

HYDROLOGY/HYDRAULICS REPORT

Wildwood-Wemme Section
U.S. 26, Mt. Hood Highway
Clackamas County, Oregon
Key # 12840



Prepared by:

Dan Gunther, P.E. Hydraulic Engineer
Oregon Department of Transportation

Reviewed by:

Anne MacDonald, CEG
Geomorphologist/Hydrologist

May 2006

HYDROLOGY/HYDRAULICS REPORT

Project Description

Numerous driveways and streets provide access to US 26 from MP 38.75 to MP 40.01. The existing 4-foot median creates a safety problem when left turning vehicles stop in the travel lanes to await oncoming traffic to clear.

A 600-signature petition was submitted to the District 2C Manager in 1999 requesting that ODOT address safety and access issues along this section of US 26. Fourteen accidents 2 fatal have been reported in this section from January 1, 1997, to December 31, 2002.

The project proposes to construct a median that meets driver expectations and is consistent with the existing cross section at each end of the project. Left turn lanes will be striped at side streets and vehicles turning left at driveways will utilize the median as a refuge. The approaches of three residential streets on the north side of the highway may need to be modified to match grade with the expanded highway.

Existing Conditions:

The topography of the project corridor is generally flat but gently rising towards the east, with an elevation of about 1200' on the west to about 1300' at the east end of the project. The highway follows a low divide between the Sandy River on the north and the Salmon River on the south. No named or unnamed creeks are crossed by the highway.

On the south side of the highway, Mt. Hood Village, a recreational "cottage" and RV park development, is located at about MP 38.75, at the approximate west end of the proposed project. The driveway is shared with the Mt. Hood National Forest information center, located immediately east from and adjacent to Mt. Hood Village. The dominant land use for the rest of the section along the south side of the highway is large lot residential. The access to the BLM River Watch/Wildwood Recreation Site is at about MP 39.29. Some commercial uses have developed at about MP 39.64. The Arrah Wanna Boulevard intersection is the east end of the improvement project, where US 26 connects to an existing five-lane section. The intersection at Arrah Wanna Boulevard is dominated by commercial uses, along both the south and north sides of the highway.

The land use of the project area is dominated by diffuse large-lot residential development. The residences are generally sited off highway right of way by at least 50-100 ft. and are characteristically small, rustic summer homes or cabins that are accessed from US 26 by gravel driveways on the south side. Access to the residential development on the north side is from collector or secondary streets and roads, from west to east: Wemme Trail Road (MP 38.80) which loops back to US 26 at about MP 39.22; E. Mountain Air Drive (MP 39.0); E. Lataurelle Avenue (MP 39.51); and E. Wildwood Avenue (MP 39.62). There are no private driveways that serve individual lots directly from US 26 on the north side, although a church is located between MP 39.7 and 39.8, with access directly to US 26.

The project is within the Sandy River Basin, and runs parallel with the main stem of the Sandy River to the north between river miles (RM) 39 and 40. The river is approximately 0.25 to 0.4 miles away from the highway. The buffer between Hwy 26 and the Sandy River is mostly forested with some commercial and residential activity. Most of the residential development is set back from the road with a heavily forested area for a buffer. The 303(d) status of the Sandy and Salmon Rivers is discussed in the Water Resources Report.

Drainage Patterns

Drainage for the project section (MP 38.68 to MP 40.01) north of Hwy 26 is conveyed in ditches throughout most of the project.

Sub-Basin 1:

- Stormwater runoff is conveyed in ditches on the north and south sides of the highway, collected into a piped stormwater system and then is conveyed through constructed decorative ponds in Mt. Hood Village and finally discharges into the Salmon River.
- A small wetland is located on the north side of the roadway near station 750+00 and currently receives minimal highway runoff from about 200 linear feet of highway. Runoff reaches the wetland mainly through a ditch which will be improved to function as a bio-swale.
- A cross-culvert, near station 745+00, conveys runoff from the north to the south side of the highway.

Sub-Basin 2:

- Curbs with inlets and storm drain pipes convey drainage on the north side of US26 between Laturelle Avenue and Mountain Air Drive.
- Larger storms have historically flowed onto Mountain Air Drive and into an unnamed stream which flows to the Sandy River.
- Stormwater runoff flows directly into the adjacent vegetated side slopes and forest floor within the right-of-way in areas without curbs and inlets.

Sub-Basin 3:

- Drainage from the south side of US26 near Arraha Wanna Boulevard is conveyed by a cross culvert to the Wildwood Avenue stormwater pipeline along with flow from the north side of US26.

The roadside ditches are relatively shallow, and the side slopes vary from moderately steep to flat. The ditches are vegetated with grass. Beyond the roadway shoulder vegetation density and variety increases rapidly. Storm drainage discharges to sandy-silty soils, within the right-of-way, which appear to infiltrate all stormwater up to approximately the 50-year event (based on field observation February 2006 extremely wet period and from interviews with local property owners).

Drainage Issues and Mitigation

Stormdrain hydrology and hydraulics design criteria were obtained from ODOT's Hydraulics Manual. The detention and water quality treatment design criteria came from ODOT, NMFS, and Clackamas County

The criteria guiding the design were obtained from:

- Discussions with National Marine Fisheries Service (NMFS)
- *Surface Water Management Rules and Regulations for Clackamas County Service District No. 1*, May 1, 2000 (CC-SWMR)
- *Stormwater Management Manual*, (SWMM) City of Portland's Bureau of Environmental Services, Revision #1, September 2000.
- *Hydraulics Manual*, Oregon Department of Transportation, January 1990 (ODOT-HM), and,
- *Surface Water Design Manual*, King County, Washington, September 1998 (King Co).

The criteria are summarized in the following table:

Table 1: Design Criteria

Component	Design Criteria
Pavement Area to be Treated	<ul style="list-style-type: none"> • Treat a pavement area equivalent to 140% of the new impervious pavement area (NMFS)
Storm Drain System	<ul style="list-style-type: none"> • Storm drains shall be designed to convey runoff produced by a 10-year storm except that a 50-year storm shall be used for the entire length of a system carrying water from mainline sags (ODOT-HM).
Detention	<ul style="list-style-type: none"> • The 2-year, 24-hour storm post-developed peak discharge rate must be reduced to a ½ of the 2-year, 24-hour storm pre-developed peak discharge rate (CC-SWMR).
Water-Quality Treatment	<ul style="list-style-type: none"> • Treat the runoff resulting from the water-quality storm, defined as 2/3 of a 2-year post-developed 24-hour storm (CC-SWMR). • The water quality system shall use vegetation for treatment.
Small Channels	<ul style="list-style-type: none"> • Channel geometry and linings shall be designed to create a stable channel system when conveying the design storm discharge. <p>For water-quality swales this includes:</p> <ul style="list-style-type: none"> • Maximum velocity during WQ storm is 0.33 m/s (1 ft/s) (King Co), • Maximum velocity for high-flow events is 1.5 m/s (5 ft/s) (King Co).

Overall, the project area along Hwy 26 currently receives moderate water quality treatment through the existing drainage system. The existing stormwater management system will be retained and enhanced where necessary to meet detention and water quality treatment criteria triggered by the additional runoff from this project. High runoff

storm events (>25-yr storm) will discharge, without treatment, a portion of stormwater runoff to the Sandy River. Dry detention ponds with bottom vegetation that meets the design criteria for a vegetated swale will be constructed as a Best Management Practice (BMP) for water quality treatment. Filtration through vegetation and infiltration into soil will remove the majority of pollutants, especially for water quality storms. The effect of additional impervious surface on pollutant loading will be nominal. The continued infiltration of stormwater means that the increased stormwater runoff due to widening in this area will not alter hydrologic characteristics of the Sandy River.

The water quality/quantity facilities will treat flow from the center turn lane and westbound lane of the roadway. The amount of impervious area thus treated by is more than the amount of new impervious for the new turn lane (approximately 6.8 acres will be treated versus 2.3 acres of new impervious area).

Table 1

Sub-Basin No.	Project Sub-Basin	Approx. Station	Existing Impervious Area, ac.	New Roadway Width, ft	Proposed New Impervious Area, ac.	
1	West Sub-Basin	741+00 to 763+31	3.3 ac.	14	0.72	
2	Middle Sub-Basin	763+31 to 794+53	4.1 ac	16	0.89	
3	East Sub-Basin	807+53 to 794+53	2.8 ac	14	0.64	
			10.2 ac.		2.25 ac.	

Basin enhancements include:

- **Sub-Basin 1** existing ditches, upstream of where runoff is flows into the wetland, will be replaced with a vegetated swale.
- **Sub-Basin 2** swales and overflow that has occasionally flowed to Mountain Air Drive will be re-constructed to route treated drainage to the un-named creek within the BLM property. This change accomplishes two objectives, it will prevent runoff flow toward Mountain Air Drive, and it will enhance infiltration of runoff by spreading stormwater to a larger area.
- **Sub-Basin 3** drainage will be upgraded by adding detention and treatment. The amount of infiltration will be enhanced so the small and medium storm events infiltrate and only larger flood events will discharge to the surface waters after local soils are saturated with moisture.

References:

Discussions with National Marine Fisheries Service (NMFS).

Surface Water Management Rules and Regulations for Clackamas County Service District No. 1 , May 1, 2000 (CC-SWMR).

Stormwater Management Manual, (SWMM) City of Portland's Bureau of Environmental Services, Revision #1, September 2000.

Hydraulics Manual, Oregon Department of Transportation, January 1990 (ODOT-HM).

Surface Water Design Manual, King County, Washington, September 1998 (King Co).

Wildwood - Wemme Project

