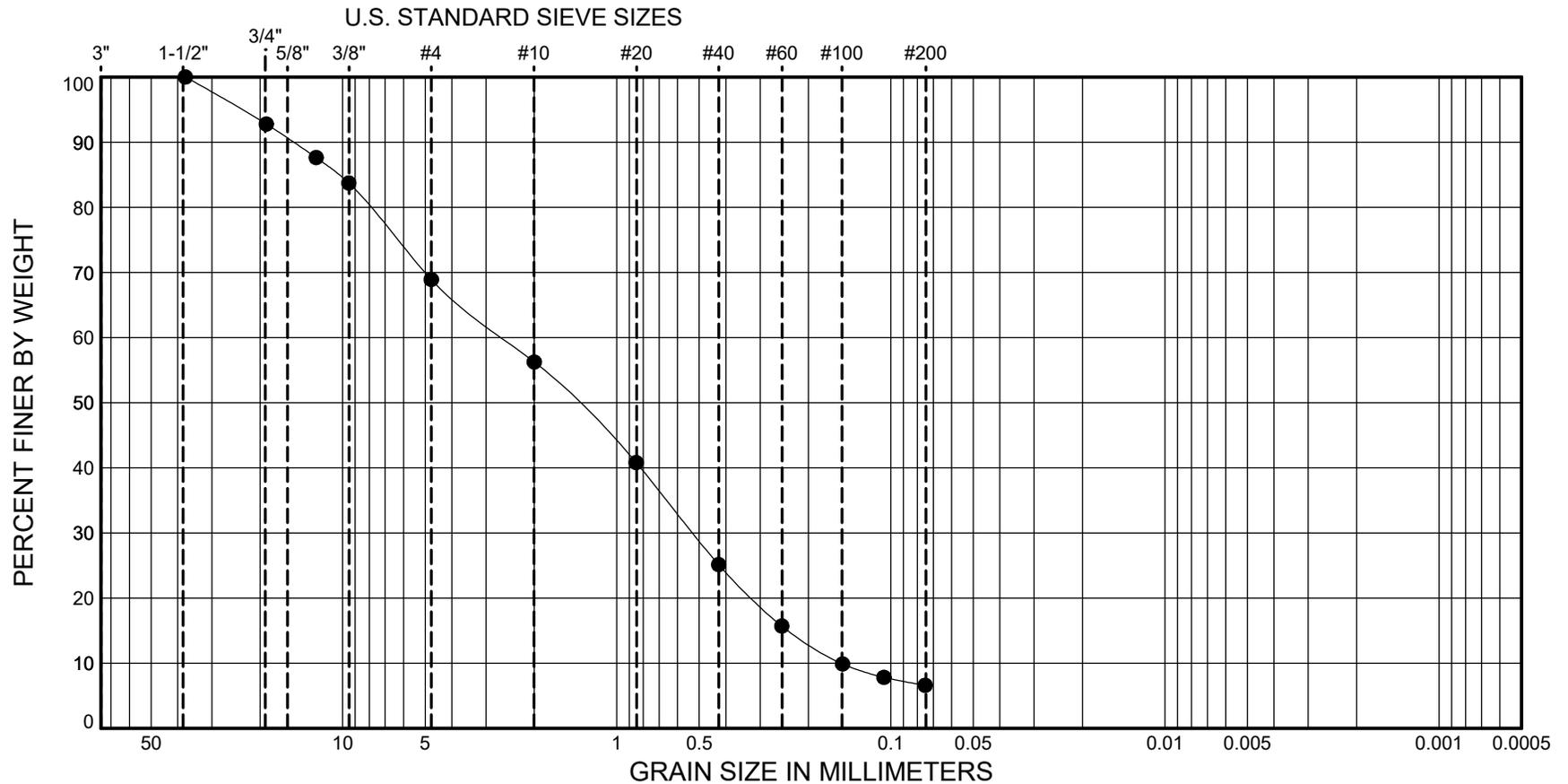


211th Place Corridor Improvements Project  
Arlington, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHODS ASTM D6913/D7928



GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft.)	ASTM SOIL CLASSIFICATION	% MC	LL	PL	PI	Gravel %	Sand %	Silt %	Clay %	Fines %
●	BH-6 S-4	10.0 - 11.5	(SP-SM) Olive-brown, poorly graded SAND with silt and gravel	6				31.1	62.3			6.6



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211th Place Corridor Improvements Project  
Arlington, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHODS ASTM D6913/D7928

PROJECT NO.: 2023-049-21

FIGURE: B-9

## APPENDIX C

### EXPLORATIONS BY OTHERS

Project: sr/530 59th 211 th pl NE  
 Northing: ~436,298 feet      Latitude: 48.188614  
 Easting: ~1,320,719 feet      Longitude: -122.144040  
 Elevation: ~67 feet      Collector: Geotech Office  
 Horizontal/Vertical Datum: NAD 83/91 HARN, SPN / NAVD88  
 Started: June 16, 2022      Completed: June 16, 2022

Job Number: XL6435      Route & MP Range: SR 530 MP 19.20 - 19.90  
 Driller/Inspector: Harrell, Nicholas (#3322T) / Cooper, Rich (#2964)  
 Start Card: SE82444  
AE73407  
 Drilling Method: Casing Advancer      Hole Diam.: 4 in  
 Equipment: CME 45C (ID:9A4-7)      Rod Type: HQ  
 Hammer Type: Autohammer      Historic Efficiency: 91.5%

Depth (feet)	Approximate Elevation (feet)	Profile	Penetration Resistance (blows/ft) Field N      SPT N <sub>60</sub>	Blows/6" (N bpf) and other Field Data	Sample Type	Sample Number	Lab Tests	Material Description	Water Observations	Backfill
0										
3										
9										
16										
18										
20										
22										
24										
8										
11										
20										
24										
4										
3										
3										
6										
6										
6										
6										
12										
15										
17										
14										
3										
3										
4										
4										
7										

HOLE ENDED AT 21.0 FEET ON 6-16-2022

**NOTES:**

- This is a summary log of the boring. Soil/rock descriptions are derived from visual field identifications and laboratory test data (where tested). See exploration log legend for explanation of graphics and abbreviations.
- The implied accuracy of the location information displayed on this log is typically sub-meter(X,Y) when collected using GPS methods by the Geotechnical Office and sub-centimeter (X,Y,Z) when collected by the Region survey crew.
- Where oversized samplers were used, a correction was made to the N-value per the AASHTO Manual on Subsurface Investigations, 1988.

**BAIL-RECHARGE TEST RESULTS:**

Test Date: June 16, 2022  
 Hole Depth / Casing Depth: 0.0 feet / 19.0 feet  
 Water Depth Before Bailing: 3.0 feet

ELAPSED TIME (minutes)	WATER DEPTH (feet)
0	10.3
1	9.7
2	9.5
3	9.3
5	9.3

Project: sr/530 59th 211 th pl NE Job Number: XL6435 Route & MP Range: SR 530 MP 19.20 - 19.90

Depth (feet)	Approximate Elevation (feet)	Profile	Penetration Resistance (blows/ft) Field N	SPT N <sub>60</sub>	Blows/6" (N bpf) and other Field Data	Sample Type	Sample Number	Lab Tests	Material Description	Water Observations	Backfill
--------------	------------------------------	---------	---	---------------------	---------------------------------------	-------------	---------------	-----------	----------------------	--------------------	----------

- Blow counts per 6-inch increment have not been corrected.
- The groundwater level(s), if shown, represents observations made during drilling and/or stabilized water measured during a bail test. The groundwater level should be considered approximate and will vary based on seasonal and other effects.

10	9.2
15	9.2
20	9.2

Project: sr/530 59th 211 th pl NE  
 Northing: ~436,249 feet      Latitude: 48.188497  
 Easting: ~1,320,856 feet      Longitude: -122.143464  
 Elevation: ~70 feet      Collector: Geotech Office  
 Horizontal/Vertical Datum: NAD 83/91 HARN, SPN / NAVD88  
 Started: June 15, 2022      Completed: June 15, 2022

Job Number: XL6435      Route & MP Range: SR 530 MP 19.20 - 19.90  
 Driller/Inspector: Harrell, Nicholas (#3322T) / Cooper, Rich (#2964)  
 Start Card: SE82444  
AE73407  
 Drilling Method: Casing Advancer      Hole Diam.: 4 in  
 Equipment: CME 45C (ID:9A4-7)      Rod Type: HQ  
 Hammer Type: Autohammer      Historic Efficiency: 91.5%

Depth (feet)	Approximate Elevation (feet)	Profile	Penetration Resistance (blows/ft) Field N      SPT N <sub>60</sub>	Blows/6" (N bpf) and other Field Data	Sample Type	Sample Number	Lab Tests	Material Description	Water Observations	Backfill
7.0	68		20	2 3 14 20 (17) Rec=1.2'	D-1		-grass/sod WELL-GRADED GRAVEL WITH SAND, subangular, medium dense, gray, moist, homogeneous.			
17.0	67		40	17 27 40 50 (67) Rec=1.5'	D-2		WELL-GRADED SAND WITH GRAVEL, subangular, very dense, gray, moist, homogeneous.			
21.0	66		30	31 50/6" (REF) Rec=1.0'	D-3		WELL-GRADED SAND WITH GRAVEL, subangular, very dense, gray, moist, homogeneous.			
22.0	65		40	21 22 16 17 (38) Rec=1.7'	D-4		WELL-GRADED SAND WITH GRAVEL, subangular, dense, gray, moist, homogeneous.			
26.0	64		20	6 5 5 (11) Rec=1.0'	D-5		WELL-GRADED SAND WITH GRAVEL, rounded, medium dense, gray, wet, homogeneous.			
31.0	63		20	3 3 2 2 (5) Rec=0.8'	D-6		WELL-GRADED SAND WITH GRAVEL, rounded, loose, gray, wet, homogeneous.			
36.0	62		20	5 5 7 5 (12) Rec=1.3'	D-7		SILTY SAND WITH GRAVEL, rounded, medium dense, brown, wet, stratified.			
41.0	61		20	4 4 4 4 (8) Rec=1.5'	D-8		POORLY GRADED SAND, loose, brown, wet, homogeneous.			

HOLE ENDED AT 26.0 FEET ON 6-15-2022

**NOTES:**

1. This is a summary log of the boring. Soil/rock descriptions are derived from visual field identifications and laboratory test data (where tested).

**BAIL-RECHARGE TEST RESULTS:**

Test Date: June 15, 2022  
 Hole Depth / Casing Depth: 26.0 feet / 24.0 feet

Project: sr/530 59th 211 th pl NE Job Number: XL6435 Route & MP Range: SR 530 MP 19.20 - 19.90

Depth (feet)	Approximate Elevation (feet)	Profile	Penetration Resistance (blows/ft) Field N	SPT N <sub>60</sub>	Blows/6" (N bpf) and other Field Data	Sample Type	Sample Number	Lab Tests	Material Description	Water Observations	Backfill
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See exploration log legend for explanation of graphics and abbreviations.

- The implied accuracy of the location information displayed on this log is typically sub-meter(X,Y) when collected using GPS methods by the Geotechnical Office and sub-centimeter (X,Y,Z) when collected by the Region survey crew.
- Where oversized samplers were used, a correction was made to the N-value per the AASHTO Manual on Subsurface Investigations, 1988. Blow counts per 6-inch increment have not been corrected.
- The groundwater level(s), if shown, represents observations made during drilling and/or stabilized water measured during a bail test. The groundwater level should be considered approximate and will vary based on seasonal and other effects.

Water Depth Before Bailing: 6.0 feet

ELAPSED TIME (minutes)	WATER DEPTH (feet)
0	6.0
1	15.5
2	14.6
3	13.6
5	13.3
10	12.9
15	12.6
20	12.5
25	12.4
30	12.3

The screenshot shows the City of Arlington website with a COVID-19 information banner at the top. Below the banner is a navigation menu with links for Government, Departments, Doing Business, Living, Visiting, and How Do I... A search bar is located below the navigation menu. A language selection dropdown menu is open, displaying a list of languages. At the bottom of the page, there are four circular icons: Notify Me, Report a Concern, Pay Online, and Agendas & Minutes.

**COVID-19 INFORMATION** COVID-19 Information  
Read On...

Create an Account - Increase your productivity, customize your experience, and engage in information you care about. Sign In

**GOVERNMENT** Government Departments Doing Business Living Visiting How Do I...

**Arlington**  
WASHINGTON

Search...

Select Language

Afrikaans	Bulgarian	Esperanto	Italian	Latin	Mongolian	Russian	Spanish	Ukrainian
Albanian	Catalan	Estonian	Japanese	Latvian	Myanmar (Burmese)	Samoan	Sundanese	Urdu
Amharic	Chichewa	Finnish	Kannada	Lithuanian	Nepali	Scots Gaelic	Swahili	Uyghur
Arabic	Chinese (Simplified)	French	Hindi	Kazakh	Luxembourgish	Norwegian	Serbian	Swedish
Azerbaijani	Chinese (Traditional)	Frisian	Hmong	Khmer	Macedonian	Odia (Oriya)	Sesotho	Tajik
Basque	Corsican	Gaelic	Hungarian	Kinyarwanda	Malay	Persian	Shona	Tamil
Belarusian	Croatian	Georgian	Icelandic	Korean	Malayalam	Polish	Sinhala	Telugu
Bengali	Czech	German	Igbo	Kurdish (Kurmanji)	Maltese	Portuguese	Slovak	Thai
Bosnian	Dutch	Gujarati	Irish	Lao	Marathi	Romanian	Somali	Turkish
								Zulu

Notify Me® Pay Online Report a Concern Agendas & Minutes

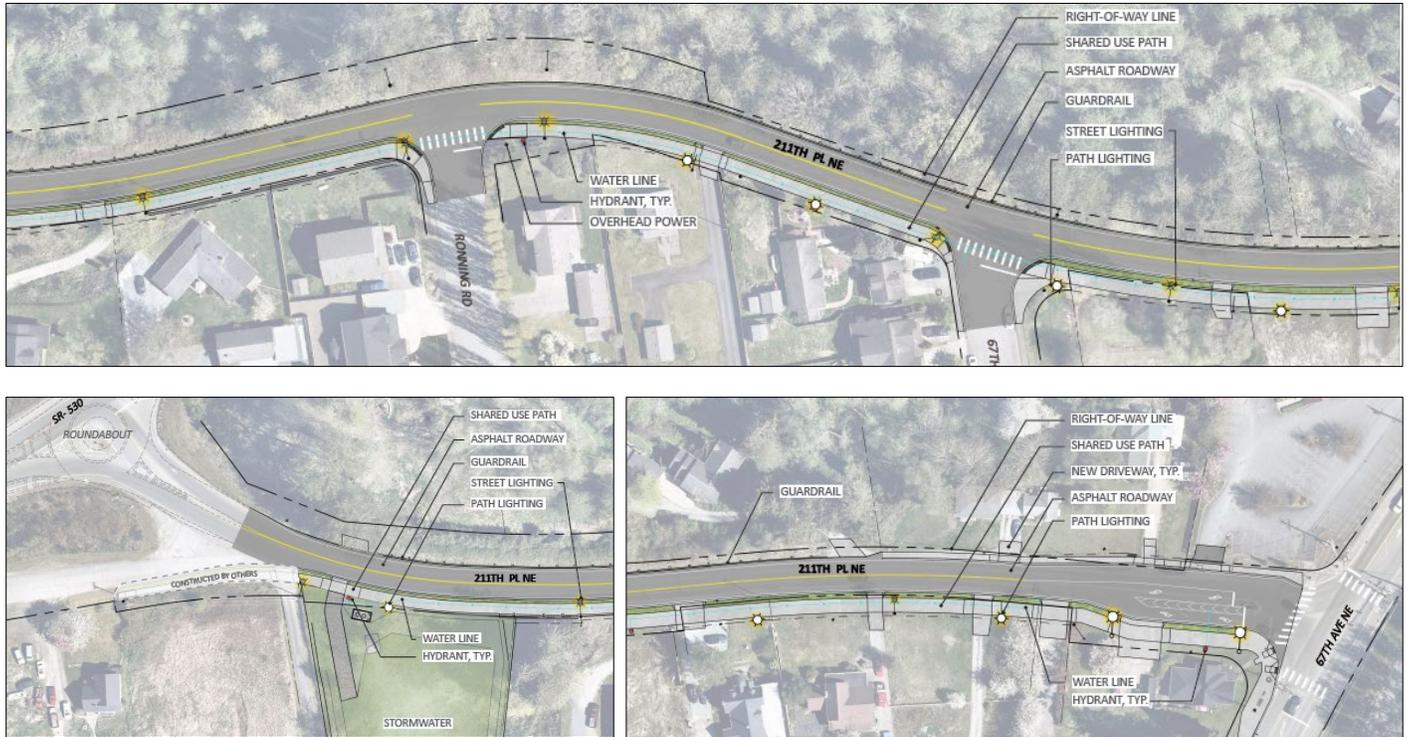
www.arlingtonwa.gov

 Government	Departments	Doing Business	Living	Visiting	How Do I...
<ul style="list-style-type: none"> <li>204th St NE / 74th Ave Intersection Improvement Project</li> <li>74th Ave Trail Project</li> <li>Gleneagle Reservoir Roof Replacement Project</li> <li>Prairie Creek / BNSF Culvert Replacement</li> <li>Smokey Point Blvd Corridor Project</li> <li>Smokey Point Blvd Overlay Project</li> <li>South Cascade Industrial Center Utilities Project</li> <li>SR 530 - 59th &amp; 211th Roundabouts</li> <li>SR-530/Smokey Point Blvd Roundabout</li> <li>SR 531 (172nd St NE)/40th Ave Intersection</li> <li>SR 531 Widening Project</li> <li>Stormwater Wetland Park Maintenance Projects</li> <li>Water Reclamation Facility Modifications</li> </ul>	<p>The City of Arlington will be constructing the first phase of a new two-lane road, 173<sup>rd</sup> St NE. While the planned 173<sup>rd</sup> St alignment will eventually extend between Smokey Point Blvd and Airport Blvd, this first phase will extend from Smokey Point Blvd to 40<sup>th</sup> Ave.</p> <p>This roadway will include a 12-foot wide multi-use path, street lighting, landscaping, low-impact drainage and a privacy and sound fence along the north side of the roadway.</p> <p><b>Project Benefits</b></p> <ul style="list-style-type: none"> <li>• Improve access</li> <li>• Alleviate congestion on 172<sup>nd</sup></li> <li>• Increase Pedestrian Safety</li> <li>• Boost vehicle safety</li> </ul> <p><b>Project Cost and Funding</b></p> <ul style="list-style-type: none"> <li>• Engineer's Estimate: \$2,351,700.00</li> <li>• Funding source: Transportation Improvement Funds</li> </ul> <p><b>Project Schedule</b></p> <ul style="list-style-type: none"> <li>• Design 2020/2021</li> <li>• Estimated bid time: spring 2021</li> <li>• Construction: Fall 2021</li> </ul> <p><b>FAQ's</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Project FAQ Sheet</a></li> </ul> <p><b>Coordination with Local Residents</b></p>		<p><b>Project Documents</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Project Conceptual Plan</a></li> <li>• <a href="#">Fence Alternative Memo</a></li> <li>• <a href="#">Open House Presentation</a></li> <li>• <a href="#">Preliminary Bid Tab</a></li> <li>• <a href="#">Certified Bid Tab</a></li> </ul> <p>To translate documents, download the document then click the link: <a href="https://translate.google.com/">https://translate.google.com/</a></p> <p><b>Project Updates</b></p>		

# 211<sup>th</sup> Place Corridor Improvements 90% Design Open House Survey

EXHIBIT N

The City of Arlington is nearing completion of design for the 211<sup>th</sup> Place Corridor Improvements project. We have taken the community's comments from project survey #1, incorporated them where possible, and have developed the following 90% design. We would like the community's feedback on our 90% design effort.



**What are your thoughts on the proposed concept above?**

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**Are there any minor changes you would like to see addressed as we go into final design.**

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**Which of the below options would be good for the city to evaluate for the project's construction phase (summer 2024)? (check all that apply)**

- Only build half the road at a time so one lane of traffic can continue.
- Contractors should be limited to only nighttime work, allowing equipment to run during night hours.
- Contractors should be limited to daytime work only.
- Close sections of 211<sup>th</sup> Place so the contractor can work quicker and expedite construction.

**Demographic Information**

The City of Arlington complies with Title VI of the Civil Rights Act. Part of that compliance is requesting demographic information from participants responding to this project's outreach and public participation. The following information is requested, you are not obligated to provide this information.

**What is your age?**

- 18 – 24       24 – 29       30 – 34  
 35 – 49       50 – 64       65+

**What gender do you identify with?**

- Female       Male       Prefer not to answer.

**What race/ethnicity do you identify with?**

- Hispanic/Latino  
 Native Hawaiian or Pacific Islander  
 African American/Black  
 Asian  
 White/Caucasian  
 American Indian or Alaska Native  
 Prefer not to answer.

**What is your annual household income?**

- Less than \$15,000  
 \$15,000 - \$30,000  
 \$30,000 - \$50,000  
 \$50,000 - \$75,000  
 \$75,000 - \$100,000  
 More than \$100,000  
 Prefer not to answer.

**If you would like to receive email updates about this project, please supply your email address below.**

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## CITY OF ARLINGTON

## NEW 180TH STREET BETWEEN SMOKEY POINT BLVD AND AIRPORT BLVD

**What's it About?** The City is starting the design process of a new East-West road connecting Smokey Point Boulevard to Airport Boulevard.

*La Ciudad está comenzando el proceso de diseño de una nueva carretera de este a oeste que conecta Smokey Point Boulevard con Airport Boulevard.*



SCAN THE  
QR CODE TO  
GO TO THE  
PROJECT  
WEBSITE!

### Project Benefits

- ◆ Improve vehicle and freight access  
*Mejorar el acceso de vehículos y carga*
- ◆ Provide pedestrian and bicycle facilities  
*Proporcionar facilidades para peatones y bicicletas*
- ◆ Increase safety  
*Aumentar la seguridad*
- ◆ Support new development  
*Apoyar el nuevo desarrollo*

Please join us for an Informational Event in your neighborhood to learn more about this project!

Come enjoy hot dogs, play some games, families encouraged!



*¡Únase a nosotros en un evento informativo en su vecindario para obtener más información sobre este proyecto!  
¡Venga a disfrutar de hot dogs, juega algunos juegos, amigable para familias!*

When: August 22nd, 5-7pm

Where: Smokey Point Community Church Parking Lot, 17721 Smokey Point Boulevard

Questions? (360) 403-3544 • [cityprojects@arlingtonwa.gov](mailto:cityprojects@arlingtonwa.gov)

# Project Overview

# Descripción General del Proyecto

The City has received funding for the design of a two-lane roadway from the 180th St/Smokey Point Blvd intersection east to Airport Blvd. This project includes a multi-use trail on the north side and a sidewalk on the south side with a roundabout at the intersection of 180th St/Airport Blvd. The City will be reaching out to the community to solicit input and feedback on the design of this roadway. Design work will be starting in late fall 2023, the 180th St. Connector project continues the City's goal to develop of a multimodal transportation grid-network in the Smokey Point area.

### Project Benefits

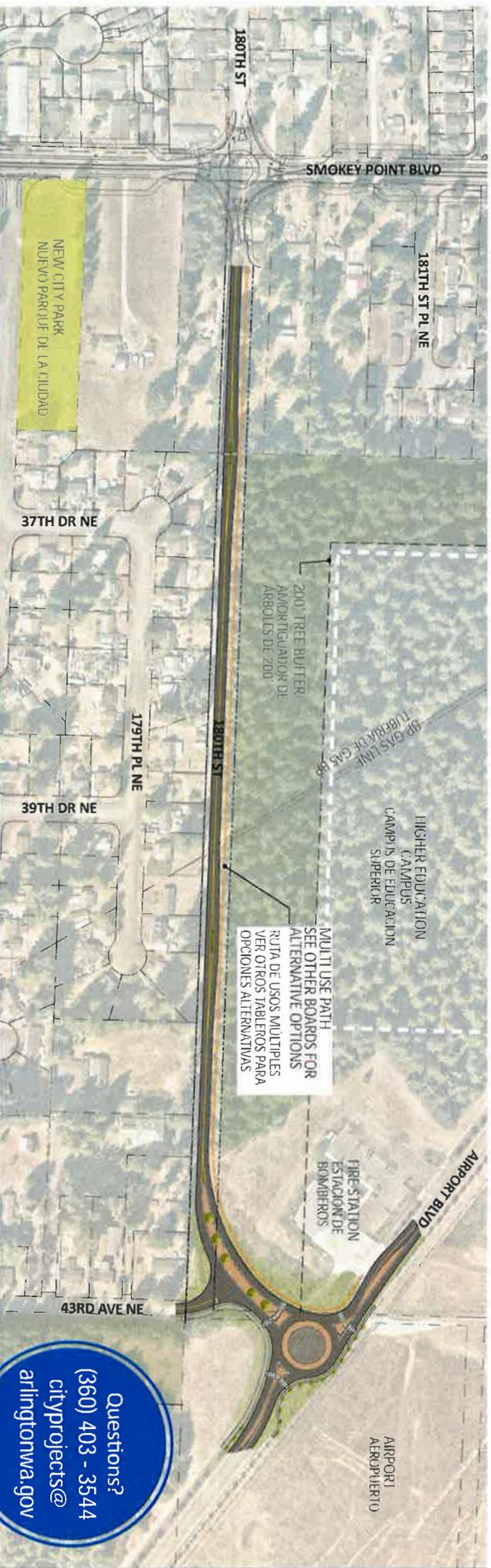
- Provide Multi-Use Path connecting to the Airport Trail
- Increased Emergency Response Time
- Prevents cut-thru southbound traffic on 43rd
- 180th Street is part of a larger Cascade Industrial Center (CIC) master plan
- Project will support new development around Airport Boulevard
- Provides relief to other congested intersections
- Provides an alternative transportation route

### Resumen Del Proyecto

La Ciudad ha recibido fondos para el diseño de una carretera de dos carriles desde la intersección de 180th St/Smokey Point Blvd hacia el este de Airport Blvd. Este proyecto incluye un sendero de usos múltiples en el lado norte y una acera en el lado sur con una rotonda en la intersección de 180th St/Airport Blvd. La Ciudad se comunicará con la comunidad para solicitar opiniones y comentarios sobre el diseño de esta carretera. El trabajo de diseño comenzará a fines de otoño de 2023, el proyecto apoyará el nuevo desarrollo alrededor de Airport Boulevard. El proyecto continuará el objetivo de la ciudad de desarrollar una red de transporte multimodal en el área de Smokey Point.

### Beneficios del proyecto

- Proporcionar una ruta de usos múltiples que conecte con la ruta del aeropuerto
- Mayor tiempo de respuesta a emergencias
- Impide el tráfico en acjio hacia el sur en la calle 43
- 180th Street es parte de un plan maestro más grande del Cascade Industrial Center (CIC)
- El proyecto apoyará el nuevo desarrollo alrededor de Airport Boulevard
- Proporciona alivio a otros intereses congestionados
- Proporciona una ruta de transporte alternativa



## 180th Street Connector Project

City of Arlington | August 2024

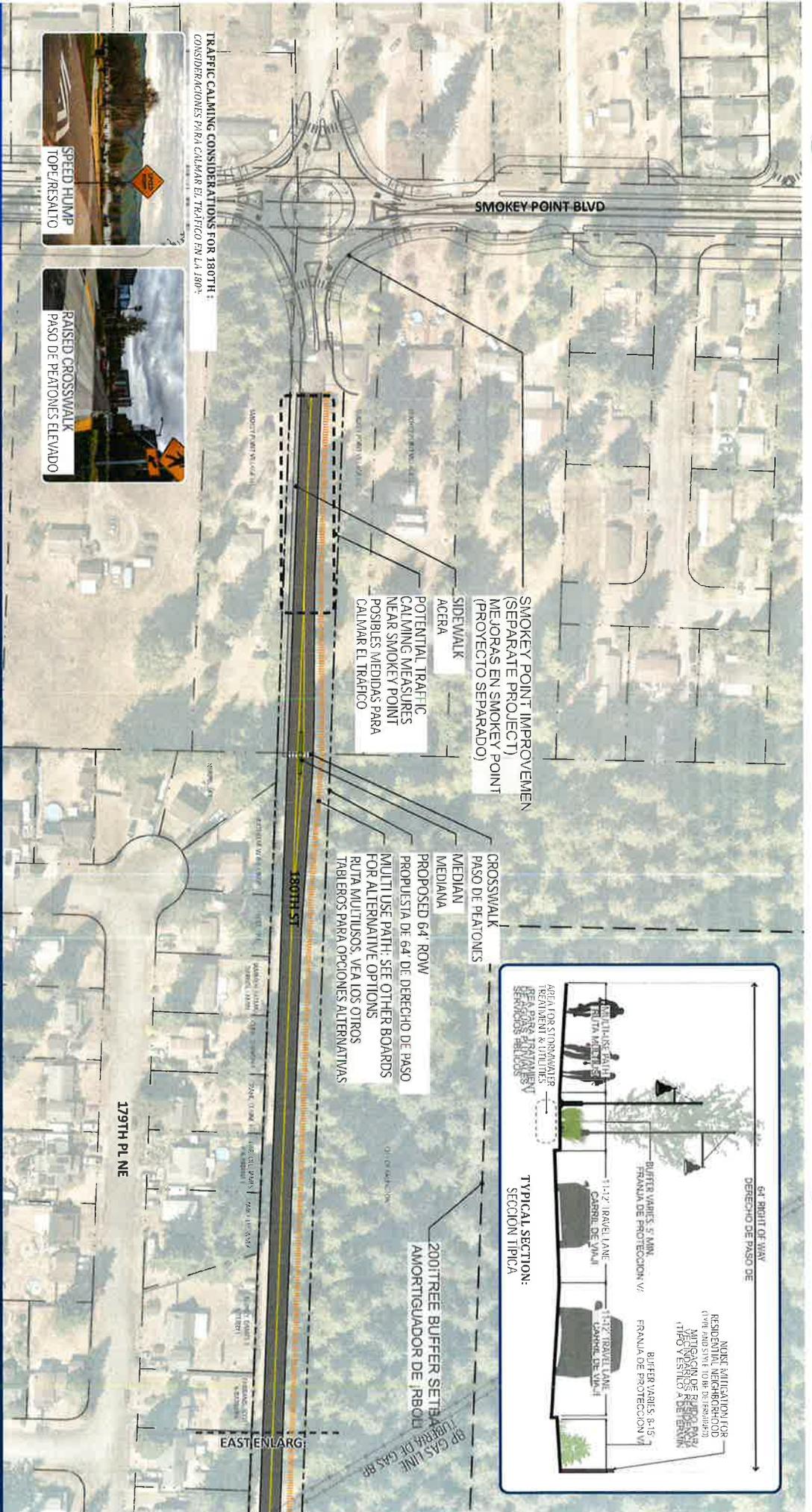
Scan the QR code to go to the project website!



Questions?  
 (360) 403 - 3544  
 cityprojects@arlingtonwa.gov

# Enlargement- West

# Ampliación- Oeste



**TRAFFIC CALMING CONSIDERATIONS FOR 180TH :**  
 CONSIDERACIONES PARA CALMAR EL TRAFICO EN LA 180th



**180th Street Connector Project**  
 City of Arlington | August 2024

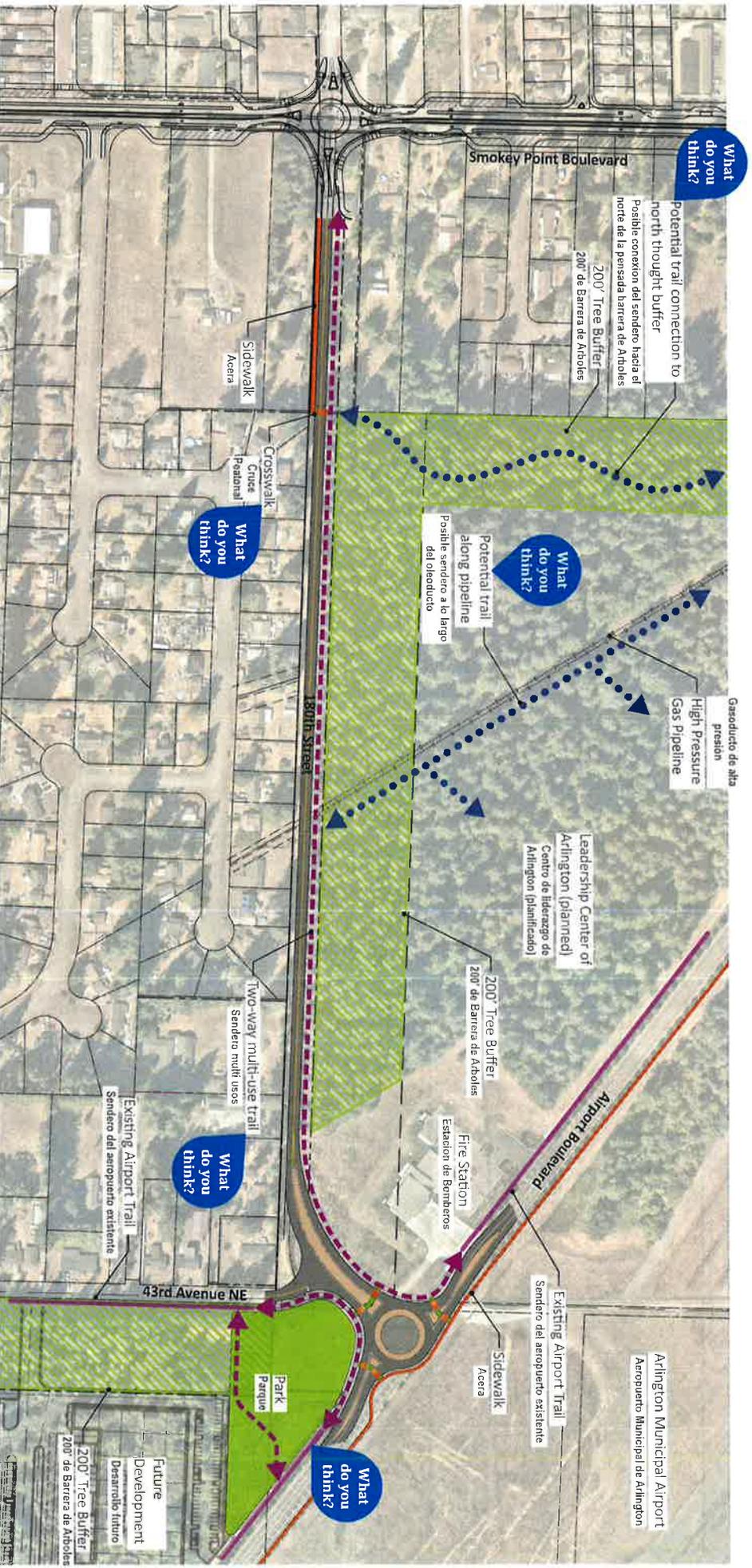
Scan the QR code to go to the project website!

0 50 100



# Trail Concept 1: Basic Trail

# Concepto 1: Sendero Básico



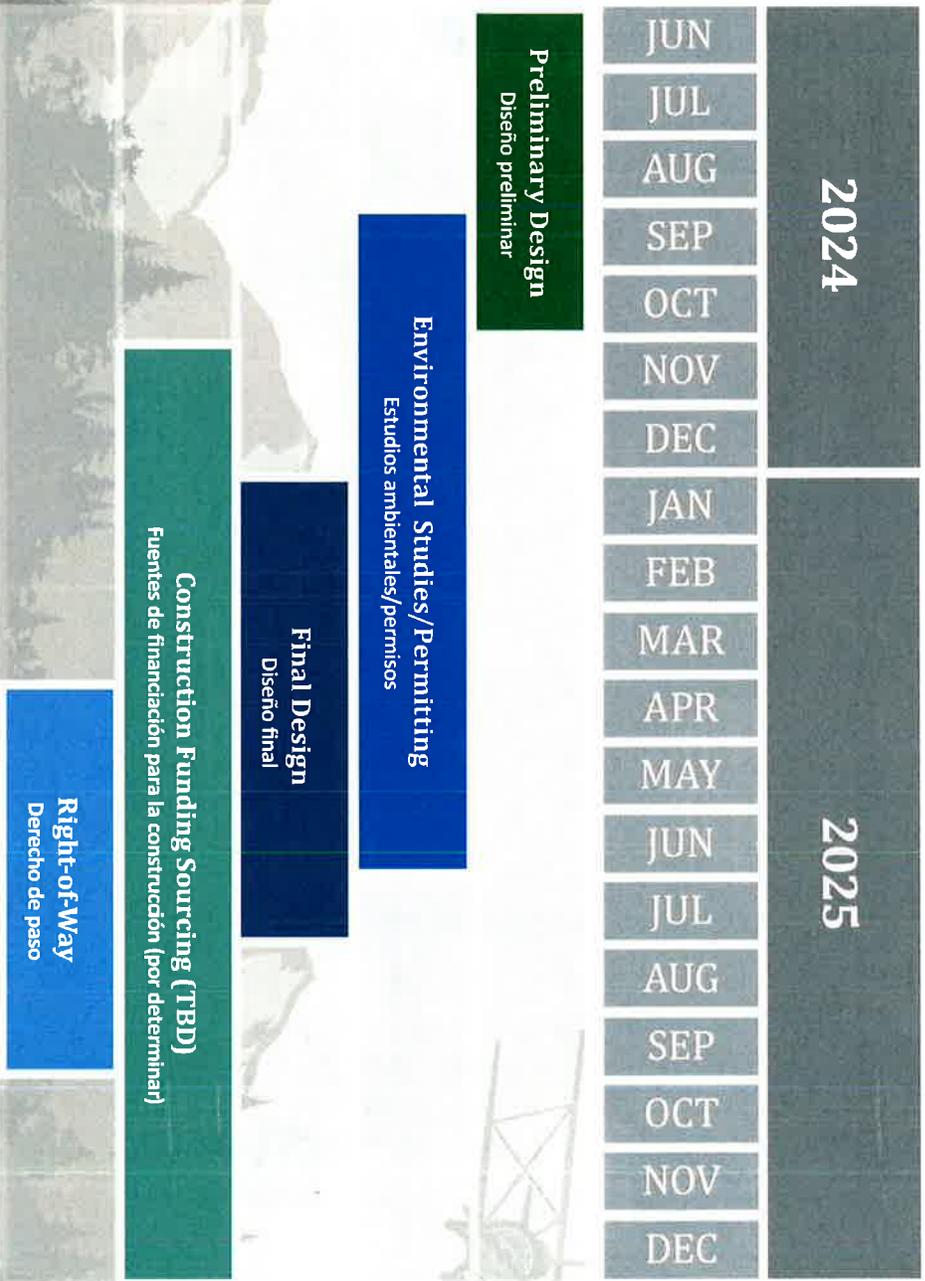
180th Street Connector Project  
City of Arlington | August 2024





# Project Schedule

# Cronograma del Proyecto

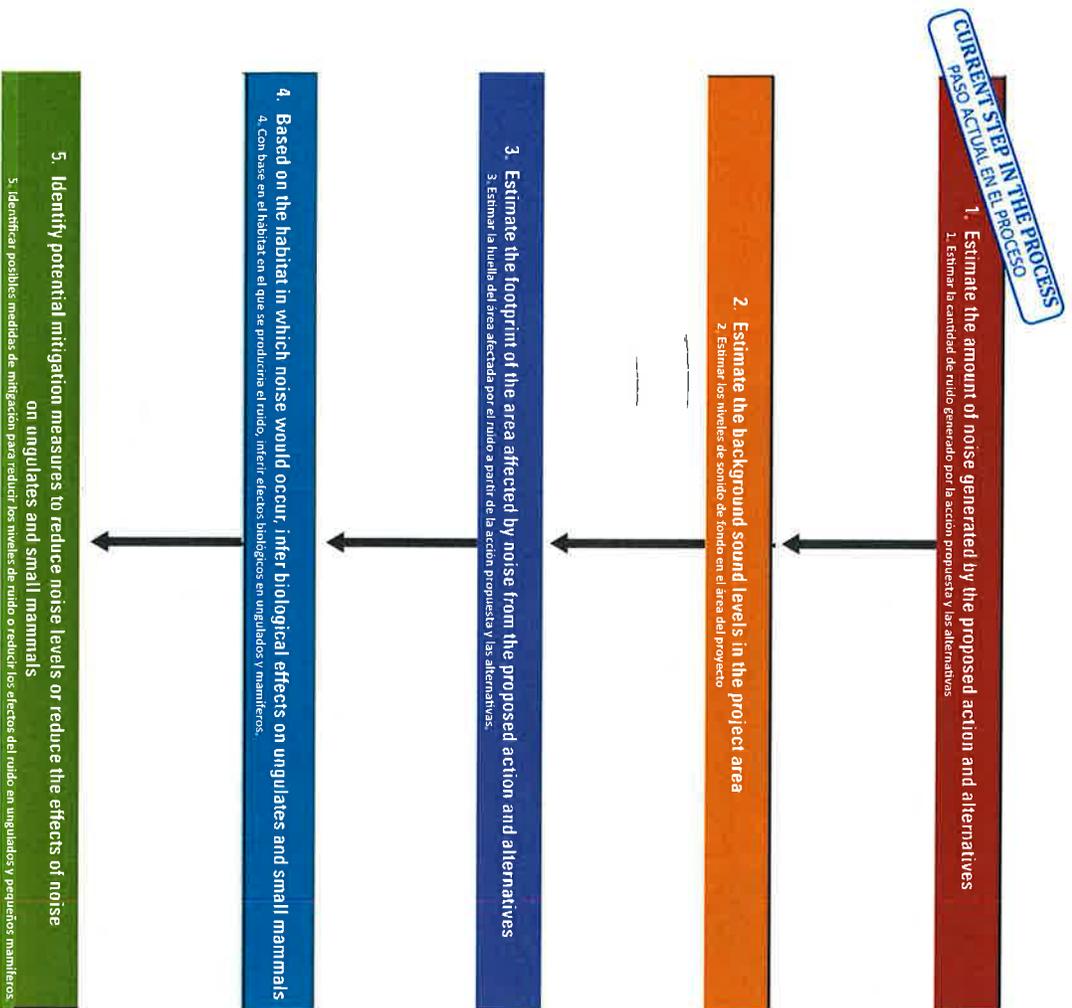


**180th Street Connector Project**  
City of Arlington | August 2024



Questions?  
(360) 403 - 3544  
cityprojects@arlingtonwa.gov

# Noise Study Review Process

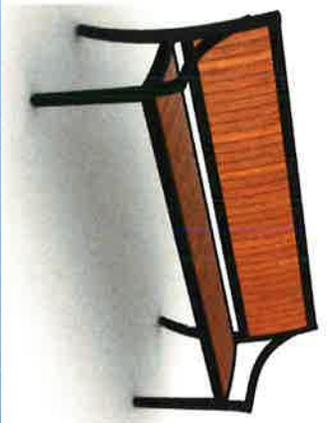


**180th Street Connector Project**  
City of Arlington | August 2024



# Amenities

# Comodidades



**STREET FURNISHINGS (MATCH SMOKEY POINT IMPROVEMENTS):**  
*Contemporary with traditional elements, differentiates the corridor from downtown Arlington*

**MOBILIARIO URBANO (MEJORAS EN EL SMOKEY POINT):**  
*Contemporáneo con elementos tradicionales, diferencia el corredor del centro de la ciudad.*



## 180th Street Connector Project

City of Arlington | August 2024

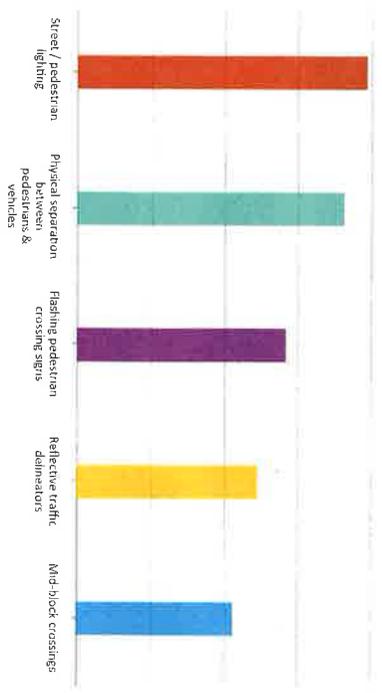
Scan the QR code to go to the project website!



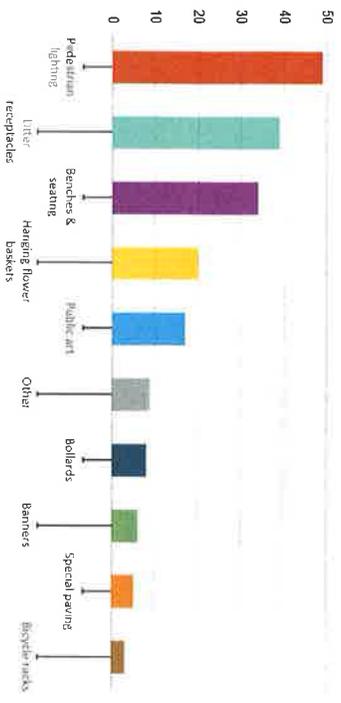
# Survey Results

63 Survey Responses:

Rank (1-5) what features would make you feel safer when using 180th Street?:



What pedestrian amenities are most important to you?



Comments from 1st Public Survey :

This is a wonderful addition to routing traffic in other directions.

I hope the project fixes speeding issues and that children will be safer :)

Keep a good sized buffer for wildlife!!!!

Love to see Arlington addressing the increasing growth in positive ways.

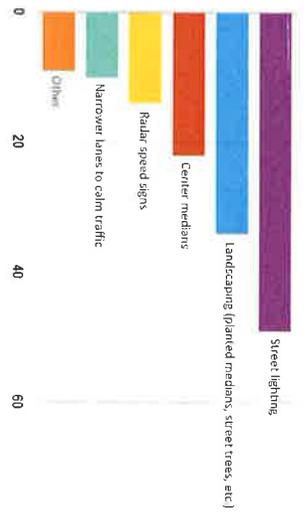
Something has to be done to alleviate the traffic mess in Arlington.

High fencing along the backyards that run along this road

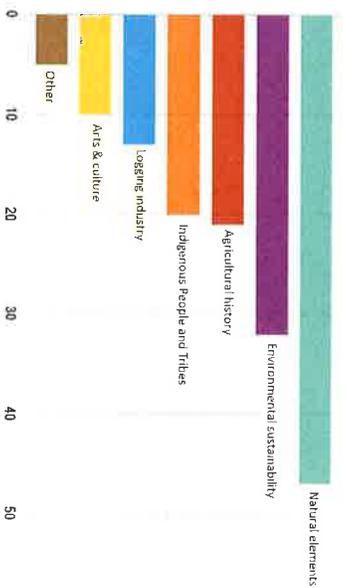
Street racing, drug use and dumping are issues already on Airport Blvd!

Perfectly straight road. Speed will be an issue.

What roadway features are most important to you?



Thinking about the history and character of the area, what design elements should be included?



180th Street Connector Project  
City of Arlington | August 2024

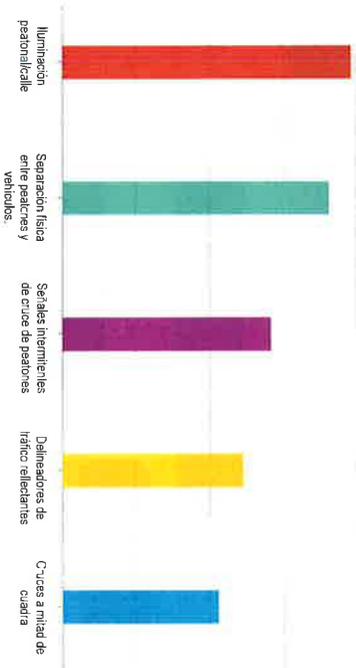


Scan the QR code to go to the project website!

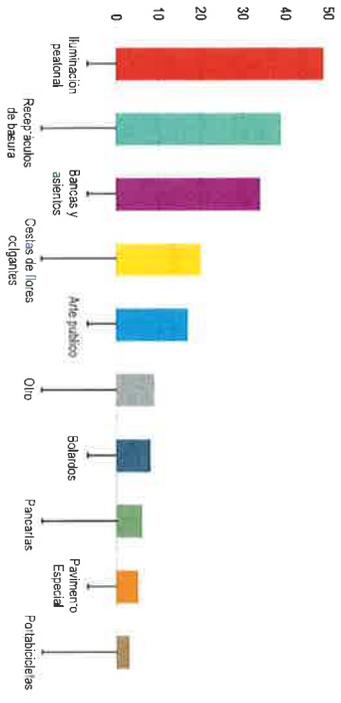
# Resultados de la Encuesta

## 63 Respuestas a la Encuesta

Califique (1-5) ¿Qué características le harían sentir más seguro al usar la Calle 1807?



¿Qué servicios para peatones son más importantes para usted?



## Comentarios de la primera encuesta pública:

Esta es una maravillosa adición para dirigir el tráfico en otras direcciones.

Mantengan una zona de buen tamaño para la vida silvestre!!!

Espero que el proyecto solucione los problemas de velocidad y que los niños estén más seguros :)

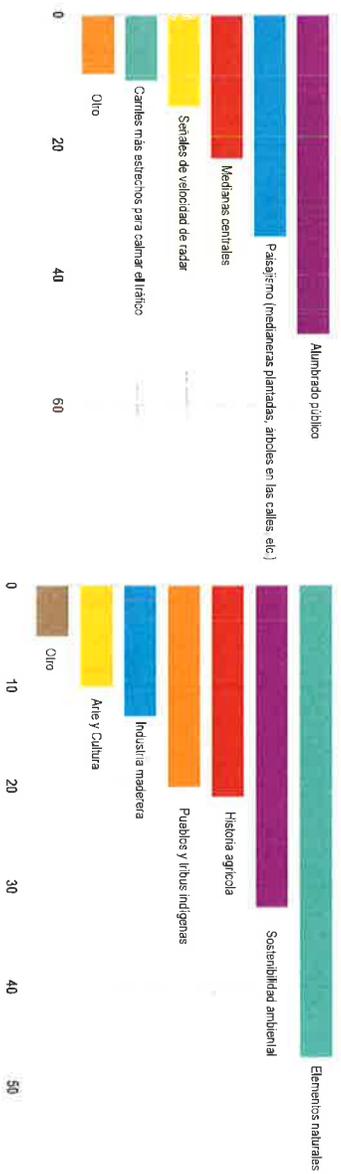
Hay que hacer algo para aliviar el desorden de tráfico en Arlington.

Las carreteras/callejeras, el consumo de drogas y vagancia ya son problemas en Airport Blvd!!!

Vallas altas a lo largo de los patios traseros que aseguran a lo largo de esta carretera.

Carrino perfectamente recto. La velocidad será un problema.

¿Qué características de carretera son más importantes para usted?



Pensando en la historia y el carácter de la zona, ¿qué elementos de diseño deberían incluirse?



SCU ALLIANCE

180th Street Connector Project  
City of Arlington | August 2024

Scan the QR code to go to the project website!





## Technical Memo

**To** Jim Kelly, PE and Katy Shores (City of Arlington)  
**From:** Madison Wright, PE (SCJ Alliance)  
**Date:** October 16, 2024 6-7pm  
**Project:** 180<sup>th</sup> Corridor  
**Subject** 180<sup>th</sup> Corridor Public Zoom Meeting

---

### Introduction:

On October 16th, 2024, at 6:00 PM, a public Zoom meeting was held to gather public opinions on the 180th Corridor Project. Previous public events included an in-person pop-up event and a public Zoom meeting. After considering the public feedback collected at the previous events on the initial design, SCJ Alliance, the City of Arlington, and MacLeod Reckord revisited the plans to propose new roadway layouts that better addressed the community's concerns. During this Zoom meeting, the community was presented with three layouts to review—one being the original layout and the other two being the new layouts. Attendees were encouraged to ask questions using Zoom's chat feature, which were addressed at the end of the meeting.

### 1 Panelist

Jim Kelly (City of Arlington)

Dan Irelan (SCJ Alliance)

Madison Wright (SCJ Alliance)

David Saxen (MacLeod Reckord)

## 2 Attendance

<b>BF</b> Barbara Farrand (Guest)	<b>L</b> Linda (Guest)
<b>BR</b> Beth Robbins (Guest)	<b>LZ</b> Lu Zhang (Guest)
<b>BD</b> Bob Dietz (Guest)	<b>MK</b> MacKenna Kelly (Guest)
<b>BC</b> Bri Carroll (Guest)	<b>MG</b> Madhu Gadde (Guest)
<b>B</b> BrittneyBrandt (Guest)	<b>MP</b> Mike Phillips (Guest)
<b>C</b> Chris (Guest)	<b>M</b> Mitch (Guest)
<b>G</b> gayle (Guest)	<b>R</b> Raja (Guest)
<b>JS</b> Jan Schuette, Arlington City Co... (Guest)	<b>SO</b> Sally Omally (Guest)
<b>KS</b> Katy Shores (Guest)	<b>SL</b> Sean Ludviksen (Guest)
<b>LU</b> Laura Uskevich (Guest)	<b>TS</b> Tim Shoultz - SMARTCAP CEO (Guest)

## 3 Meeting Minutes

**BF** **Barbara Farrand** (Guest) 06:36 PM

Those of us in the neighborhood use the 43rd access to get in and out of our neighborhood effectively. Having access from southbound Airport to 43rd is important to us and would be lost in layout 1 and 2

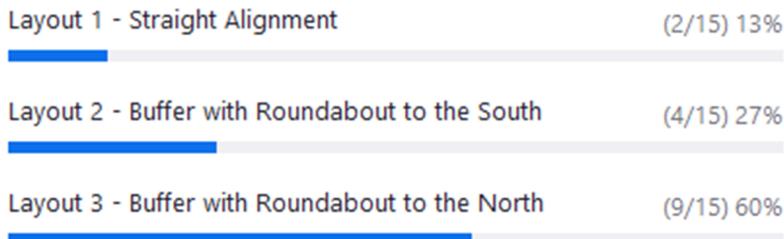
1. How close do you live to the project site? (Single choice)

16/16 (100%) answered



2. Which Layout do you prefer? (Single choice)

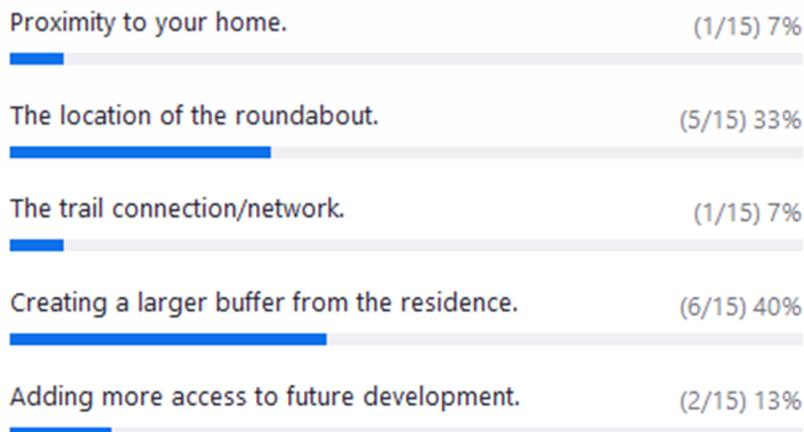
15/16 (93%) answered



\*An email was received after the meeting with an additional vote for layout 3

3. What influenced your decision the most? (Single choice)

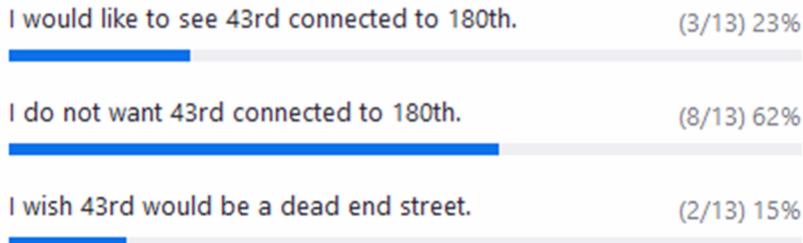
15/16 (93%) answered





4. What represents your opinion of the 43rd Avenue Connection?  
(Single choice)

13/16 (81%) answered



**Anonymous attendee** 07:03 PM

Thank you for addressing our concerns!

## 4 Questions and Answers



**Mitch** (Guest) 06:09 PM

Why is the buffer between the airport and the road instead of between our neighborhood and the road?



**Madison Wright (You)** 06:10 PM

Hi Mitch! We will be covering this a little later on in the presentation!



**Bri Carroll** (Guest) 06:11 PM

If the tree buffer is supposed to go along 43rd also, why are all of the shrubs currently being cleared out?

Its is being done to help with the homeless encampment issues in the area.



**Beth Robbins** (Guest) 06:20 PM

So what 8 am hearing is that the 5' wide trail is in the north side of the road. Does that mean that the road is up against the fence line?

Not a great idea when there could be freight trucks driving by our homes.

There would be approximately a 8-15 ft buffer for layout 1.

**BF** **Barbara Farrand** (Guest) 06:28 PM

Is the raingarden basically a drainage pond?

**M** **Madison Wright (You)** 06:28 PM   
Yes, it would be a stormwater pond most likely.

**R** **Raja** (Guest) 06:35 PM

Does 54 ft ROW on 3rd option runs from Smokey Point Blvd to Airport Road?

**M** **Madison Wright (You)** 06:37 PM   
Yes, the ROW would be 54' along the whole 180th project.

**B** **BrittneyBrandt** (Guest) 06:46 PM

Do you have an estimated time to start building and which part of the road?

This is to be determined, 2026 at the earliest.

**M** **Mitch** (Guest) 06:48 PM

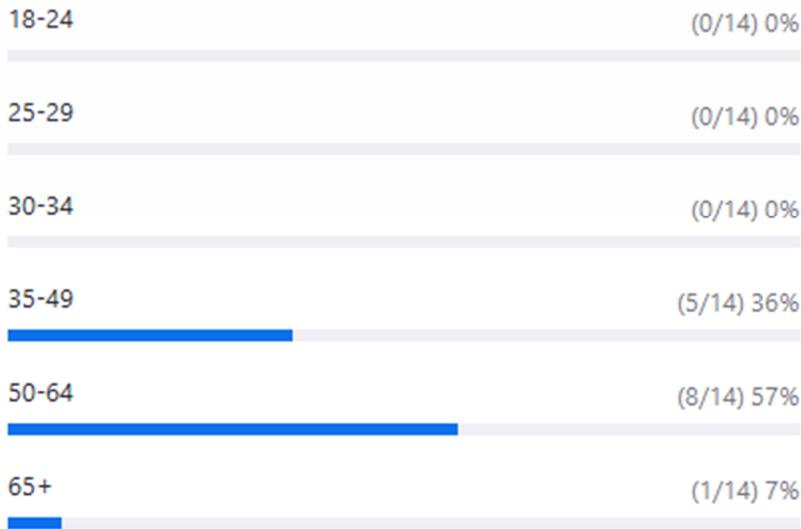
Is there a study queued up if there are changes to the value of our property if the you go with layout 1?

We will get more info and follow up with you on this question.

## 5 Meeting Demographics

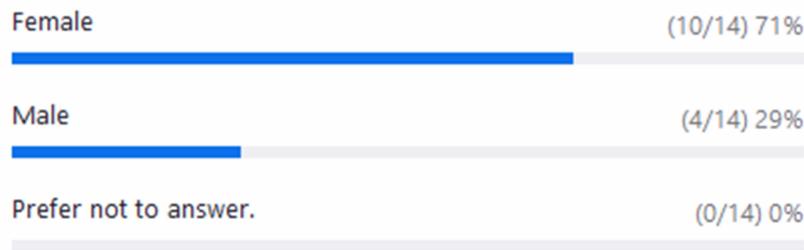
### 1. What is your age? (Single choice)

14/14 (100%) answered



### 2. What gender do you identify with? (Single choice)

14/14 (100%) answered





3. What race/ethnicity do you identify with? (Single choice)

13/14 (92%) answered

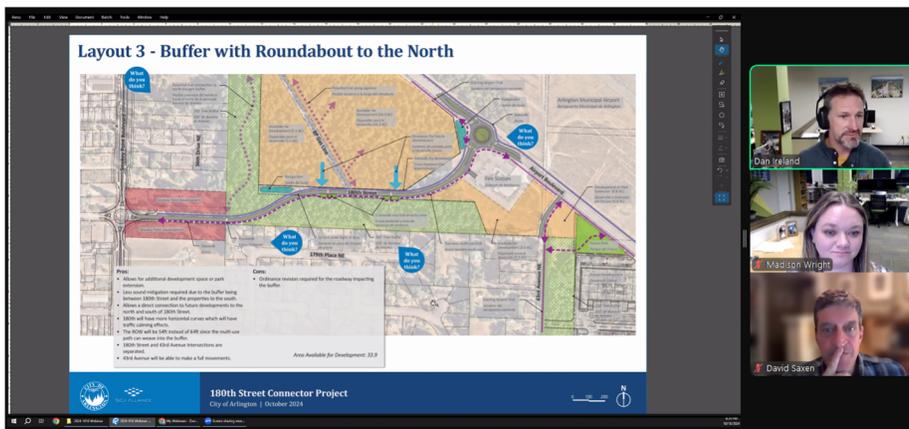
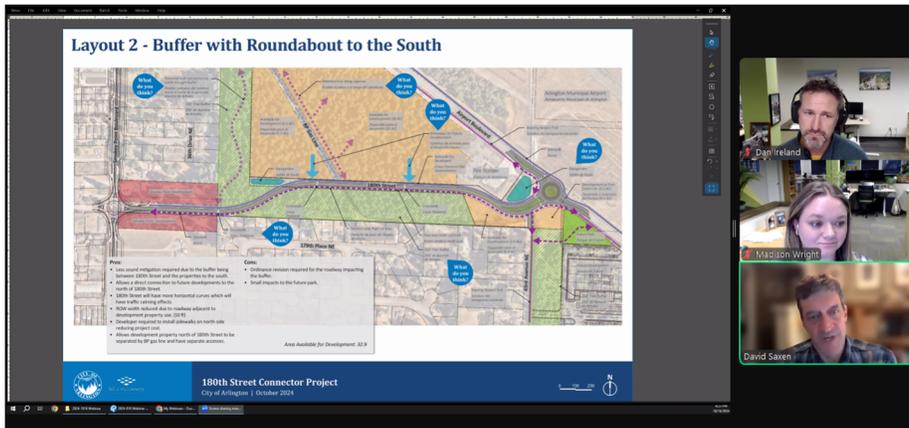
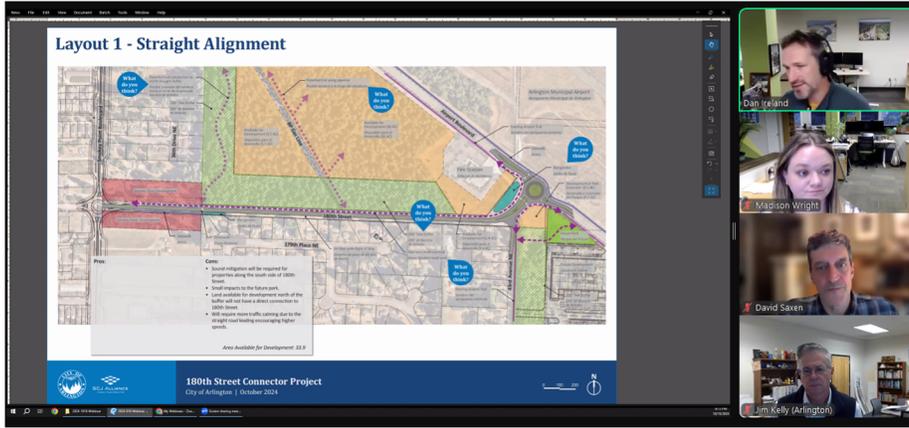


4. What is your annual household income? (Single choice)

13/14 (92%) answered



# 6 Photos





## Conclusion:

Twenty City of Arlington residents attended this meeting via Zoom. Overall, the community appreciated that their concerns were heard and incorporated into the two new roadway layouts. Layout 3 emerged as the favorite among participants, mainly due to the location of the roundabout and the proposed new placement of the 200-foot tree buffer. Additionally, the majority of the community preferred that 43rd Ave not connect to the proposed 180th Corridor. The meeting provided valuable insights that will guide the next steps in refining the project to align with community preferences.

**ADVERTISEMENT FOR BID**  
**City of Arlington**  
**PROJECT TITLE (PW-XXX.XXX)**

Notice is hereby given that sealed proposals will be received by the City of Arlington Public Works Department, 154 W. Cox, Arlington, Washington 98223, until **2:00 PM, local time** on **(DATE)**, for furnishing the necessary labor, materials, equipment, tools, and guarantees thereof to perform the project.

**(Optional)** A non-mandatory pre-bid meeting has been scheduled for **(TIME AND DATE)** to be held at the Public Works Department, address above.

Work shall include **(PROJECT DESCRIPTION)**

All bidding and construction is to be performed in compliance with the Contract Documents for this project and any Addenda issued thereto, which are on file with the City of Arlington Public Works Department.

Proposals received after the date and time stated above will not be considered. Immediately following the deadline for submission, the proposals will be publicly opened and read aloud in the Stillaguamish Conference Room at the Public Works Administration Building located at 154 W. Cox Ave, Arlington, WA 98223. Proposals must be submitted on the forms provided with the contract documents. All proposals must be accompanied by a bid deposit in the form of a certified or cashier's check, or bid bond, for not less than five percent (5%) of the total amount bid, including additives and alternates, if any. Refer to Instructions to Bidders for more information. Should the successful Bidder fail to enter into such contract and furnish satisfactory payment and performance bonds within the time stated in the specifications, the bid deposit shall be forfeited to the City of Arlington.

Plans and specifications are available for viewing at the City of Arlington Public Works Department, 154 W. Cox Ave, Arlington, Washington 98223.

Free-of-charge access to project bid documents (plans, specifications, addenda, and Bidders List) is provided to Prime Bidders, Subcontractors, and Vendors by going to [www.bxwa.com](http://www.bxwa.com) and clicking on "Posted Projects", "Public Works", and "City of Arlington". This online plan room provides Bidders with fully usable online documents with the ability to: download, view, print, order full/partial plan sets from numerous reprographic sources, and a free online digitizer/take-off tool. It is recommended that Bidders "Register" in order to receive automatic e-mail notification of future addenda and to place themselves on the "Self-Registered Bidders List". Bidders that do not register will not be automatically notified of addenda and will need to periodically check the on-line plan room for addenda issued on this project. Contact Builders Exchange of Washington at (425) 258-1303 should you require assistance with access or registration. The content available through [bxwa.com](http://bxwa.com) is our property or the property of our licensors and is protected by copyright and other intellectual property laws. Access to project documents is intended for use by bidders (general contractors/prime bidders, subcontractors, and suppliers), agency personnel and agency's consultants, as well as for personal, noncommercial, use by the public. You may display or print the content available for these uses only. "Harvesting" (downloading, copying, and transmitting) of any project information and/or project documents for purposes of reselling and/or redistributing information by any other party is not allowed by BXWA.

The City of Arlington expressly reserves the right to reject any and all bids, to waive minor irregularities or informalities, and to further make award of the project to the lowest responsible Bidder as it best serves the interest of the City of Arlington. No proposal may be withdrawn after the time stated above, or before Award of Contract, unless said award is delayed for a period exceeding sixty (60) calendar days after opening of the proposals, or Bidder withdraws proposal due to error in accordance with Section 1-03.1 of the WSDOT Standard Specifications.

The City of Arlington, in accordance with the provisions of Title VI of the Civil Rights Act of 1964, (78 Stat. 252, 42 U.S.C. 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award. and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-Assisted Programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises as defined at 49 CFR Part 26 will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

Published: Everett Herald  
 1<sup>st</sup> Pub:

2<sup>nd</sup> Pub:

Seattle Daily Journal of Commerce  
 1<sup>st</sup> Pub: 2<sup>nd</sup> Pub:





**Instructions for DOT form 421-012**

**Program Certification:** Check all the boxes that apply and that can be verified through OMWBE and/or WEBS

**Prime Contractor:** Enter the business name of the Prime Contractor for this project.

**Statewide Vendor Number:** Enter the Prime Contractor's Statewide Vendor Number.

**State Contract Number:** Enter the Contract number assigned to the project.

**Project Title:** Enter the name of the project

**Request Number:** Enter the sequential number of the request.

**Lower Tier Subcontractor or Subcontractor boxes\*:** Click the box to indicate if the request is for a subcontractor or a lower tier subcontractor.

**Lower Tier Subcontractor/Subcontractor name:** Enter the business name of the subcontractor or lower tier subcontractor.

**Unified Business Identifier (UBI):** Enter the UBI number for the subcontractor or lower tier subcontractor.

**Federal Employer I.D. Number:** Enter the Federal Employer ID Number for the subcontractor or lower tier subcontractor.

**Address:** Enter the address for the subcontractor or lower tier subcontractor, including city, state and zip code.

**Telephone Number:** Enter the telephone number for the subcontractor or lower tier subcontractor.

**Estimated Starting Date:** Enter the anticipated date when the subcontractor or lower tier subcontractor will be on-site to perform work.

**If Lower Tier Subcontractor, Name of Hiring Subcontractor:** If the lower tier subcontractor box was marked above, enter the business name of the subcontractor that hired your company.

**Fed ID of Hiring Subcontractor:** If the lower tier subcontractor box was marked above, enter the Federal Employer ID Number for the subcontractor that hired the lower tier.

**Request to Sublet # of Hiring Subcontractor:** If the lower tier subcontractor box was marked above, enter the Request to Sublet number for the subcontractor that hired the lower tier.

**Item No:** Enter the bid item number(s) that will be sublet. This number is shown in the first column of original contract proposal and in the first column of the summary of quantities found in the original contract plans.

**Partial or Complete:** Choose partial from the drop down list if your company will only be performing a portion of the work associated with the bid item. Choose complete if the company will be performing all of the work associated with the bid item.

**Item Description:** Enter the bid item name corresponding with the Bid Item No previously entered on the form. This information is located in the second column of the original contract proposal and in the seventh column (titled ITEM) of the summary of quantities found in the original contract plans.

**Work Description (if partial):** Provide a brief description of the type of work being performed on the project.

**Amount:** Enter the dollar amount equivalent to the work the subcontractor is expected to perform.

**Prime Contractor Signature and Date:** The Prime Contractor signs the document using an electronic signature (can be typed or a copy of their signature applied to the document) and enters the date.



Agency

Address

**ALN 20.205 - Highway Planning and Construction**  
(Assistance Listing Number)

**Project Number**

**Agreement Number**

For WSDOT Use Only

The Local Agency having complied, or hereby agreeing to comply, with the terms and conditions set forth in (1) Title 23, U.S. Code Highways, (2) the regulations issued pursuant thereto, (3) 2 CFR Part 200, (4) 2 CFR Part 180 – certifying that the local agency is not excluded from receiving Federal funds by a Federal suspension or debarment, (5) the policies and procedures promulgated by the Washington State Department of Transportation, and (6) the federal aid project agreement entered into between the State and Federal Government, relative to the above project, the Washington State Department of Transportation will authorize the Local Agency to proceed on the project by a separate notification. Federal funds which are to be obligated for the project may not exceed the amount shown herein on line r, column 3, without written authority by the State, subject to the approval of the Federal Highway Administration. All project costs not reimbursed by the Federal Government shall be the responsibility of the Local Agency.

**Project Description**

Name

Length

Termini

**Description of Work**

Project Agreement End Date

Advertisement Date

Indirect Cost Rate  
Yes No

Type of Work	Estimate of Funding		
	(1) Estimated Total Project Funds	(2) Estimated Agency Funds	(3) Estimated Federal Funds
PE			
%			
a. Agency			
b. Other			
Federal Aid Participation Ratio(s) for PE			
c. Other			
d. State Services			
e. Total PE Cost Estimate			
Right of Way			
%			
f. Agency			
g. Other			
Federal Aid Participation Ratio(s) for RW			
h. Other			
i. State Services			
j. Total R/W Cost Estimate			
Construction			
%			
k. Contract			
l. Other			
m. Other			
Federal Aid Participation Ratio(s) for CN			
n. Other			
o. Agency			
p. State Services			
q. Total CN Cost Estimate			
r. Total Project Cost Estimate			

**Agency Official**

By

Title

Agency Date

**Washington State Department of Transportation**

By

Director, Local Programs

Date Executed

**Construction Method of Financing (Check Method Selected)****State Ad and Award**

Method A - Advance Payment - Agency Share of total construction cost (based on contract award)

Method B - Withhold from gas tax the Agency's share of total construction cost (line 5, column 2) in the amount of

\$ \_\_\_\_\_ at \$ \_\_\_\_\_ per month for \_\_\_\_\_ months.

**Local Force or Local Ad and Award**

Method C - Agency cost incurred with partial reimbursement

The Local Agency further stipulates that pursuant to said Title 23, regulations and policies and procedures, and as a condition to payment of the federal funds obligated, it accepts and will comply with the applicable provisions set forth below. Adopted by official action on \_\_\_\_\_, \_\_\_\_\_, Resolution/Ordinance No. \_\_\_\_\_.

**Provisions****I. Scope of Work**

The Agency shall provide all the work, labor, materials, and services necessary to perform the project which is described and set forth in detail in the "Project Description" and "Type of Work."

When the State acts for and on behalf of the Agency, the State shall be deemed an agent of the Agency and shall perform the services described and indicated in "Type of Work" on the face of this agreement, in accordance with plans and specifications as proposed by the Agency and approved by the State and the Federal Highway Administration.

When the State acts for the Agency but is not subject to the right of control by the Agency, the State shall have the right to perform the work subject to the ordinary procedures of the State and Federal Highway Administration.

**II. Delegation of Authority**

The State is willing to fulfill the responsibilities to the Federal Government by the administration of this project. The Agency agrees that the State shall have the full authority to carry out this administration. The State shall review, process, and approve documents required for federal aid reimbursement in accordance with federal requirements. If the State advertises and awards the contract, the State will further act for the Agency in all matters concerning the project as requested by the Agency. If the Local Agency advertises and awards the project, the State shall review the work to ensure conformity with the approved plans and specifications.

**III. Project Administration**

Certain types of work and services shall be provided by the State on this project as requested by the Agency and described in the Type of Work above. In addition, the State will furnish qualified personnel for the supervision and inspection of the work in progress. On Local Agency advertised and awarded projects, the supervision and inspection shall be limited to ensuring all work is in conformance with approved plans, specifications, and federal aid requirements. The salary of such engineer or other supervisor and all other salaries and costs incurred by State forces upon the project will be considered a cost thereof. All costs related to this project incurred by employees of the State in the customary manner on highway payrolls and vouchers shall be charged as costs of the project.

**IV. Availability of Records**

All project records in support of all costs incurred and actual expenditures kept by the Agency are to be maintained in accordance with local government accounting procedures prescribed by the Washington State Auditor's Office, the U.S. Department of Transportation, and the Washington State Department of Transportation. The records shall be open to inspection by the State and Federal Government at all reasonable times and shall be retained and made available for such inspection for a period of not less than three years from the final payment of any federal aid funds to the Agency. Copies of said records shall be furnished to the State and/or Federal Government upon request.

**V. Compliance with Provisions**

The Agency shall not incur any federal aid participation costs on any classification of work on this project until authorized in writing by the State for each classification. The classifications of work for projects are:

1. Preliminary engineering.
2. Right of way acquisition.
3. Project construction.

Once written authorization is given, the Agency agrees to show continuous progress through monthly billings. Failure to show continuous progress may result the Agency's project becoming inactive, as described in 23 CFR 630, and subject to de-obligation of federal aid funds and/or agreement closure.

If right of way acquisition, or actual construction of the road for which preliminary engineering is undertaken is not started by the close of the tenth fiscal year following the fiscal year in which preliminary engineering phase was authorized, the Agency will repay to the State the sum or sums of federal funds paid to the Agency under the terms of this agreement (see Section IX).

If actual construction of the road for which right of way has been purchased is not started by the close of the tenth fiscal year following the fiscal year in which the right of way phase was authorized, the Agency will repay to the State the sum or sums of federal funds paid to the Agency under the terms of this agreement (see Section IX).

The Agency agrees that all stages of construction necessary to provide the initially planned complete facility within the limits of this project will conform to at least the minimum values set by approved statewide design standards applicable to this class of highways, even though such additional work is financed without federal aid participation.

The Agency agrees that on federal aid highway construction projects, the current federal aid regulations which apply to liquidated damages relative to the basis of federal participation in the project cost shall be applicable in the event the contractor fails to complete the contract within the contract time.

## VI. Payment and Partial Reimbursement

The total cost of the project, including all review and engineering costs and other expenses of the State, is to be paid by the Agency and by the Federal Government. Federal funding shall be in accordance with the Federal Transportation Act, as amended, 2 CFR Part 200. The State shall not be ultimately responsible for any of the costs of the project. The Agency shall be ultimately responsible for all costs associated with the project which are not reimbursed by the Federal Government. Nothing in this agreement shall be construed as a promise by the State as to the amount or nature of federal participation in this project.

The Agency shall bill the state for federal aid project costs incurred in conformity with applicable federal and state laws. The agency shall minimize the time elapsed between receipt of federal aid funds and subsequent payment of incurred costs. Expenditures by the Local Agency for maintenance, general administration, supervision, and other overhead shall not be eligible for federal participation unless a current indirect cost plan has been prepared in accordance with the regulations outlined in 2 CFR Part 200 - Uniform Admin Requirements, Cost Principles and Audit Requirements for Federal Awards, and retained for audit.

The State will pay for State incurred costs on the project. Following payment, the State shall bill the Federal Government for reimbursement of those costs eligible for federal participation to the extent that such costs are attributable and properly allocable to this project. The State shall bill the Agency for that portion of State costs which were not reimbursed by the Federal Government (see Section IX).

### 1. Project Construction Costs

Project construction financing will be accomplished by one of the three methods as indicated in this agreement.

**Method A** – The Agency will place with the State, within (20) days after the execution of the construction contract, an advance in the amount of the Agency's share of the total construction cost based on the contract award. The State will notify the Agency of the exact amount to be deposited with the State. The State will pay all costs incurred under the contract upon presentation of progress billings from the contractor. Following such payments, the State will submit a billing to the Federal Government for the federal aid participation share of the cost. When the project is substantially completed and final actual costs of the project can be determined, the State will present the Agency with a final billing showing the amount due the State or the amount due the Agency. This billing will be cleared by either a payment from the Agency to the State or by a refund from the State to the Agency.

**Method B** – The Agency's share of the total construction cost as shown on the face of this agreement shall be withheld from its monthly fuel tax allotments. The face of this agreement establishes the months in which the withholding shall take place and the exact amount to be withheld each month. The extent of withholding will be confirmed by letter from the State at the time of contract award. Upon receipt of progress billings from the contractor, the State will submit such billings to the Federal Government for payment of its participating portion of such billings.

**Method C** – The Agency may submit vouchers to the State in the format prescribed by the State, in duplicate, not more than once per month for those costs eligible for Federal participation to the extent that such costs are directly attributable and properly allocable to this project. Expenditures by the Local Agency for maintenance, general administration, supervision, and other overhead shall not be eligible for Federal participation unless claimed under a previously approved indirect cost plan.

The State shall reimburse the Agency for the Federal share of eligible project costs up to the amount shown on the face of this agreement. At the time of audit, the Agency will provide documentation of all costs incurred on the project. The State shall bill the Agency for all costs incurred by the State relative to the project. The State shall also bill the Agency for the federal funds paid by the State to the Agency for project costs which are subsequently determined to be ineligible for federal participation (see Section IX).

## VII. Audit of Federal Consultant Contracts

The Agency, if services of a consultant are required, shall be responsible for audit of the consultant's records to determine eligible federal aid costs on the project. The report of said audit shall be in the Agency's files and made available to the State and the Federal Government.

An audit shall be conducted by the WSDOT Internal Audit Office in accordance with generally accepted governmental auditing standards as issued by the United States General Accounting Office by the Comptroller General of the United States; WSDOT Manual M 27-50, Consultant Authorization, Selection, and Agreement Administration; memoranda of understanding between WSDOT and FHWA; and 2 CFR Part 200.501 - Audit Requirements.

If upon audit it is found that overpayment or participation of federal money in ineligible items of cost has occurred, the Agency shall reimburse the State for the amount of such overpayment or excess participation (see Section IX).

## VIII. Single Audit Act

The Agency, as a subrecipient of federal funds, shall adhere to the federal regulations outlined in 2 CFR Part 200.501 as well as all applicable federal and state statutes and regulations. A subrecipient who expends \$1,000,000 or more in federal awards from all sources during a given fiscal year shall have a single or program-specific audit performed for that year in accordance with the provisions of 2 CFR Part 200.501. Upon conclusion of the audit, the Agency shall be responsible for ensuring that a copy of the report is transmitted promptly to the State.

**IX. Payment of Billing**

The Agency agrees that if payment or arrangement for payment of any of the State's billing relative to the project (e.g., State force work, project cancellation, overpayment, cost ineligible for federal participation, etc.) is not made to the State within 45 days after the Agency has been billed, the State shall effect reimbursement of the total sum due from the regular monthly fuel tax allotments to the Agency from the Motor Vehicle Fund. No additional Federal project funding will be approved until full payment is received unless otherwise directed by the Director, Local Programs.

Project Agreement End Date - This date is based on your projects Period of Performance (2 CFR Part 200.309).

Any costs incurred after the Project Agreement End Date are NOT eligible for federal reimbursement. All eligible costs incurred prior to the Project Agreement End Date must be submitted for reimbursement within 60 days after the Project Agreement End Date or they become ineligible for federal reimbursement.

**X. Traffic Control, Signing, Marking, and Roadway Maintenance**

The Agency will not permit any changes to be made in the provisions for parking regulations and traffic control on this project without prior approval of the State and Federal Highway Administration. The Agency will not install or permit to be installed any signs, signals, or markings not in conformance with the standards approved by the Federal Highway Administration and MUTCD. The Agency will, at its own expense, maintain the improvement covered by this agreement.

**XI. Indemnity**

The Agency shall hold the Federal Government and the State harmless from and shall process and defend at its own expense all claims, demands, or suits, whether at law or equity brought against the Agency, State, or Federal Government, arising from the Agency's execution, performance, or failure to perform any of the provisions of this agreement, or of any other agreement or contract connected with this agreement, or arising by reason of the participation of the State or Federal Government in the project, PROVIDED, nothing herein shall require the Agency to reimburse the State or the Federal Government for damages arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence of the Federal Government or the State.

**XII. Nondiscrimination Provision**

No liability shall attach to the State or Federal Government except as expressly provided herein.

The Agency shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any USDOT-assisted contract and/or agreement or in the administration of its DBE program or the requirements of 49 CFR Part 26. The Agency shall take all necessary and reasonable steps under 49 CFR Part 26 to ensure nondiscrimination in the award and administration of USDOT-assisted contracts and agreements. The WSDOT's DBE program, as required by 49 CFR Part 26 and as approved by USDOT, is incorporated by reference in this agreement. Implementation of this program is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the Agency of its failure to carry out its approved program, the Department may impose sanctions as provided for under Part 26 and may, in appropriate cases, refer the matter for enforcement under 18 U.S.C. 1001 and/or the Program Fraud Civil Remedies Act of 1986 (31 U.S. C. 3801 et seq.).

The Agency hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the rules and regulations of the Secretary of Labor in 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee or understanding pursuant to any federal program involving such grant, contract, loan, insurance, or guarantee, the required contract provisions for Federal-Aid Contracts (FHWA 1273), located in Chapter 44 of the Local Agency Guidelines.

The Agency further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the applicant so participating is a State or Local Government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the contract.

The Agency also agrees:

- (1) To assist and cooperate actively with the State in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and rules, regulations, and relevant orders of the Secretary of Labor.
- (2) To furnish the State such information as it may require for the supervision of such compliance and that it will otherwise assist the State in the discharge of its primary responsibility for securing compliance.
- (3) To refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, government contracts and federally assisted construction contracts pursuant to the Executive Order.
- (4) To carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the State, Federal Highway Administration, or the Secretary of Labor pursuant to Part II, subpart D of the Executive Order.

In addition, the Agency agrees that if it fails or refuses to comply with these undertakings, the State may take any or all of the following actions:

- (a) Cancel, terminate, or suspend this agreement in whole or in part;
- (b) Refrain from extending any further assistance to the Agency under the program with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from the Agency; and
- (c) Refer the case to the Department of Justice for appropriate legal proceedings.

**XIII. Liquidated Damages**

The Agency hereby agrees that the liquidated damages provisions of 23 CFR Part 635, Subpart 127, as supplemented, relative to the amount of Federal participation in the project cost, shall be applicable in the event the contractor fails to complete the contract within the contract time. Failure to include liquidated damages provision will not relieve the Agency from reduction of federal participation in accordance with this paragraph.

**XIV. Termination for Public Convenience**

The Secretary of the Washington State Department of Transportation may terminate the contract in whole, or from time to time in part, whenever:

- (1) The requisite federal funding becomes unavailable through failure of appropriation or otherwise.
- (2) The contractor is prevented from proceeding with the work as a direct result of an Executive Order of the President with respect to the prosecution of war or in the interest of national defense, or an Executive Order of the President or Governor of the State with respect to the preservation of energy resources.
- (3) The contractor is prevented from proceeding with the work by reason of a preliminary, special, or permanent restraining order of a court of competent jurisdiction where the issuance of such order is primarily caused by the acts or omissions of persons or agencies other than the contractor.
- (4) The Secretary is notified by the Federal Highway Administration that the project is inactive.
- (5) The Secretary determines that such termination is in the best interests of the State.

**XV. Venue for Claims and/or Causes of Action**

For the convenience of the parties to this contract, it is agreed that any claims and/or causes of action which the Local Agency has against the State of Washington, growing out of this contract or the project with which it is concerned, shall be brought only in the Superior Court for Thurston County.

**XVI. Certification Regarding the Restrictions of the Use of Federal Funds for Lobbying**

The approving authority certifies, to the best of his or her knowledge and belief, that:

- (1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit the Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, and contracts and subcontracts under grants, subgrants, loans, and cooperative agreements) which exceed \$100,000, and that all such subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification as a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

**XVII. Assurances**

Local agencies receiving Federal funding from the USDOT or its operating administrations (i.e., Federal Highway Administration, Federal Transit Administration, Federal Aviation Administration) are required to submit a written policy statement, signed by the Agency Executive and addressed to the State, documenting that all programs, activities, and services will be conducted in compliance with Section 504 and the Americans with Disabilities Act (ADA).

**Additional Provisions**

## Instructions

1. **Agency Name and Billing Address** – Enter the Agency of primary interest which will become a party to the agreement.
2. **Project Number** – Leave blank. This number will be assigned by WSDOT. Not including all fund program prefixes (ex. “STBGR”), Project Number is defined as the Federal Award Identification Number (FAIN).
3. **Agreement Number** – Leave blank. This number will be assigned by WSDOT.
4.
  - a. **Project Description** – Enter the project name, total length of the project (in miles), and a brief description of the termini. Data entered here must be consistent with the name, length, and termini noted in the STIP and Project Prospectus  
*Example:* (Name) “Regal Road”, (Length) “1.2 miles”, (Termini) “Smith Road to Main Street”
  - b. **Description of Work** – Enter a concise statement of the major items of work to be performed. Statement must be consistent with the description of work noted in the STIP and Project Prospectus.  
*Example:* “Overlay Regal Road; install curb, gutter, and sidewalk; illumination; and traffic signal at the intersection of Regal Road and Dakota Avenue.”
  - c. **Project Agreement End Date** – Enter the Project Agreement End Date (mm/dd/yy). This date is based on the project’s Period of Performance (2 CFR 200.309).  
 For Planning Only projects – WSDOT recommends agencies estimate the end of the project’s period of performance and add three years to determine the “Project Agreement End Date”.  
 For PE and RW – WSDOT recommends agencies estimate when the phase will be completed and add three years to determine the “Project Agreement End Date”. For Construction – WSDOT recommends agencies estimate when construction will be completed and add three years to determine the “Project Agreement End Date”.
  - d. **Advertisement Date** – At construction authorization only, enter the proposed project advertisement date (mm/dd/yy).
  - e. **Claiming Indirect Cost Rate** – Check the Yes box if the agency will be claiming indirect costs on the project. For those projects claiming indirect costs, supporting documentation that clearly shows the indirect cost rate being utilized must be provided with the local agency agreement. Indirect cost rate approval by your cognizant agency or through your agency’s self-certification and supporting documentation is required to be available for review by FHWA, WSDOT and /or State Auditor. Check the No box if the agency will not be claiming indirect costs on the project. See section 23.5 for additional guidance.
4. **Type of Work and Funding (Round all dollar amounts to the nearest whole dollar)**
  - a. **PE** – Lines a through d show Preliminary Engineering costs for the project by type of work (e.g., consultant, agency, state services, etc.).  
 \*Federal aid participation ratio for PE – enter ratio for PE lines with amounts in column 3.
    - **Line a** – Enter the estimated amount of agency work in columns 1 through 3.
    - **Line b & c** – Identify user, consultant, etc., and enter the estimated amounts in columns 1 through 3.
    - **Line d** – State Services. Every project must have funding for state services. Enter the estimated amounts in columns 1 through 3.
    - **Line e** – Total of lines a + b + c + d.
  - b. **Right of Way** – If a Right of Way phase is authorized on the project, the appropriate costs are shown in lines f through i.  
 \*Federal aid participation ratio for RW – enter ratio for RW lines with amounts in column 3.
    - **Line f** – Enter the estimated amount of agency work in columns 1 through 3.
    - **Line g & h** – Identify user, consultant, etc., and enter the estimated amounts in columns 1 through 3.
    - **Line i** – State Services. Every project must have funding for state services. Enter the estimated amounts in columns 1 through 3.
    - **Line j** – Total of lines f + g + h + i.
  - c. **Construction** – Lines k through p show construction costs for the project by type of work (e.g., contract, consultant, agency, state services, etc.).

\*Federal aid participation ratio for CN – enter ratio for CN lines with amounts in column 3.

- **Line k** – Enter the estimated cost of the contract.
- **Lines l, m, & n** – Enter other estimated costs such as utility and construction contracts or non-federally matched contract costs.
- **Line o** – Enter estimated costs of all construction related agency work.
- **Line p** – State Services. Every project must have funding for state services. Enter the estimated amounts in columns 1 through 3.
- **Line q** – Total Construction Cost Estimate. Total of lines k + l + m + n + o + p.

**d. Total Project Cost Estimate**

- **Line r** – Total Cost Estimate of the Project. Total of lines e + j + q.

\*Please remember, if the federal aid participation rate entered is not the maximum rate allowed by FHWA, then the participation rate entered becomes the maximum rate allowed.

6. **Signatures** – An authorized official of the local agency signs the agreement and enters their title and date of signature (mm/dd/yy). **Note:** Do NOT enter a date on the Date Executed line.
7. **Method of Construction Financing** – Choose the method of financing for the construction portion of the project.
  - a. **Method “A”** is used when the state administers the contract for the agency.
  - b. **Method “B”** is also used when the state administers the contract for the agency.
  - c. **Method “C”** is used with projects administered by the local agency. The agency will submit billings monthly through the state to FHWA for all eligible costs. The billings must document the payment requests from the contractor. If state-force work, such as audit and construction engineering, is to receive federal participation, it will be billed to the agency and FHWA simultaneously at the indicated ratio. To show continuous progress agencies should bill monthly until agreement is closed.
8. **Resolutions/Ordinances** – When someone other than the County Executive/Chairman, County Commissioners/Mayor is authorized to sign the agreement, the agency must submit to WSDOT with the agreement a copy of the Resolution/Ordinance designating that individual.

**CONSTRUCTION CONTRACT**

**FOR FEDERALLY FUNDED PROJECTS**

Project Name \_\_\_\_\_ Project # \_\_\_\_\_

**THIS CONTRACT**, is made and entered into in duplicate this \_\_\_\_ day of \_\_\_\_\_, 202\_, by and between the CITY OF ARLINGTON, a municipal corporation of the State of Washington, hereafter called the "CITY", and \_\_\_\_\_ (CONTRACTOR NAME) hereafter referred to as the "CONTRACTOR".

**WHEREAS**, the CITY desires \_\_\_\_\_, and

**WHEREAS**, the CONTRACTOR is qualified, willing and able to perform the necessary work.

**NOW, THEREFORE**, in consideration of the mutual promises and covenants herein contained, to be kept, performed and fulfilled by the respective parties thereto, and other valuable considerations, it is mutually agreed as follows:

**1. SCOPE OF SERVICES**

CONTRACTOR agrees to perform the services described in the attached Scope of Work and/or proposal which is attached hereto as Exhibit "A" and is herein incorporated by reference.

**2. TERM**

2.1 No work is to be performed prior to written notice by the CITY to proceed.

2.2 All work under this Contract is to be done within \_\_\_\_\_ working days of notice to proceed.

**3. COMPENSATION AND METHOD OF PAYMENT**

3.1 CITY shall pay CONTRACTOR for the work performed under this Contract: (check one)  
*(please include all applicable taxes and fees)*

**Hourly:** \$ \_\_\_\_\_ per hour but not more than a total of \$ \_\_\_\_\_.

**Fixed Sum:** a total amount of \$ \_\_\_\_\_.

**Other:** \_\_\_\_\_.

for all work performed and expenses incurred under this Contract.

- 3.2 The CONTRACTOR shall do all work and furnish all tools, materials, and equipment for \_\_\_\_\_, which includes any applicable sales or use tax, in accordance with and as described in the attached plans and specifications and the Standard Specifications for Municipal Public Works Construction, which are by this reference incorporated herein and made a part hereof, and shall perform any alterations in or additions to the work provided under this Contract and every part thereof.
- 3.3 The CONTRACTOR shall maintain time and expense records and report them to the CITY monthly; and shall submit invoices to the CITY monthly for payment for work performed to the date of the invoice. Invoices shall be in a format acceptable to the CITY.
- 3.4 The CITY shall pay all invoices from the CONTRACTOR by mailing a CITY warrant within 30 days of receipt of a properly completed invoice.
- 3.5 All records and accounts pertaining to this Contract are to be kept available for inspection by representatives of the CITY for a period of three (3) years after final payment. Copies shall be made available to the CITY upon request.
- 3.6 If during the course of the Contract, the work rendered does not meet the requirements set forth in the Contract, the CONTRACTOR shall correct or modify the required work to comply with the requirements of the Contract. The CITY shall have the right to withhold payment for such work until it meets the requirements of the Contract.

#### **4. PREVAILING WAGE**

- 4.1 This Contract is subject to the requirements of Chapter 39.12 RCW, and as it may be amended, relating to prevailing wages. On Public Works projects, funded in part or in whole with Federal funds, Federal wages laws and regulations shall also be applicable. **NO WORKER, LABORER OR MECHANIC EMPLOYED IN THE PERFORMANCE OF ANY PART OF THIS CONTRACT SHALL BE PAID LESS THAN THE PREVAILING RATE OR WAGE** as determined by the Industrial Statistician of the Department of Labor and Industries for the State of Washington. The schedule of prevailing wage rates for this Contract is attached hereto and by this reference made a part of this Contract as though fully set forth herein.
- 4.2 Prior to making any payment under this Contract, the CITY must receive an approved copy of the "Statement of Intent to Pay Prevailing Wages on Public Works Contracts" from the Department of Labor and Industries.
- 4.3 It is the CONTRACTOR's responsibility to obtain and file the Statement. The CONTRACTOR shall be responsible for all filing fees. Each invoice shall include a signed statement that prevailing wages have been paid by the CONTRACTOR and all subcontractors. Following the final acceptance of services rendered, CONTRACTOR shall submit an "Affidavit of

Wages Paid” which must be certified by the Industrial Statistician of the Department of Labor and Industries.

5. **REPRESENTATIONS**

CITY has relied upon the qualifications of CONTRACTOR in entering into this Contract. By execution of this Contract, CONTRACTOR represents it possesses the ability, skill and resources necessary to perform the work and is familiar with all applicable current laws, rules and regulations which reasonably relate to the Scope of Services detailed in Exhibit “A” hereto.

6. **STANDARD OF CARE**

CONTRACTOR shall exercise the degree of skill and diligence normally employed by contractors engaged in the same profession, and performing the same or similar services at the time such services are performed. CONTRACTOR will be responsible for the technical accuracy of its services and documents resulting therefrom, and CITY shall not be responsible for discovering deficiencies therein. CONTRACTOR agrees to correct any deficiencies discovered without additional compensation, except to the extent such deficiencies are directly attributable to deficiencies or omissions in City-furnished information.

7. **RESPONSIBILITY OF CONTRACTOR**

7.1 **Safety.** CONTRACTOR shall take all necessary precautions for the safety of employees on the work site and shall comply with all applicable provisions of Federal, State, and municipal safety laws.

7.2 **Corrections of Defects.** CONTRACTOR shall be responsible for correcting all defects in workmanship and/or materials discovered within one year after acceptance of this work. When corrections of defects are made, CONTRACTOR shall be responsible for correcting all defects in workmanship and/or materials in the corrected work for one year after acceptance of the corrections by the CITY. The CONTRACTOR shall start work to remedy such defects within seven (7) days of mailing notice of discovery thereof by the CITY and shall complete such work within a reasonable time. In emergencies where damage may result from delay or where loss of service may result, such corrections may be made by the CITY, in which case the cost shall be borne by the CONTRACTOR. In the event the CONTRACTOR does not accomplish corrections at the time specified, the work will be otherwise accomplished and the cost of same shall be paid by the CONTRACTOR.

7.3 **Warranty.** CONTRACTOR shall be responsible for correcting all defects in workmanship and material in a responsible period of time, after said work is completed. CONTRACTOR shall start work to remedy such defects within seven (7) days of mailing notice of discovery thereof by the CITY and shall complete such work in a reasonable time. In emergencies where damage may result from delay or where loss of service may result, such correction may be made by the CITY, in which case the cost shall be borne by the CONTRACTOR. In the event the CONTRACTOR does not accomplish corrections at the time specified, the

work will be otherwise accomplished and the cost of same shall be paid by the CONTRACTOR.

CONTRACTOR shall be liable for any costs, losses, expenses or damages, including consequential damages, suffered by the CITY resulting from defects in the CONTRACTOR's work including, but not limited to, cost of materials and labor extended by the CITY in making emergency repairs and cost inspection and supervision of the CITY. CONTRACTOR shall hold the CITY harmless from any and all claims which may be made against the CITY as a result of any defective work and the CONTRACTOR shall defend any such claims at his own expense. Where materials or procedures are not specified in the contract, the CITY relies on the professional judgment of the CONTRACTOR to make appropriate selections.

#### 7.4 Nondiscrimination.

- 7.4.1 Nondiscrimination Requirement. During the term of this Contract, CONTRACTOR, including any subcontractor, shall not discriminate on the bases enumerated at RCW 49.60.530(3). In addition, CONTRACTOR, including any subcontractor, shall give written notice of this nondiscrimination requirement to any labor organizations with which CONTRACTOR, or subcontractor, has a collective bargaining or other agreement.
- 7.4.2 Obligation to Cooperate. CONTRACTOR, including any subcontractor, shall cooperate and comply with any Washington state agency investigation regarding any allegation that CONTRACTOR, including any subcontractor, has engaged in discrimination prohibited by this Contract pursuant to RCW 49.60.530(3).
- 7.4.3 Default. Notwithstanding any provision to the contrary, Agency may suspend CONTRACTOR, including any subcontractor, upon notice of a failure to participate and cooperate with any state agency investigation into alleged discrimination prohibited by this Contract, pursuant to RCW 49.60.530(3). Any such suspension will remain in place until Agency receives notification that CONTRACTOR, including any subcontractor, is cooperating with the investigating state agency. In the event CONTRACTOR, or subcontractor, is determined to have engaged in discrimination identified at RCW 49.60.530(3), Agency may terminate this Contract in whole or in part, and CONTRACTOR, subcontractor, or both, may be referred for debarment as provided in RCW 39.26.200. CONTRACTOR or subcontractor may be given a reasonable time in which to cure this noncompliance, including implementing conditions consistent with any court-ordered injunctive relief or settlement agreement.
- 7.4.4 Remedies for Breach. Notwithstanding any provision to the contrary, in the event of Contract termination or suspension for engaging in discrimination, CONTRACTOR, subcontractor, or both, shall be liable for contract damages as authorized by law including, but not limited to, any cost difference between the original contract and the replacement or cover contract and all administrative

costs directly related to the replacement contract, which damages are distinct from any penalties imposed under Chapter 49.60, RCW. Agency shall have the right to deduct from any monies due to CONTRACTOR or subcontractor, or that thereafter become due, an amount for damages CONTRACTOR or subcontractor will owe Agency for default under this provision.

- 7.4.5 Employment. Any and all employees of the CONTRACTOR while engaged in the performance of any work or services required by the CONTRACTOR under this Contract, shall be considered employees of the CONTRACTOR only and not of the CITY and any and all claims that may or might arise under the Worker's Compensation Act on behalf of said employees, while so engaged and any and all claims made by a third party as consequence of any negligent act or omission on the part of the CONTRACTOR's employees, while so engaged on any of the work or services provided or rendered herein, shall be the sole obligation and responsibility of the CONTRACTOR.

## **8. SUBCONTRACTOR RESPONSIBILITY**

- 8.1 The CONTRACTOR shall include the language of this section in each of its first-tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. The requirements of this section apply to all subcontractors regardless of tier.

At the time of subcontract execution, the CONTRACTOR shall verify that each of its first-tier subcontractors meets the following bidder responsibility criteria:

- 8.1.1 Have a current certificate of registration as a CONTRACTOR in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
- 8.1.2 Have a current Washington Unified Business Identifier (UBI) number;
- 8.1.3 If applicable, have:
- 8.1.3.1 Industrial Insurance (worker's compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW;
- 8.1.3.2 A Washington Employment Security Department number, as required in Title 50 RCW;
- 8.1.3.3 A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;

8.1.3.4 An electrical CONTRACTOR license, if required by Chapter 19.28 RCW;

8.1.3.5 An elevator CONTRACTOR license, if required by Chapter 70.87 RCW

8.1.4 Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).

## 9. **HOLD HARMLESS**

The CONTRACTOR shall defend, indemnify and hold the CITY, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or in connection with the performance of this Contract, except for injuries and damages caused by the sole negligence of the CITY.

However, should a court of competent jurisdiction determine that this Contract is subject to RCW 4.24.115, then, in the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the CONTRACTOR and the CITY, its officers, officials, employees, and volunteers, the CONTRACTOR's liability hereunder shall be only to the extent of the CONTRACTOR's negligence. It is further specifically and expressly understood that the indemnification provided herein constitutes the CONTRACTOR's waiver of immunity under Industrial Insurance, Title 51 RCW, solely for the purposes of this indemnification. This waiver has been mutually negotiated by the parties. The provisions of this section shall survive the expiration or termination of this Contract.

## 10. **INSURANCE**

10.1 **Insurance Term.** CONTRACTOR shall procure and maintain, for the duration of this Contract, insurance against claims for the injuries to persons or damages to property which may arise from or in connection with the performance of the work thereunder by the CONTRACTOR, his agent, representatives, employees or subcontractors. The cost of such insurance shall be paid by the CONTRACTOR.

10.2 **No Limitation.** The CONTRACTOR shall procure and maintain insurance, as required in this Section, without interruption from commencement of the CONTRACTOR's work through the term of the Contract and for thirty (30) days after the Physical Completion date, unless otherwise indicated herein.

10.3 **Minimum Scope of Insurance.** The Contractor's required insurance shall be of the types and coverage as stated below:

10.3.1 Automobile Liability insurance covering all owned, non-owned, hired and leased vehicles. Coverage shall be at least as broad as Insurance Services Office (ISO) form CA 00 01.

- 10.3.2 Commercial General Liability insurance shall be at least as broad as ISO occurrence form CG 00 01 and shall cover liability arising from premises, operations, independent contractors, products-completed operations, stop gap liability, personal injury and advertising injury, and liability assumed under an insured contract. The Commercial General Liability insurance shall be endorsed to provide a per project general aggregate limit using ISO form CG 25 03 05 09 or an endorsement providing at least as broad coverage. There shall be no exclusion for liability arising from explosion, collapse or underground property damage. The CITY, and its representatives shall be named as an additional insured under the Contractor's Commercial General Liability insurance policy with respect to the work performed for the CITY using ISO Additional Insured endorsement CG 20 10 10 01 and Additional Insured-Completed Operations endorsement CG 20 37 10 01 or substitute endorsements providing at least as broad coverage.
- 10.3.3 Workers' Compensation coverage as required by the Industrial Insurance laws of the State of Washington.
- 10.4 Minimum Amounts of Insurance. CONTRACTOR shall maintain limits no less than:
- 10.4.1 Automobile Liability insurance with a minimum combined single limit for bodily injury and property damage of \$1,000,000 per accident.
- 10.4.2 Commercial General Liability insurance shall be written with limits no less than \$2,000,000 each occurrence, \$2,000,000 general aggregate and a \$2,000,000 products-completed operations aggregate limit.
- 10.4.3 Worker's Compensation coverage as required by the Worker's Compensation Act of the State of Washington.
- 10.5 City's Full Availability of Contractor Limits. If the Contractor maintains higher insurance limits than the minimums shown above, the CITY shall be insured for the full available limits of Commercial General and Excess or Umbrella liability maintained by the Contractor, irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract or whether any certificate of insurance furnished to the CITY evidences limits of liability lower than those maintained by the Contractor.
- 10.6 Other Insurance Provision. The Contractor's Automobile Liability and Commercial General Liability insurance policies are to contain, or be endorsed to contain that they shall be primary insurance as respect the CITY. Any insurance, self-insurance, or self-insured pool coverage maintained by the CITY shall be excess of the Contractor's insurance and shall not contribute with it.
- 10.7 Acceptability of Insurers. Insurance is to be placed with insurers with a Best's rating of no less than A: VII.

- 10.8 Verification of Coverage. CONTRACTOR shall furnish the CITY with certificates of insurance effecting coverage required by this clause. The certification for each insurance policy is to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates are to be received and approved by the CITY before work commences. The CITY reserves the right to require complete, certified copies of all required insurance policies, at any time.
- 10.9 Subcontractors. The CONTRACTOR shall cause each and every subcontractor to provide insurance coverage that complies with all applicable requirements of the Contractor-provided insurance as set forth herein, except the CONTRACTOR shall have sole responsibility for determining the limits of coverage required to be obtained by subcontractors. The CONTRACTOR shall ensure that the CITY is an additional insured on each and every Subcontractor's Commercial General liability insurance policy using an endorsement as least as broad as ISO CG 20 10 10 01 for ongoing operations and CG 20 37 10 01 for completed operations.
- 10.10 Notice of Cancellation. The Contractor shall provide the CITY and all additional insureds for this work with written notice of any policy cancellation within two business days of their receipt of such notice.
- 10.11 Failure to Maintain Insurance. Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which the CITY may, after giving five business days' notice to the Contractor to correct the breach, immediately terminate the Contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the CITY on demand, or at the sole discretion of the CITY, offset against funds due the Contractor from the CITY.

## 11. CLAIMS

- 11.1 Any claim against the CITY for damages, expenses, costs or extras arising out of the performance of this Contract must be made in writing to the CITY within thirty (30) days after the discovery of such damage, and in no event later than the time of approval by the CITY of final payment. CONTRACTOR, upon making applications for final payment, shall be deemed to have waived this right to claim for final payment.

## 12. COMPLIANCE WITH LAWS

- 12.1 The CONTRACTOR shall comply with all Federal, State and local laws and regulations applicable to the work done under this contract. Any violation of the provisions of this Contract shall be considered a violation of a material provision and shall be grounds for cancellation, termination or suspension of the Contract by the CITY, in whole or on part, and may result in ineligibility for future work for the CITY.

- 12.2 If federal funds are being used by the City in this Contract, the CONTRACTOR agrees to comply with the terms and conditions set forth on Exhibit B attached hereto.
- 12.3 If the estimated cost of the project is more than \$2,000,000, then CONTRACTOR agrees to comply with the terms and conditions set forth on Exhibit C attached.

**13. CITY'S RIGHT TO TERMINATE CONTRACT**

- 13.1 The CITY may terminate this Contract upon the occurrence of any one or more of the events hereafter specified:
- 13.1.1 If the CONTRACTOR should be adjudged bankrupt.
- 13.1.2 If the CONTRACTOR should make a general assignment of benefit of his creditors.
- 13.1.3 If a receiver should be appointed on the account of insolvency of the CONTRACTOR.
- 13.1.4 If CONTRACTOR should persistently or repeatedly refuse or fail to supply a sufficient number of properly skilled workmen or proper materials for completion of the work.
- 13.1.5 If the CONTRACTOR shall fail to complete the work within the time specified in the contract.
- 13.1.6 If the CONTRACTOR shall fail to make a prompt payment to subcontractors or for material or labor.
- 13.1.7 If CONTRACTOR should persistently disregard laws, ordinances or regulations of Federal, State or municipal agencies or subdivisions thereof.
- 13.1.8 If CONTRACTOR should persistently disregard instructions of Management, or otherwise be guilty of a substantial violation of the contract.
- 13.2 This Contract, and any amendments or extensions to said Contract may be terminated for any reason not previously identified by either party by giving ten (10) days written notice to the other party. In the event that this Contract is terminated by the CITY, CONTRACTOR shall not be entitled to receive any further balance of the amount to be paid under this Contract until the work shall have been fully finished. At such time, if the unpaid balance of the amount to be paid under this Contract exceeds the expense incurred by the CITY in finishing the work, all of the damages sustained or which may be sustained by reason of such refusal, neglect, failure of discontinuance of employment, such excess shall be paid by the CITY to CONTRACTOR. If such expense and damages shall exceed the unpaid balance, CONTRACTOR and his surety and each thereof shall be jointly and severally liable therefore to CITY and shall pay the difference to the CITY. Such expense and damage shall include all legal costs incurred by the CITY in employment of attorneys to protect the rights and interests of the CITY under the contract; provided such legal costs shall be reasonable.

**14. OWNERSHIP OF DOCUMENTS**

14.1 On payment to the CONTRACTOR by the CITY of all compensation due under this Contract all finished or unfinished documents and material prepared by the CONTRACTOR with funds provided by this Contract shall become the property of the CITY and shall be forwarded to the CITY at its request.

14.2 Any records, reports, information, data or other documents or materials given to or prepared or assembled by the CONTRACTOR under this Contract will be kept as confidential and shall not be made available to any individual or organization by the CONTRACTOR without prior written approval of the CITY or by court order.

**15. PLANS AND SPECIFICATIONS**

Plans and Specifications hereto referred to as the Exhibits, shall be available during office hours at the following address: \_\_\_\_\_ . Said Plans and Specifications are by this reference incorporated herein.

**16. ASSIGNMENT**

This Contract may not be assigned or otherwise transferred by the parties hereto without the written consent of the other party.

**17. INDEPENDENT CONTRACTOR**

CONTRACTOR is and shall be at all times during the term of this Contract an independent CONTRACTOR.

**18. ATTORNEYS FEES AND COSTS**

If any legal proceeding is brought for the enforcement of this Contract, or because of a dispute, breach, default, or misrepresentation in connection with any of the provisions of this Contract, the prevailing party shall be entitled to recover from the other party, in addition to any other relief to which such party may be entitled, reasonable attorney's fees and other costs incurred in that action or proceeding.

**19. NOTICE**

Notices, other than applications for payment, shall be given in writing to the persons named below:

TO THE CITY:

TO THE CONTRACTOR:

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

**20. JURISDICTION AND VENUE**

20.1 This Contract has been and shall be construed as having been made and delivered within the State of Washington, and it is agreed by each party hereto that this Contract shall be governed by laws of the State of Washington, both as to interpretation and performance.

20.2 Any action of law, suit in equity, or judicial proceeding for the enforcement of this Contract or any provisions thereof, shall be instituted and maintained only in any of the courts of competent jurisdiction in Snohomish County, Washington.

**21. SEVERABILITY**

21.1 If, for any reason, any part, term or provision of this Contract is held by a court of the United States to be illegal, void or unenforceable, the validity of the remaining provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular provision held to be invalid.

21.2 If it should appear that any provision hereof is in conflict with any statutory provision of the State of Washington, said provision which may conflict therewith shall be deemed inoperative and null and void insofar as it may be in conflict therewith, and shall be deemed modified to conform to such statutory provisions.

**22. MODIFICATION**

No change, alteration, modification or addition to the Contract will be effective unless it is in writing and properly signed by all parties thereto.

**IN WITNESS WHEREOF**, the parties have executed this Contract as of this \_\_\_\_ day of \_\_\_\_\_, 202\_.

CITY OF ARLINGTON, WASHINGTON:

CONTRACTOR:

By \_\_\_\_\_

By \_\_\_\_\_

Title \_\_\_\_\_

Title \_\_\_\_\_

SAMPLE

**EXHIBIT A - SCOPE OF WORK**

SAMPLE

**EXHIBIT B – FEDERALLY FUNDED CONSTRUCTION PROJECTS**

**(A) Equal Employment Opportunity.** The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts. In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633. The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60- 1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3. Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

**1. Equal Employment Opportunity:** Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement: "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms

of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

**2. EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

**3. Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

**4. Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

**5. Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

**6. Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

**7. Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

**8. Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

**9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

**10. Assurances Required:**

- a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.
- b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to: (1) Withholding monthly progress payments; (2) Assessing sanctions; (3) Liquidated damages; and/or (4) Disqualifying the contractor from future bidding as nonresponsible.
- c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

**11. Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

- a. The records kept by the contractor shall document the following:
  - (1) The number and work hours of minority and nonminority group members and women employed in each work classification on the project;
  - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
  - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.
- b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and nonminority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

**(B) Davis-Bacon Act, as amended (40 U.S.C. 3141-3148).**

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA1273 format and FHWA program requirements.

## 1. Minimum wages (29 CFR 5.5)

a. Wage rates and fringe benefits. All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH-1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

### b. Frequently recurring classifications.

(1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

- (i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;
- (ii) The classification is used in the area by the construction industry; and
- (iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination. The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed

in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. Conformance.

(1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to DBAconformance@dol.gov. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to DBAconformance@dol.gov, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. Fringe benefits not expressed as an hourly rate. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. Unfunded plans. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. Interest. In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

## **2. Withholding (29 CFR 5.5)**

a. Withholding requirements. The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. Priority to withheld funds. The Department has priority to funds withheld or to be withheld in accordance with paragraph 2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its procurement costs;

- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

### 3. Records and certified payrolls (29 CFR 5.5)

#### a. Basic record requirements

(1) Length of record retention. All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) Information required. Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) Additional records relating to fringe benefits. Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) Additional records relating to apprenticeship. Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

#### b. Certified payroll requirements

(1) Frequency and method of submission. The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for

at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) Information required. The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker ( e.g., the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH-347 or in any other format desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division website at <https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf> or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) Statement of Compliance. Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) Use of Optional Form WH-347. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(3) of this section.

(5) Signature. The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) Falsification. The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) Length of certified payroll retention. The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. Contracts, subcontracts, and related documents. The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. Required disclosures and access

(1) Required record disclosures and access to workers. The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) Sanctions for non-compliance with records and worker access requirements. If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) Required information disclosures. Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

#### **4. Apprentices and equal employment opportunity (29 CFR 5.5)**

## a. Apprentices

(1) Rate of pay. Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) Fringe benefits. Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) Apprenticeship ratio. The allowable ratio of apprentices to journey workers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) Reciprocity of ratios and wage rates. Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journey worker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. Equal employment opportunity. The use of apprentices and journey workers under this part must be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT). Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of

Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journey workers shall not be greater than permitted by the terms of the particular program.

**5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

**6. Subcontracts.** The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

**7. Contract termination: debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

**9. Disputes concerning labor standards.** As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

**10. Certification of eligibility.**

- a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).
- b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).
- c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

**11. Anti-retaliation.** It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

- a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;
- b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;
- c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or
- d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

**(C) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708).**

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

**1. Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

**2. Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)\* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

\* \$31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

### 3. Withholding for unpaid wages and liquidated damages

a. Withholding process. The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. Priority to withheld funds. The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

- (1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;
- (2) A contracting agency for its procurement costs;
- (3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;
- (4) A contractor's assignee(s);
- (5) A contractor's successor(s); or
- (6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

**4. Subcontracts.** The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

**5. Anti-retaliation.** It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to

discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

- a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;
- b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;
- c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or
- d. Informing any other person about their rights under CWHSSA or this part.

**(D) Rights to Inventions Made Under a Contract or Agreement.** If the Federal award meets the definition of “funding agreement” under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

**(E) Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended**

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II. The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

**(F) Debarment and Suspension (Executive Orders 12549 and 12689)**

**1. Instructions for Certification – First Tier Participants:**

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or

explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the

eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

## **2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

**3. Instructions for Certification - Lower Tier Participants:** (Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily 13 excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

#### **4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements) b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

#### **(G) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352).**

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**(H) Build America, Buy America Act (Pub. L. 177-58)**

Contractor must comply with the Build America, Buy America Act (BABAA) requirements codified in 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 CFR Part 661.

Contractor shall include Manufacturer's Certification for BABAA requirements with all applicable submittals. If a specific manufacturer is used in the bidding, a statement that Manufacturer will comply with BABAA must be included with the bid submission.

Contractor shall comply with BABAA requirements, including coordination with manufacturers, distributors, and suppliers to correct deficiencies in any BABAA documentation.

Engineer/Architect approval of shop drawings or samples shall include review of BABAA documentation.

Contractor shall certify upon completion that all work and materials have complied with BABAA requirements.

For any change orders, Contractor shall provide BABAA documentation for any new products or materials required by the change.

Installation of materials or products that are not compliant with BABAA requirements shall be considered defective work. Contractor should ensure that Engineer/Architect has an approved Manufacturer's Certification or waiver prior to items being delivered to the project site.

By submitting an application for payment, based in whole or in part on furnishing equipment or materials, Contractor certifies that such equipment and materials, to contractor's knowledge, are compliant with BABAA requirements.

SAMPLE

## EXHIBIT C – APPRENTICE UTILIZATION

**Intent:** As a material part of this Contract, this exhibit includes the requirements, process, and procedures associated with the utilization of apprentices on this Contract. These requirements are in addition to the requirements that may be found elsewhere in the Contract.

### **1. APPRENTICE UTILIZATION REQUIREMENT**

The Contractor must ensure that 15 percent of the total Contract Labor Hours used on the project are performed by apprentices registered in a state-approved training program. This requirement must be included in any subcontract at any tier on the Project.

Total Contract labor hours include additional hours worked because of Change Orders, and exclude hours worked by foremen, superintendents, supervisors, owners, and workers who are not subject to prevailing wage requirements.

However, it may be determined that they are subject to prevailing wage requirements under the following criteria of WAC 296-127-015: supervisors (e.g. foreman, general foreman, superintendents) are entitled to receive at least the journey level prevailing rate of wage for performing manual or physical labor:

1. For each hour spent in the performance of manual or physical labor if it is for more than 20 percent but less than 50 percent of their hours worked on a public works project during any given week.
2. For all hours worked in any given week if they perform manual or physical labor for 50 percent or more of their hours worked on a public works project during such week. The Contractor must include the apprentice utilization requirements of this Section in all subcontracts executed for the Project and ensure that all Subcontractors working on the project are notified of the apprentice utilization requirements.

The Contractor is responsible for meeting the apprentice utilization requirements of the Contract, including overall compliance on all Contract labor hours worked by Subcontractors. The Contractor must ensure compliance with RCW 49.04, WAC 296-05, and the apprenticeship training standards for each trade/craft classification used on the Project, as set forth by L&I.

### **2. APPRENTICE UTILIZATION PLAN**

The Contractor must submit a comprehensive plan listing the subcontractors and apprentices/programs to be used on the Project and how the apprentice utilization requirements will be met on the total Contract labor hours.

The plan must be submitted [insert format, timing, and submission details].

An approved Plan is required prior to [insert requirement]. An updated Plan is required when any new subcontractor is approved to the project and when any Change Order Proposal is submitted.

### 3. GOOD FAITH EFFORTS AND ADJUSTMENTS TO THE APPRENTICE UTILIZATION REQUIREMENT

If the Contractor determines that the Project will be unable to achieve the apprentice utilization percentage, the Contractor may make a written request to [owner] to adjust the required apprentice utilization percentage as allowed under RCW 39.04.320(2).

The request must include documentation of the Contractor's and subcontractor's *good faith efforts* to hire registered apprentices.

Acceptable good faith efforts must include one, or more of the following:

1. Not enough registered apprentices in the geographic/county area as verified by WSATC;
2. An inadequate number of apprentices are available to comply with the required apprentice utilization percentage as verified by appropriate state programs;
3. There are not enough hours on the project to afford the appropriate ratio of journey level to apprentice oversight as verified by the appropriate state programs and documented through the Project schedule;
4. There is a disproportionately high ratio of material costs to labor hours, which does not make the required minimum levels of apprentice participation possible for this Contract as verified by the schedule of values/bid item breakdown and/or backup invoicing from suppliers or similar;
5. Apprentice utilization and involvement in Work of the Project would void warranty as verified by an original equipment manufacturer and/or surety;
6. Other documented and verifiable impracticality that could not have been foreseen or avoided.

The Owner will evaluate the request and, if appropriate, prepare a Change Order reducing the required utilization percentage. If the Owner determines that a reduction in the required utilization percentage is not justified, the Owner will communicate the decision in writing to the Contractor and a monetary disincentive may be assessed.

### 4. PREVAILING WAGES FOR APPRENTICES

An apprentice is defined as a laborer, worker, or mechanic employed to perform the Work for whom an apprentice agreement is established through a Training Program that is registered and approved by the Washington State Apprenticeship and Training Council (WSATC).

Per RCW 39.12.021 and RCW 49.04, apprentices must be paid the applicable prevailing hourly rate for an apprentice of that trade. An apprentice wage schedule has been added to the Journey Level rates. Intents, Affidavits, and certified payrolls must contain the relevant apprentice information and be recorded in L&I's Prevailing Wage Intents and Affidavits system.

### 5. APPRENTICE UTILIZATION REPORTING

The Contractor and every Subcontractor must report all apprentices and the wages paid as required by L&I. The Contractor must submit other information as requested by the Owner to verify compliance

with the apprentice utilization requirements of the Contract. The Owner may add, delete, or change the information required by the Contractor, as necessary.

## 6. MONITORING APPRENTICE UTILIZATION

The Owner will monitor the Contractor's and subcontractor's progress in apprentice utilization by reviewing and approving Apprentice Utilization Plan(s), Intents and Affidavits filed and Certified Payroll as part of the monthly Progress Payment reviews. The Owner reserves the right to withhold payment until appropriate documentation is loaded into PWIA.

## 7. MEETING APPRENTICE UTILIZATION REQUIREMENTS: MONETARY INCENTIVE

Should the Contractor, and/or subcontractors, achieve 15% apprentice utilization *without any good faith efforts*, a monetary assessment of [\$XXXXXX] will be paid to the Contractor for proportional distribution to all employers of apprentices on the Project.

## 8. FAILURE TO COMPLY WITH APPRENTICE UTILIZATION REQUIREMENTS: DISINCENTIVE ASSESSMENT

Failure to comply with requirements for apprentice utilization, without a good faith effort, is a material breach of the Contract for which the Contractor, or its subcontractors, are subject to damages. If the Owner determines that the Contractor, or any of its subcontractors, are noncompliant, a monetary disincentive assessment of [\$20] for every minimum apprentice hour not achieved, will be subtracted from monies otherwise owed to the Contractor. If no additional monies are owed, an invoice will be sent for remittance prior to the filing the Notice of Completion with the state. In no event, will the disincentive assessment exceed 5% of the Total Contract Cost.

*Presented to*

***Katy Shores***

*For completion of 2 classroom hours of training in*

***Title VI Training for Local Public  
Agencies***

*Sponsored by*

*WSDOT Local Programs*

*Washington State Local Technical Assistance Program*

*May 30, 2024*

*WEBINAR*



**Washington State  
Department of Transportation**

*Doris Karolczyk*

Doris Karolczyk

External Civil Rights Specialist