# OPERATION & MAINTENANCE MANUAL

## DFI No. : D00191
## Facility Type: Water Quality Manhole


**OCTOBER, 2011**

**INDEX**

## 1. Identification

| | |
|---|---|
| Drainage Facility ID (DFI): | **D00191** |
| Facility Type: | Water Quality Manhole |
| Construction Drawings: | (V-File Number) [39V-063] |
| Location: | District: 2B (Old 2A) |
| | Highway No.: 140 |
| | Mile Post: [5.45 (beg./end)] |
| | Description: This facility is located on the southeast quadrant of the intersection of Farmington Road and the Hillsboro-Silverton Hwy (OR 219) when heading eastbound onto Farmington Road. Access may be obtained from the right shoulder of Farmington Road. |

## 2. Facility Contact Information

Contact the Engineer of Record, Region Technical Center, or Geo-Environmental's Senior Hydraulics Engineer for:

- Operational clarification
- Maintenance clarification
- Repair or restoration assistance

Engineering Contacts:

Region Technical Center Hydro Unit Manager

Or

Geo-Environmental Senior Hydraulics Engineer (503) 986-3365.

## 3. Construction

| | |
|---|---|
| Engineer of Record: | Consultant Designer – David Evans and Assoc., Inc., Richard Attanasio, P.E., 503-223-6663 |
| Facility construction: | 2006 |
| Contractor: | Kerr Contractors, Inc. |

## 4. Storm Drain System and Facility Overview

This water quality manhole is an underground facility designed to treat stormwater runoff. The system is a proprietary product called First Defense® manufactured by Hydro International, Inc. The underground vortex system provides treatment using a 'low energy vortex regime' by removing or separating the solids from the water via sedimentation and flow through an inlet, a separation chamber, and a sump at the bottom. This facility contains an Operation and Maintenance manual as prepared by the manufacturer and is provided in Appendix C.

This facility is located on the southeast quadrant of the intersection of Farmington Road and the Hillsboro-Silverton Hwy (OR 219) when heading eastbound onto Farmington Road. Access may be obtained from the right shoulder of Farmington Road.

A 12-inch storm drain pipe conveys water from a nearby detention tank/pipe and flow control detention manhole facility (DFI D00190). Excess water leaving the detention tank/pipe system enters the water quality manhole (DFI D00191) from the north after collecting stormwater runoff from the surrounding ditches and impervious surfaces associated with the roadway intersection.

The water quality manhole is a specialized proprietary structure designed to treat and remove pollutants from the stormwater. Once treated, the water flows south through a 12-inch outlet pipe toward an outfall and riprap pad before entering a ditch that directs flows to Christensen Creek; see Point C of the Operational Plan, Appendix A.

A. Maintenance equipment access:
   Unobstructed access may be obtained from the right shoulder of Farmington Road just east of its intersection with the Hillsboro-Silverton Highway (OR 219).

B. Heavy equipment access into facility:

   ☒ Allowed (no limitations)
   ☐ Allowed (with limitations)
   ☐ Not allowed

C. Special Features:

   ☐ Amended Soils
   ☐ Porous Pavers
   ☐ Liners
   ☐ Underdrains


Photo 1: Interior view of water quality manhole.

## 5. Facility Haz Mat Spill Feature(s)

The water quality manhole (DFI D00191) and the adjoining detention tank/pipe facility (DFI D00190) can be used to store a volume of liquid by blocking the 12-diameter outlet pipe located at the outlet of the water quality manhole. This pipe is associated with Point A on the Operational Plan, Appendix A.

## 6. Auxiliary Outlet (High Flow Bypass)

Auxiliary Outlets are provided if the primary outlet control structure can not safely pass the projected high flows. Broad-crested spillway weirs and over flow risers are the two most common auxiliary outlets used in stormwater treatment facility design. The auxiliary outlet feature is either a part of the facility or an additional storm drain feature/structure.

The auxiliary outlet feature for this facility is:

☒ Designed into facility

An auxiliary outlet feature (a high-flow bypass) is built into the specialized manhole structure and will allow higher flows to directly pass through the manhole should a high flow stormwater event ever occur.

☐ Other, as noted below

## 7. Maintenance Requirements

Routine maintenance table for non-proprietary stormwater treatment and storage/detention facilities have been incorporated into ODOT's Maintenance Guide. These tables summarize the maintenance requirements for ponds, swales, filter strips, bioslopes, and detention tanks and vaults. Special maintenance requirements in addition to the routine requirements are noted below when applicable.

The ODOT Maintenance Guide can be viewed at the following website:

http://www.oregon.gov/ODOT/HWY/OOM/MGuide.shtml

Maintenance requirements for proprietary structures, such as underground water quality manholes and/or vaults with filter media are noted in Appendix C when applicable.

The following stormwater facility maintenance table (See ODOT Maintenance Guide) should be used to maintain the facility outlined in this Operation and Maintenance Manual or follow the Maintenance requirements outlined in Appendix C when proprietary structure is selected below:

☒ Table 1 (general maintenance)
☐ Table 2 (stormwater ponds)
☐ Table 3 (water quality biofiltration swales)
☐ Table 4 (water quality filter strips)
☐ Table 5 (water quality bioslopes)
☐ Table 6 (detention tank)
☐ Table 7 (detention vault)
☒ Appendix C (proprietary structure)
☒ Special Maintenance requirements: See Appendix C and the Proprietary Structure Maintenance Requirements for an O&M Manual specifically written for the water quality structure.

Note: Special maintenance Requirements Require Concurrence from ODOT SR Hydraulics Engineer.

## 8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the roadwaste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options: http://egov.oregon.gov/ODOT/HWY/OOM/EMS.shtml

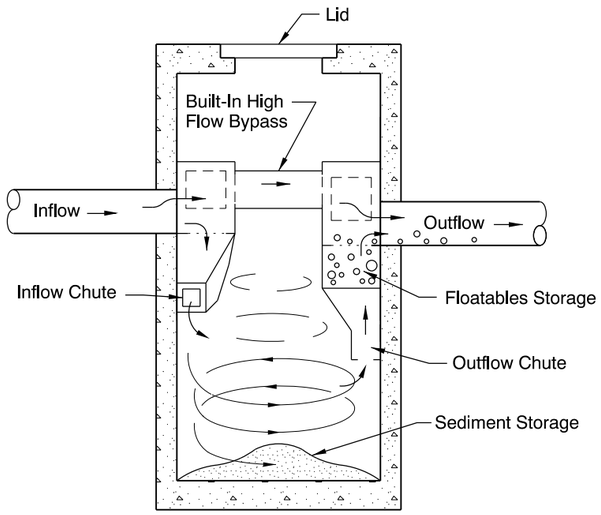
Contact any of the following for more detailed information about management of waste materials found on site:

| | |
|---|---|
| ODOT Clean Water Unit | (503) 986-3008 |
| ODOT Statewide Hazmat Coordinator | (503) 229-5129 |
| ODOT Region Hazmat Coordinator | (503) 731-8290 |
| ODEQ Northwest Region Office | (503) 229-5263 |

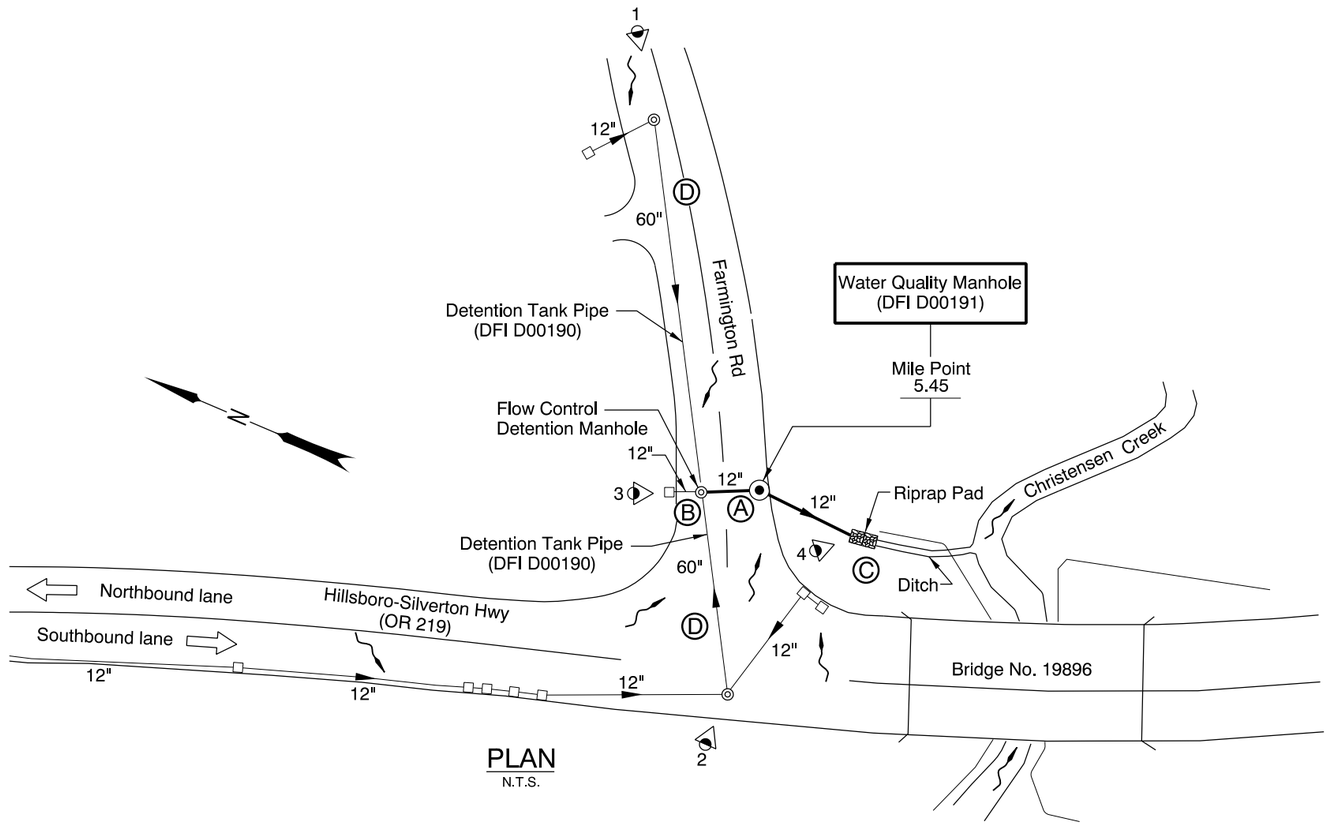
# Appendix A

**Content:**

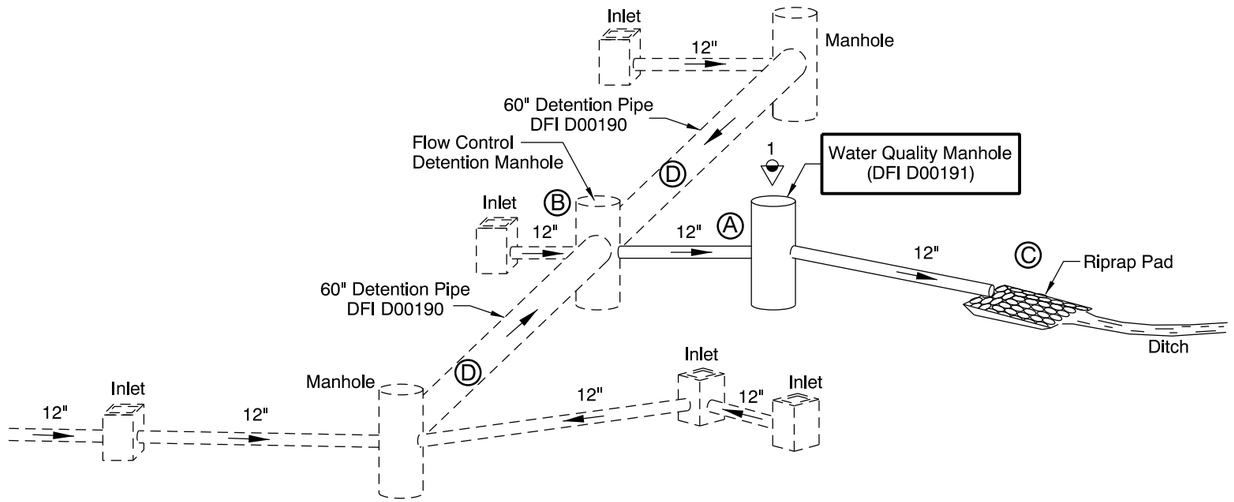
- **Operational Plan and Profile Drawing(s)**




WATER QUALITY MANHOLE - FIRST DEFENSE UNIT
DETAIL AT POINT Ⓐ
N.T.S.




PLAN
N.T.S.




SCHEMATIC OF PIPE DRAINAGE SYSTEM DFI D00191
N.T.S.

LEGEND:

- Photo Location / Direction
- Ⓐ Water Quality Manhole
- Ⓑ Flow Control Detention Manhole
- Ⓒ Stormwater Outfall/Riprap Pad
- Ⓓ 60" Detention Pipe (DFI D00190)
- Riprap Pad
- ◉ and or ◎ Manhole
- ■ and or □ Inlet
- Storm Pipe (Facility)
- Storm Pipe
- Conveyance Direction
- Pavement / Facility Flow Path

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: Bob Knorr

Drafted By: Bob Knorr

**DFI D00191**
**MAINTENANCE DISTRICT 2B HWY 140**
**WATER QUALITY MANHOLE**
HILLSBORO-SILVERTON HIGHWAY MP 5.45
WASHINGTON COUNTY

# Appendix B

**Content:**

- **ODOT Project Plan Sheets**
  - ***Cover/Title Sheet***
  - ***Water Quality/Detention Plan Sheets***
  - ***Other Details***

39V-63

| INDEX OF SHEETS | |
|---|---|
| SHEET NO. | DESCRIPTION |
| 1 | Title Sheet |
| 1A | Index Of Sheets Cont'd. & Std. Drg. Nos. |
| | |
| | |
| | |

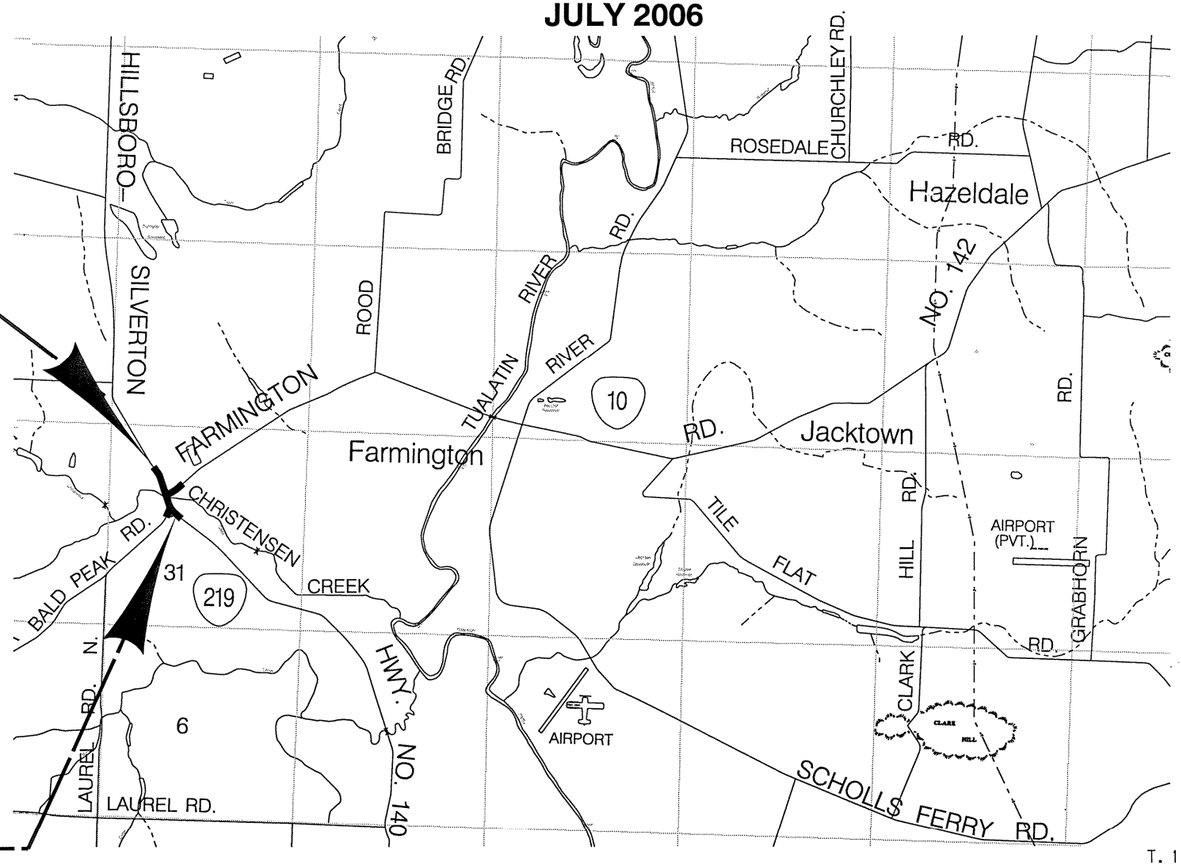
STATE OF OREGON
# DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED PROJECT

## GRADING, DRAINAGE, STRUCTURE, PAVING, SIGNING, & ROADSIDE DEVELOPMENT

# OR219: HILLSBORO - SILVERTON HIGHWAY AT FARMINGTON ROAD

## HILLSBORO - SILVERTON HIGHWAY

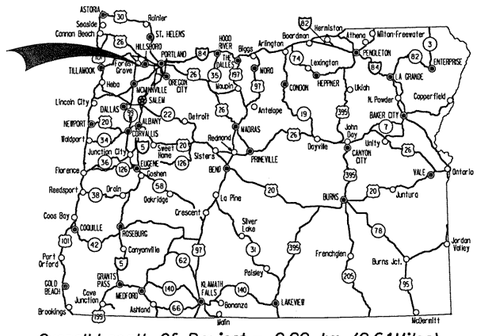
### WASHINGTON COUNTY
### JULY 2006




**BEGINNING OF PROJECT**
**STA. 8+189.00 (M.P. 5.18)**

**END OF PROJECT**
**STA. 9+175.00 (M.P. 5.79)**

T. 1 S., R. 2 W., W.M.




*Overall Length Of Project - 0.99 km (0.61Miles)*

**ATTENTION:**
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

OREGON TRANSPORTATION COMMISSION

| | |
|---|---|
| Stuart Foster | CHAIRMAN |
| Gail L. Achterman | COMMISSIONER |
| Mike Nelson | COMMISSIONER |
| Randall Pape | COMMISSIONER |
| Janice J. Wilson | COMMISSIONER |
| Matthew L. Garrett | DIRECTOR OF TRANSPORTATION |

REGISTERED PROFESSIONAL ENGINEER
13,704
OREGON
JULY 16, 1987
CATHERINE M. NELSON
Expires Dec. 31, 2006

Catherine M. Nelson
TECHNICAL SERVICES MANAGING ENGINEER

**OR219: HILLSBORO-SILVERTON HIGHWAY AT FARMINGTON ROAD**
HILLSBORO - SILVERTON HIGHWAY
WASHINGTON COUNTY

| FEDERAL HIGHWAY ADMINISTRATION | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| OREGON DIVISION | X-STP-S140 (032) | 1 |

METRIC

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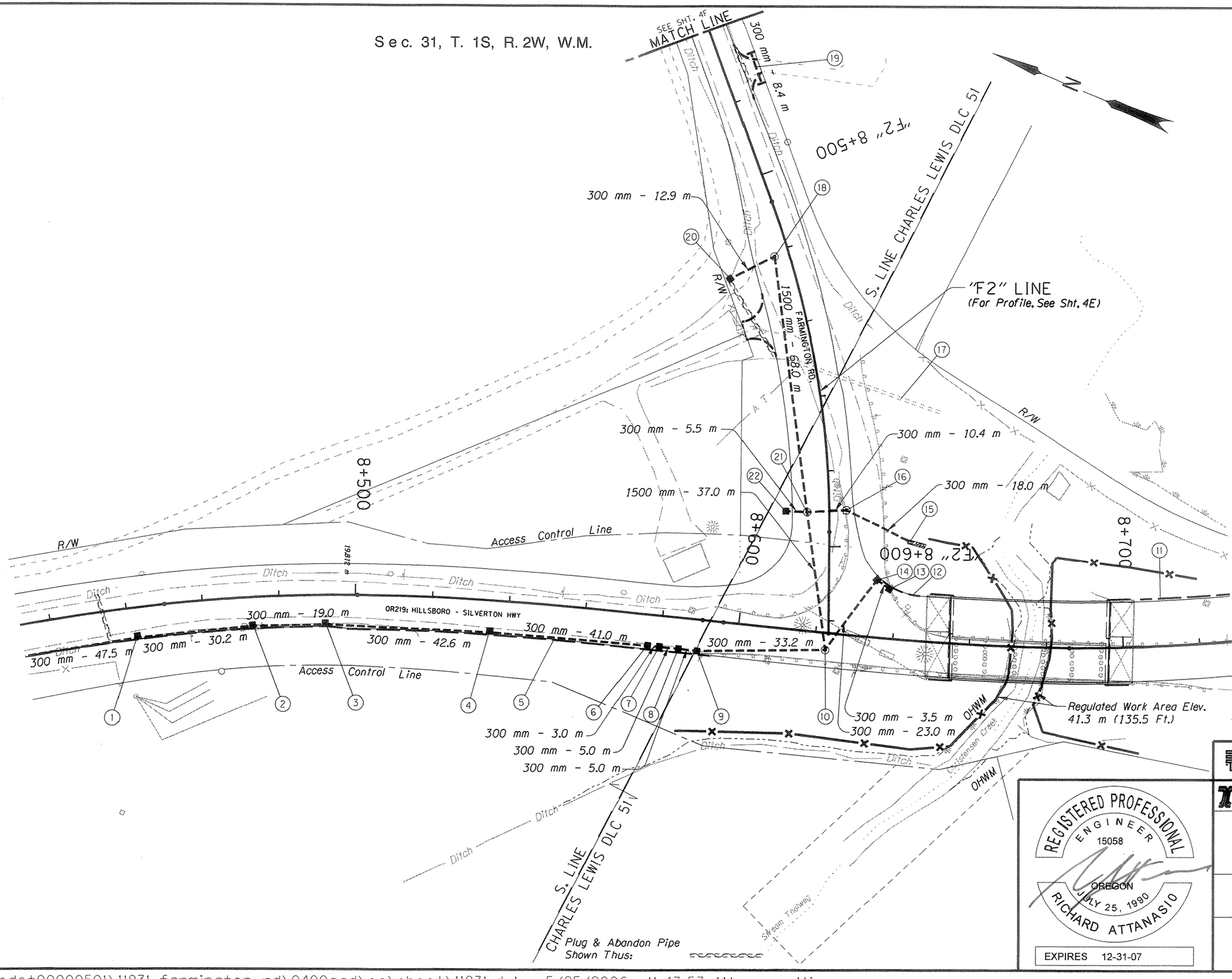


BRIDGE DETAILS CHECKED_____

DAVID EVANS AND ASSOCIATES INC.

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

**OR219: HILLSBORO - SILVERTON HIGHWAY AT FARMINGTON ROAD**

HILLSBORO - SILVERTON HIGHWAY

WASHINGTON COUNTY

Reviewed By - CPH
Designed By - SRV
Drafted By - MJY

REGISTERED PROFESSIONAL ENGINEER
15058
OREGON
JULY 25, 1990
RICHARD ATTANASIO
EXPIRES 12-31-07

# DRAINAGE PLAN

SHEET NO. 4B

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(1) *Sta. 8+442.2, Rt. (8.0 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 47.5 m*
*1.5 m Depth*

(2) *Sta. 8+472.9, Rt. (7.7 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 30.2 m*
*1.5 m Depth*

(3) *Sta. 8+492.1, Rt. (7.6m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 19.0 m*
*1.5 m Depth*

(4) *Sta. 8+535.5, Rt. (8.6 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 42.6 m*
*1.5 m Depth*

(5) *Sta. 8+498.0 To Sta. 8+594.1, Rt.*
*Const. Asph. Conc. Drainage Curb*
*(See Drg. No. RD700)*

(6) *Sta. 8+577, Rt. (9.0 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 41.0 m*
*1.5 m Depth*

(7) *Sta. 8+580, Rt. (9.0 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 3.0 m*
*1.5 m Depth*

(8) *Sta. 8+585, Rt. (9.0 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 5.0 m*
*1.5 m Depth*

(9) *Sta. 8+590, Rt. (9.0 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 5.0 m*
*1.5 m Depth*
*(See Drg. No. RD364)*

(10) *Sta. 8+622.85, Rt. (4.4 m)*
*Const. Manhole, Large 2100 mm Dia.*
*Inst. 300 mm Sew. Pipe - 33.2 m*
*1.5 m Depth*
*Inst 300 mm Sew. Pipe - 23.0 m*
*1.5 m Depth*
*(See Drg. No. RD346)*

(11) *Sta. 8+705 To Sta. 8+788.0, Lt.*
*Const. Asph. Conc. Drainage Curb*

(12) *Sta. 8+633.70 To Sta. 8+643.14, Lt*
*Const. Asph. Conc. Drainage Curb*

(13) *Sta. 8+638, Lt. (14.0 m)*
*Const. Type "G-2" Inlet*

(14) *Sta. 8+635, Rt. (16.0 m)*
*Const. Type "G-2" Inlet*
*Inst. 300 mm Sew. Pipe - 3.5 m*
*1.5 m Depth*

(15) *Sta. "F2" 8+598.20, Lt. (20.8 m)*
*Const. Outfall*
*Inst. 300 mm Sew. Pipe - 18.0 m*
*3.0 m Depth*
*Const. Loose Riprap (Class 25) - 1.44 $m^3$*
*(2.4 m Long x 1.2 m Wide x 0.5 m Deep)*

(16) *Sta. "F2" 8+590.50, Lt. (4.5 m)*
*Const. Manhole, Type Water Quality*
*Inst. 300 mm Sew. Pipe - 10.4 m*
*3.0 m Depth*

(17) *Fill Abandoned Structures*

(18) *Sta. "F2" 8+521.24, Rt. (3.8 m)*
*Const. Manhole, Large 2100 mm Dia.*
*Inst. 300 mm Sew. Pipe - 12.9 m*
*1.5 m Depth*

(19) *Sta. "F2" 8+473, Lt.*
*Inst. 300 mm Culv. Pipe - 8.4 m*
*1.5 m Depth*

(20) *Sta. "F2" 8+524, Rt. (16.8 m)*
*Const. Type "D" Inlet*
*(See Drg. No. RD370)*

(21) *Sta. "F2" 8+590.80, Rt. (5.8 m)*
*Const. Manhole, Type Flow Control, 3000 mm*
*Inst. 300 mm Sew. Pipe - 5.5 m*
*1.5 m Depth*
*Inst. 1500 mm Sew. Pipe - 68.0 m*
*6.0 m Depth*
*Inst. 1500 mm Sew. Pipe - 37.0 m*
*3.0 m Depth*
*(For Details, See Sht. GJ)*

(22) *Sta. "F2" 8+593, Rt. (10.5 m)*
*Const. Type "G-2M" Inlet*
*(See Drg. No. RD364)*

REGISTERED PROFESSIONAL ENGINEER
15058
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RICHARD ATTANASIO
EXPIRES 12-31-07

DAVID EVANS AND ASSOCIATES INC.

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

**OR219: HILLSBORO - SILVERTON HIGHWAY AT FARMINGTON ROAD**

HILLSBORO - SILVERTON HIGHWAY

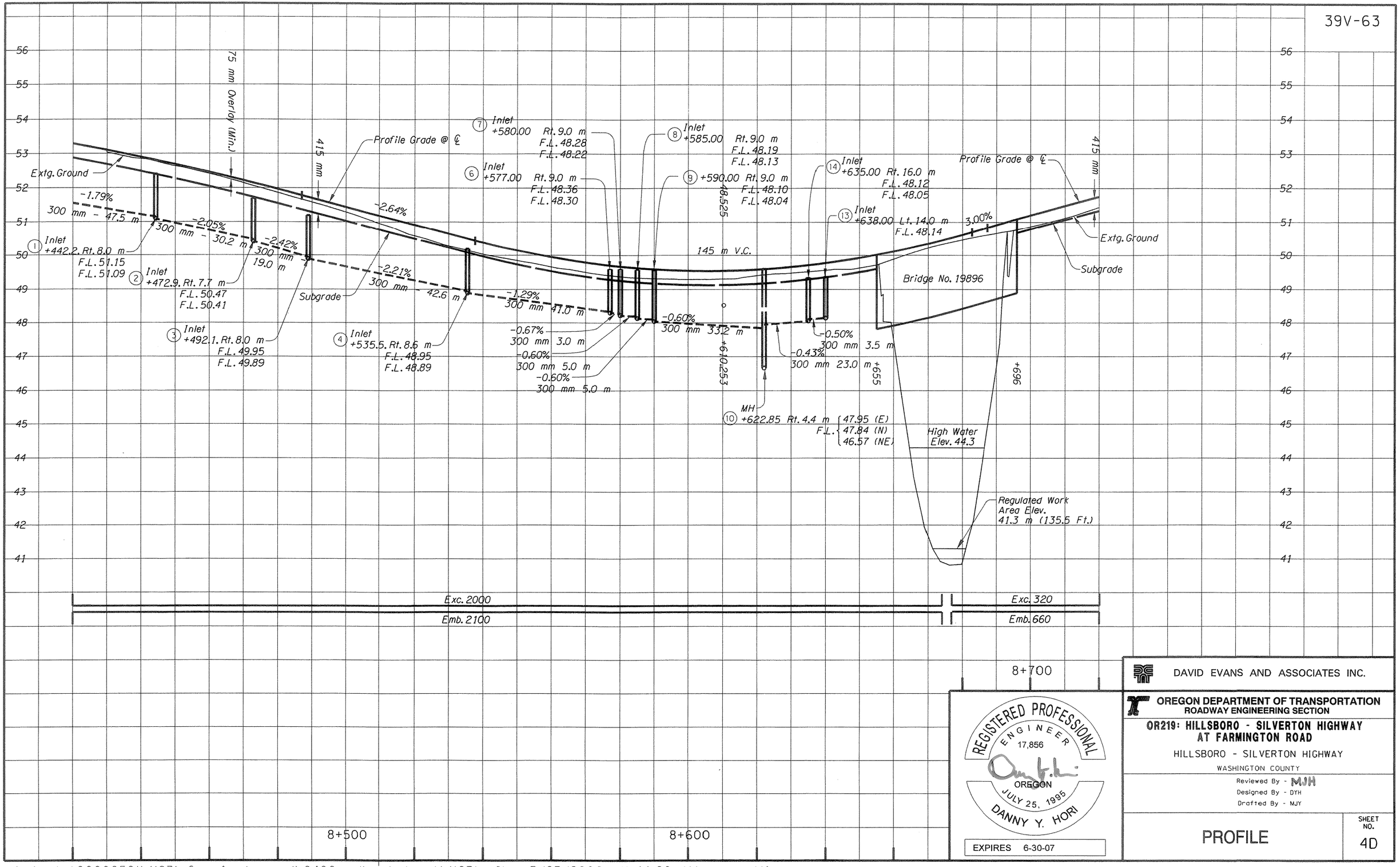
WASHINGTON COUNTY

Reviewed By - CH
Designed By - SRV
Drafted By - MJY

# DRAINAGE PLAN NOTES

SHEET NO. 4C

BRIDGE DETAILS CHECKED




DAVID EVANS AND ASSOCIATES INC.

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17,856
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DANNY Y. HORI
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OREGON DEPARTMENT OF TRANSPORTATION
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**OR219: HILLSBORO - SILVERTON HIGHWAY AT FARMINGTON ROAD**

HILLSBORO - SILVERTON HIGHWAY

WASHINGTON COUNTY

Reviewed By - MJH
Designed By - DYH
Drafted By - MJY

# PROFILE

SHEET NO. 4D

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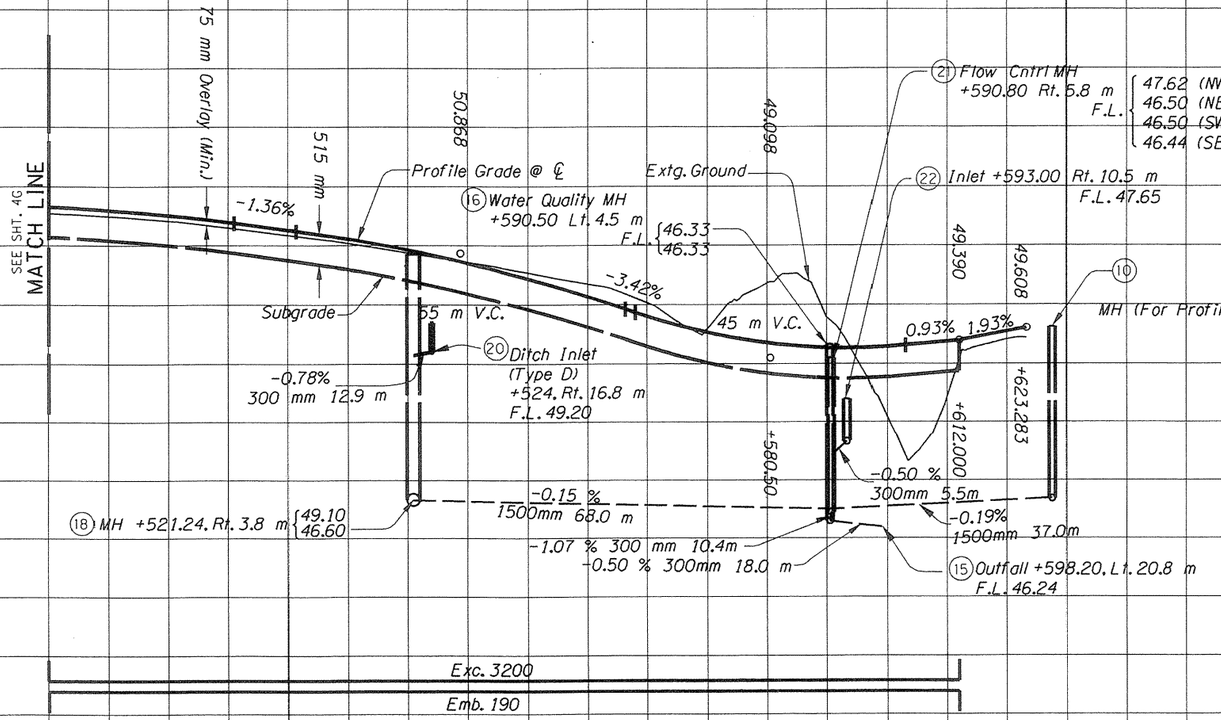



REGISTERED PROFESSIONAL ENGINEER
17,856
OREGON
JULY 25, 1995
DANNY Y. HORI
EXPIRES 6-30-07

DAVID EVANS AND ASSOCIATES INC.

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

**OR219: HILLSBORO - SILVERTON HIGHWAY AT FARMINGTON ROAD**

HILLSBORO - SILVERTON HIGHWAY

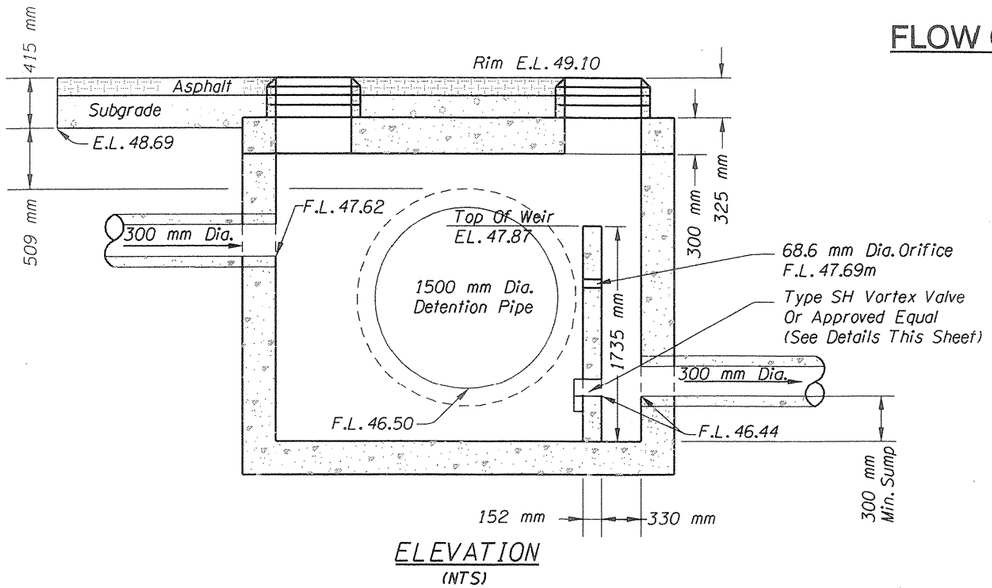
WASHINGTON COUNTY

Reviewed By - MJH
Designed By - DYH
Drafted By - MJY

PROFILE

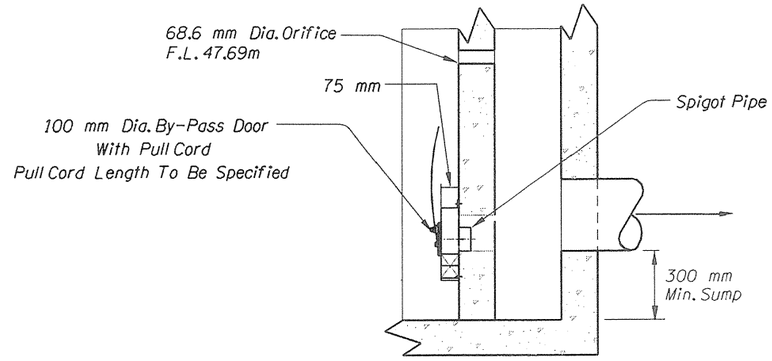
SHEET NO. 4E

# FLOW CONTROL MANHOLE




ELEVATION
(NTS)

## VORTEX VALVE DETAIL




SECTION A-A
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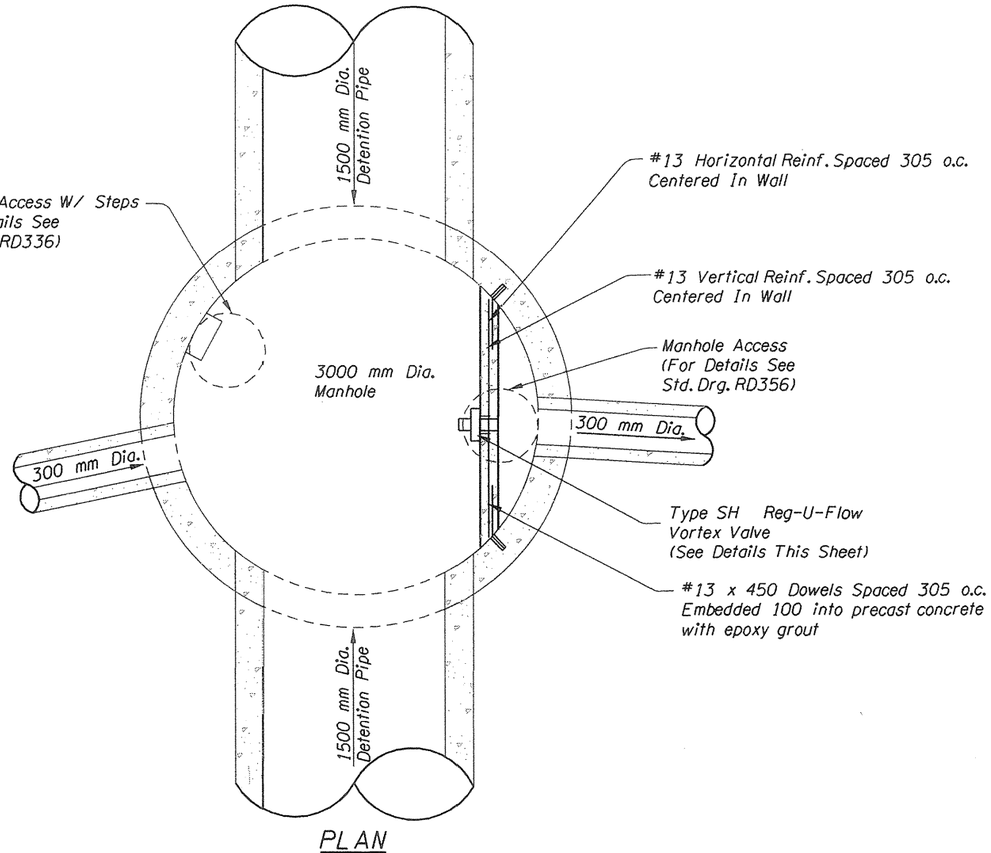
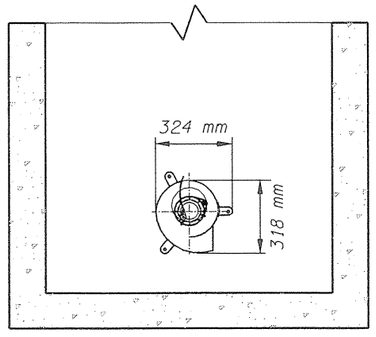



PLAN
(NTS)




SECTION B-B
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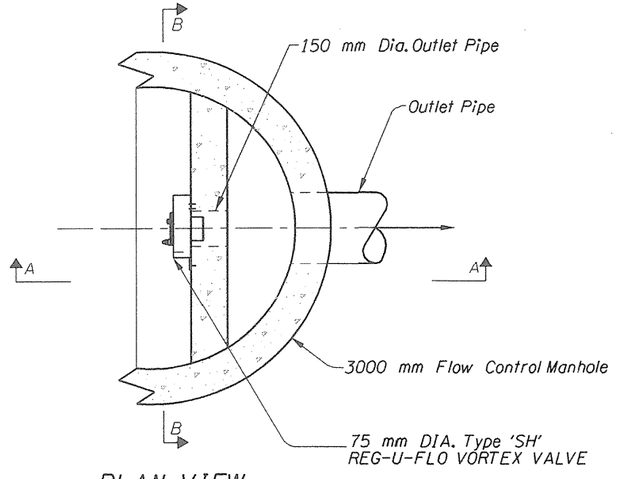



PLAN VIEW
(NTS)

DAVID EVANS AND ASSOCIATES INC.

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

OR219: HILLSBORO - SILVERTON HIGHWAY
AT FARMINGTON ROAD

HILLSBORO - SILVERTON HIGHWAY

WASHINGTON COUNTY

Reviewed By - GH
Designed By - SRV
Drafted By - TASC

STRUCTURE NO.

BRIDGE DWG. NO.

SHEET NO. GJ

DRAINAGE DETAILS

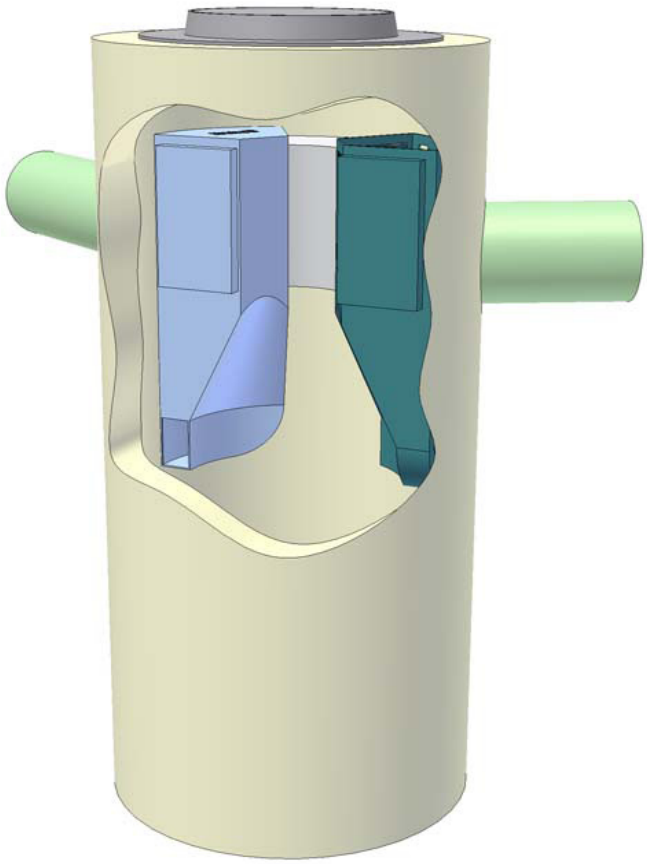
REGISTERED PROFESSIONAL ENGINEER
15058
OREGON
JULY 25, 1990
RICHARD ATTANASIO
EXPIRES 12-31-07

# Appendix C

**Content:**

- **Proprietary Structure Maintenance Requirements**

Hydro International



# First Defense®

## Stormwater Treatment System

Operation and Maintenance Manual

# Table of Contents

# First Defense® by Hydro International

Capturing more than 25 years of separation design experience, the First Defense® is Hydro International's latest addition to its family of hydrodynamic vortex separators intended for stormwater applications. It has been developed with ease of installation and maintenance at the forefront without sacrificing performance or design flexibility.

All internal components are housed in either a 4-ft or 6-ft diameter precast manhole that is designed to withstand traffic loads. Each model can be used as a catch basin inlet or standard manhole with solid cover so that runoff can enter from an overhead grate, inlet pipe or both without diminishing performance.

The First Defense has internal components that are designed to generate rotational flow within the device without requiring a tangential inlet. Flow within the precast chamber is controlled to prevent turbulence and its unique reverse-flow outlet intake ensures a longer retention time by preventing short-circuiting. An internal bypass prevents high flow re-suspension and washout and eliminates the need for additional bypass structures. The internals can easily be adjusted to change the angle between the inlet and outlet for storm drain directional changes and dual inlets are possible. This simplifies grading and site design so that flow can be conveyed from isolated locations within the same site without increasing the number of structures.

For removal of fine sediment and associated pollutants, oil spills, trash and debris, the first choice in stormwater treatment systems is the First Defense.

## FIRST DEFENSE COMPONENTS

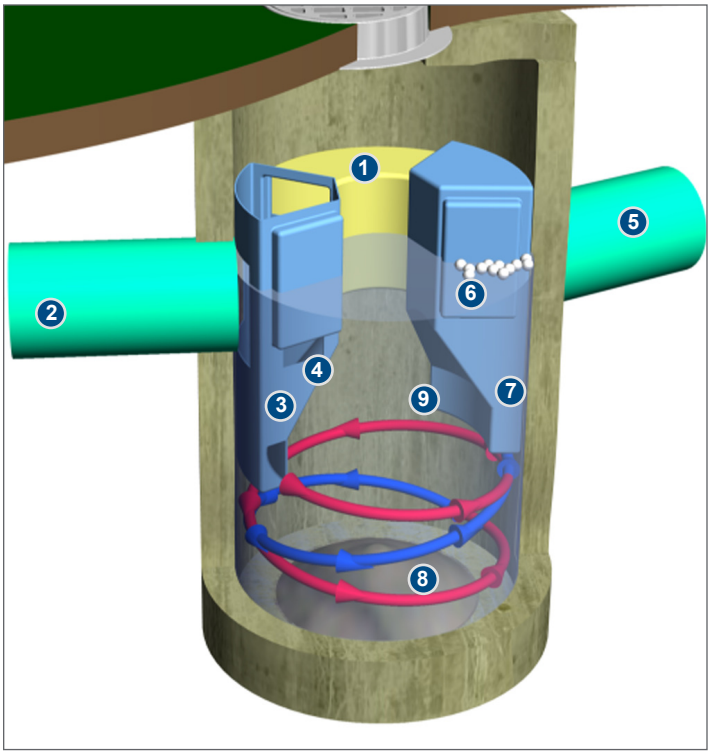
1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Outlet Chute**
8. **Sediment Storage**
9. **Reverse-flow Outlet Intake**

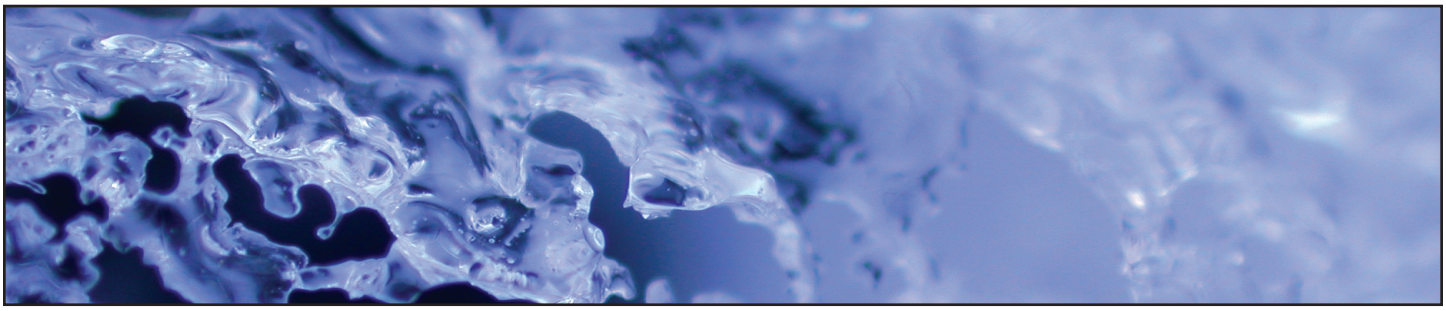
## BENEFITS OF THE FIRST DEFENSE

- Compact and flexible design
  - Can be used as a catch basin inlet and directional change manhole
  - Optional one or two inlets
  - Does not require a bypass structure
- Hydrodynamic Vortex Separation
  - Extended and structured flow path
  - Minimal headloss
  - Reduces turbulence and re-suspension
  - Reverse-flow outlet intake prevents short-circuiting
  - Improved efficiency for all flows
- Delivered Pre-assembled for easy and fast installation
- Simple to inspect and maintain
- Independently verified

## APPLICATIONS

- New developments and retrofits
- Utility yards
- Streets and roadways
- Parking lots
- Pre-treatment for filters, infiltration and storage
- Industrial and commercial facilities
- Wetlands protection





# Operation

## INTRODUCTION

The First Defense operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

## POLLUTANT CAPTURE AND RETENTION

The internal components of the First Defense have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume. The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow internally-bypassed storm events. Accessories such as oil absorbant pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

## WET SUMP

The sump of the First Defense retains a standing water level between storm events. The water in the sump prevents stored sediment from solidifying in the base of the unit. The clean-out procedure becomes more difficult and labor intensive if the system allows fine sediment to dry-out and consolidate. Dried sediment must be manually removed by maintenance crews. This is a labor intensive operation in a hazardous environment.

# Maintenance

## OVERVIEW

The First Defense protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense. The First Defense will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense will no longer be able to store removed sediment and oil. Maximum pollutant storage capacities are provided in **Table 1.**

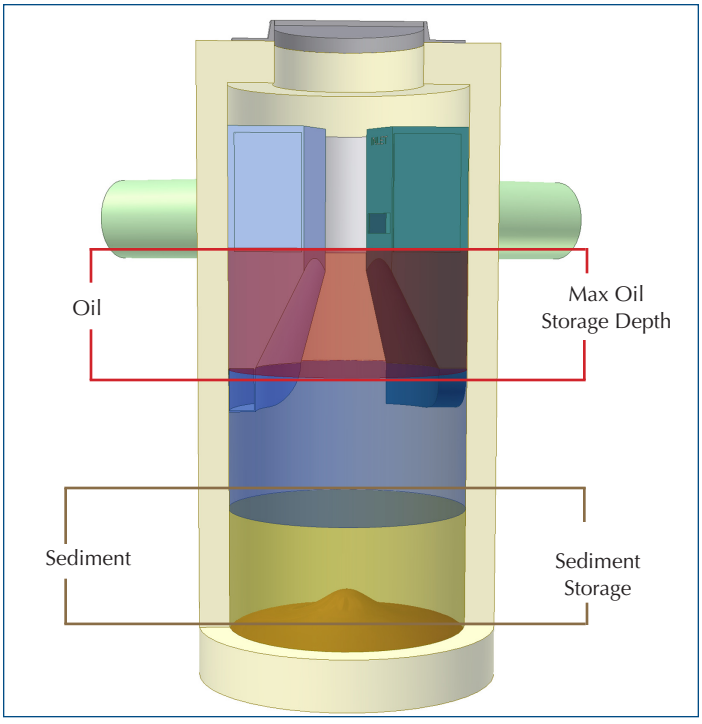



**Figure 1:** *Pollutant storage volumes in the First Defense*

The First Defense allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense, nor do they require the internal components of the First Defense to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

## DETERMINING YOUR MAINTENANCE SCHEDULE

The frequency of cleanout is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil/flotables removal, for a 6-ft First Defense typically takes less than 30 minutes and removes a combined water/oil volume of about 800 gallons.

## INSPECTION PROCEDURES

Inspection is a simple process that does not involve entry into the First Defense. Maintenance crews should be familiar with the First Defense and its components prior to inspection.

### SCHEDULING

- It is important to inspect your First Defense every six months during the first year of operation to determine your site-specific rate of pollutant accumulation.
- Typically, inspection may be conducted during any season of the year.

### RECOMMENDED EQUIPMENT

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge Judge®)
- Trash bag for removed floatables
- First Defense Maintenance Log

**Table 1**

**First Defense Pollutant Storage Capacities and Maximum Cleanout Depths**

| Unit Diameter | Total Oil Storage | Oil Clean-out Depth | Total Sediment Storage | Sediment Clean-out Depth | Max. Liquid Volume Removed |
|---|---|---|---|---|---|
| (feet) | (gal.) | (inches) | (gal.) | (inches) | (gal.) |
| 4 | 180 | <23.5 | 202 | 26 | 202-342 |
| 6 | 420 | <23.5 | 626 | 36 | 626-1046 |

**NOTE**

The total volume removed will depend on the oil accumulation level. Oil accumulation is typically much less than sediment, however, removal of oil and sediment during the same service is recommended.

### INSPECTION PROCEDURES

1. Set up any necessary safety equipment around the access port or grate of the First Defense as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Figure 2 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the outer annulus of the chamber.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

## FLOATABLES AND SEDIMENT CLEANOUT

Floatables cleanout is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Figure 2).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose and skimmer pole to be lowered to the base of the sump.

### SCHEDULING

- Floatables and sump cleanout are typically conducted once a year during any season.

- Floatables and sump cleanout should occur as soon as possible following a spill in the contributing drainage area.

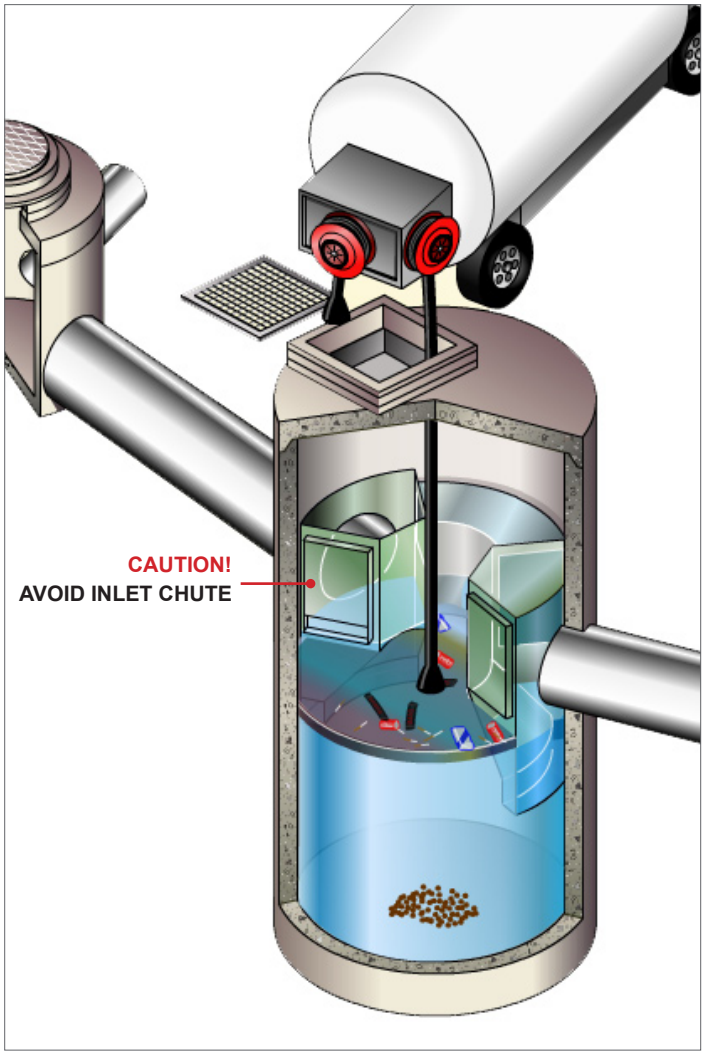



**Figure 2:** *Floatables are removed with a vactor hose*

### RECOMMENDED EQUIPMENT

- Safety Equipment (traffic cones, etc)

- Crow bar or other tool to remove grate or lid

- Pole with skimmer or net (if only floatables are being removed)

- Sediment probe (such as a Sludge Judge®)

- Vactor truck (flexible hose recommended)

- First Defense Maintenance Log

### FLOATABLES AND SEDIMENT CLEAN OUT PROCEDURES

1. Set up any necessary safety equipment around the access port or grate of the First Defense as stipulated by local ordinances. Safety equipment should notify passing

pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. Remove oil and floatables stored on the surface of the water with the vactor hose (Figure 2) or with the skimmer or net (not pictured).

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor (Figure 3).

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

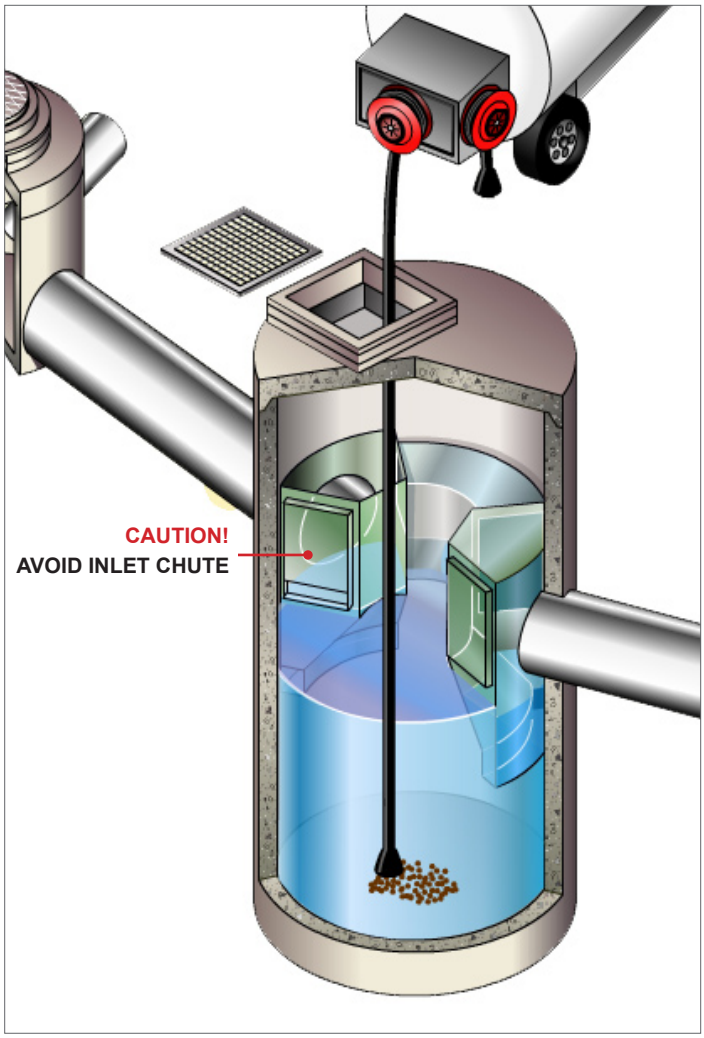



**Figure 3:** *Sediment is removed with a vactor hose*

## Maintenance at a Glance

| ACTIVITY | FREQUENCY |
|---|---|
| Inspection | - Regularly during first year of installation<br>- Every 6 months after the first year of installation |
| Oil and Floatables Removal | - Once per year, with sediment removal<br>- Following a spill in the drainage area |
| Sediment Removal | - Once per year or as needed<br>- Following a spill in the drainage area |
| NOTE: For most cleanouts it is not necessary to remove the entire volume of liquid in the vessel. Only removing the first few inches of oils/floatables and the sediment storage volume is required. | |

# First Defense® Installation Log

| | |
|---|---|
| **HYDRO INTERNATIONAL REFERENCE NUMBER:** | |
| **SITE NAME:** | |
| **SITE LOCATION:** | |
| **OWNER:** | **CONTRACTOR:** |
| **CONTACT NAME:** | **CONTACT NAME:** |
| **COMPANY NAME:** | **COMPANY NAME:** |
| **ADDRESS:** | **ADDRESS:** |
| **TELEPHONE:** | **TELEPHONE:** |
| **FAX:** | **FAX:** |

**INSTALLATION DATE:** / /

**MODEL SIZE (CIRCLE ONE):** **4-FT** **6-FT**

**INLET (CIRCLE ALL THAT APPLY):** **GRATE INLET (CATCH BASIN)** **INLET PIPE (FLOW THROUGH)**

# First Defense® Inspection and Maintenance Log

| DATE | INITIALS | DEPTH OF FLOATABLES AND OILS | SEDIMENT DEPTH MEASURED | VOLUME OF SEDIMENT REMOVED | SITE ACTIVITY AND COMMENTS |
|---|---|---|---|---|---|
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## NOTES

## NOTES

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US-FD-OM-0606