Northstar Community Services District

Sewer System Management Plan (SSMP)

Updated March 2025

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INTRODUCTION

Background

This Sewer System Management Plan (SSMP) has been prepared in compliance with the State Water Resources Control Board (SWRCB) Order 2006-0003, Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, as adopted by the SWRCB on May 2, 2006. The SSMP has also been updated to reflect SWRCB Order WQ 2013-0058-EXEC Amending Monitoring and Reporting Program for Statewide General Waste Discharge Requirements for Sanitary Sewer Systems. The WDRs prohibit Sanitary Sewer Overflows (SSOs)[1] and requires the reporting of SSOs using the statewide electronic reporting system. This SSMP has been prepared by the Northstar Community Services District (NCSD or District).

System Description

NCSD owns and operates a sanitary sewer collection system for the benefit of residents and businesses within District boundaries. The Northstar sewer collection system was originally operated by Placer County as part of County Service Area #28, Zone #21-A; Upon formation in 1990, the Northstar Community Services District adopted the sewer collection system from Placer County. NCSD began operation of the sewer collection system officially on July 1, 1991. The Northstar resort was first developed in the early 1970s, and the first portion of the sewer collection system was constructed in 1971.

Today, NCSD maintains approximately 31 miles of sanitary sewer mains, of which 6.8 miles is inverted siphon main and 1,630 feet is force main. NCSD also maintains 578 manholes, 6.1 miles of sewer lateral, and 1,116 sewer cleanouts. NCSD also maintains three sewer lift stations, and five flow meters. As of March 2025, the District provides 1,873 residential sewer connections and 68 commercial sewer connections.

NCSD operates a sewer collection system only. Waste is treated at the Tahoe-Truckee Sanitation Agency (TTSA) in Truckee California. District sewage must also pass through a section of Truckee Sanitary District's (TSD) collection system in route to the TTSA treatment facility. NCSD is under contract with TSD for use of their collection system.

NCSD has a relatively young sewer collection system, and the system is in good condition overall. In 2008, the District purchased a sewer inspection camera and began rating sewer mains according to NASSCO's Pipeline Assessment and Certification Program (PACP). Upon initial inspection, three specific sewer main locations were observed that warranted rehabilitation. Two were areas where sags in the pipe were observed creating full flow conditions. The third was a rolled gasket at a stabbed joint in

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[1] An SSO is defined as any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system, and includes:

i. Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
ii. Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States ; and
iii. Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

PVC pipe. Repairs to the mains in these three locations were made immediately by staff upon observation (within a few weeks in each instance). In the District's Capital Improvement Program, mains are scheduled for replacement at 75 years of age. Upon inspection, this seemed to be a fair estimate of infrastructure life expectancy, and the first large scale rehabilitation project was projected to be undertaken in the mid-2040s. Other sewer facilities within the NCSD service area are maintained frequently. Recent improvements include replacement of the two pumps at the Indian Hills Lift station (2012), and replacement of one of the pumps at the Highway 267 lift station (2012). All lift stations have on-site backup generators that are tested weekly.

Upgrades required due to capacity are typically driven by larger developments. The District requires developers to submit plans, and, depending on the size and nature of the development, may require a detailed sewer capacity study to be prepared and submitted during the permitting process. Developers are required to upgrade the existing collection system downstream of the development if additional capacity is required.

ELEMENT 1: GOALS

This section of the District's SSMP section identifies the goals that the District has set for the management, operation, and maintenance of its sanitary sewer system. This section also identifies how the SSMP will provide guidelines to help achieve these goals. This section fulfills the requirements of the goals element of the SSMP as dictated by the SWRCB.

1.1 Regulatory Requirement for the Goals Element

In accordance with the State's SSO WDR, SWRCB Order No. 2006-003-DWQ, the goal of the SSMP is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system in order to reduce and prevent SSOs, as well as mitigate any SSOs that do occur.

1.2 NCSD Goals

NCSD's goals for the sanitary sewer system are as follows:

1. Minimize sanitary sewer overflows.
2. Prevent public health hazards.
3. Minimize inconveniences by responsibly handling interruptions in service.
4. Protect large investment in collection systems infrastructure by maintaining adequate capacities and extending useful life through proper maintenance and repairs.
5. Prevent unnecessary damage to public and private property.
6. Use funds available to sewer operations in the most efficient manner.
7. Convey wastewater to treatment facilities with a minimum of infiltration, inflow and exfiltration.
8. Provide adequate capacity to convey peak flows.
9. Perform all operations in a safe manner to avoid personal injury and property damage.
10. Minimize impacts on environmentally sensitive waterways such as Martis Creek.

The SSMP will provide guidelines for the proper management of the sanitary sewer system and assist NCSD in minimizing the frequency and impacts of the SSO discharges by providing guidance for appropriate preventative and corrective maintenance procedures, capacity management, and emergency response.

ELEMENT 2: ORGANIZATION

This section identifies the NCSD staff and management responsible for implementing the SSMP, responding to SSO discharges, and meeting SSO reporting requirements. This section also designates the Legally Responsible Official (LRO) and fulfills the requirements of the organization element of the SSMP as dictated by the SWRCB.

2.1 Regulatory Requirement for the Organization Element

The SWRCB requirements for the organization element are as follows:

1. The name of the responsible or authorized representative;
2. The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation; and
3. The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Boards and other agencies if applicable (such as the County Health Officer, County Environmental Health Agency, and/or State Office of Emergency Services (OES)).

2.2 Discussion of Organization

This subsection describes and shows NCSD's organization and roles as they relate to the development and implementation of the SSMP. Specifically, discussion includes the name and responsibilities of the LRO, key personnel associated with the development of the SSMP, and key personnel associated with the maintenance of the sanitary sewer system. Figure 2-1 provides an organizational chart of the key personnel associated with the SSMP. Roles for the key personnel are as follows:

• Eric Martin, Director of Public Works, is the designated LRO and has ultimate responsibility for the development and implementation of the SSMP. As the LRO, he is responsible for reviewing and certifying the SSMP and for electronically reporting SSO discharges to the SWRCB. He may also designate other LRO(s) within NCSD, who would also have authority to electronically report SSO discharges to the SWRCB.

• Shaun Evans, Utilities Operations Supervisor, has overall responsibility for the NCSD's sanitary sewer system and oversees the operations department. Coordinates field operations and maintenance activities for the sanitary sewer system.

• Teto Contardi, Senior Utility Services Worker, coordinates sanitary sewer cleaning and inspection. Assists in administering the SSMP with the Operations Department.

• Josh Detwiler, Technical Program Administrator, assists the Director of Public Works in planning, preparation, and implementation of the SSMP.

• Utility Services Workers, perform operations and maintenance activities for the sanitary sewer system.

2.3 Chain of Communication

This subsection describes NCSD's protocol for chain of communications in case of an SSO discharge. Staff is made aware of SSOs in a number of ways. All roads within District boundaries are driven by staff daily and, in most cases, staff finds an SSO prior to anyone else. During regular business hours, the public can report SSOs by calling the NCSD Administration Office (530) 562-0747, or the Operations Office at (530) 562-0669. After business hours, SSOs can be reported by calling the Administration Office at (530) 562-0747 and following the automated prompt for emergency call out services.

In the event staff is notified that a SSO discharge or spill has occurred, it is the responsibility of the person receiving the call to immediately contact Shaun Evans. Should Shaun Evans be unavailable, Teto Contardi shall be contacted. Shaun Evans will oversee the SSO response. Until contact with Shaun Evans and/or Teto Contardi is established, the responding utility services worker(s) will have authority to begin spill response activities. As soon as practical after being notified of the SSO, Shaun Evans will contact Eric Martin for notification and consultation.

Telephone numbers for all key personnel are included on the NCSD Employee Phone List and Emergency Contacts List contained in Element 6.

At a minimum, the following NCSD personnel will be notified in case of an SSO discharge:

- Responding utility services worker(s)
- Teto Contardi
- Shaun Evans
- Eric Martin

The nature and extent of the release will determine the notification requirements and whether external resources will be needed to aid in the mitigation of any damage that may result from the release. A list of emergency contacts is provided in the Element 6, and includes agencies such as the Lahontan Regional Water Quality Control Board, California Office of Emergency Services, Environmental Protection Agency, Placer County Department of Environmental Health, California Department of Fish and Wildlife, and regional sewer system utilities. The LRO Eric Martin , will either contact the required agencies or delegate this responsibility. See Element 6, "Overflow Emergency Response Plan," for additional notification requirements and procedures in the event of an SSO discharge.

There are four Categories of SSOs as defined below:

1. **Category 1** - Discharges of untreated or partially treated wastewater of **any volume** resulting from the District's sanitary sewer system failure or flow condition that:

    - Reach surface water and/or reach a drainage channel tributary to a surface water; or
    - Reach a Municipal Separate Storm Sewer System (MS4) and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain

system discharges to a dedicated storm water or groundwater infiltration basin (e.g., infiltration pit, percolation pond).

2. **Category 2 –** Discharges of untreated or partially treated wastewater of **1,000 gallons or greater** resulting from the District's sanitary sewer system failure or flow condition that **do not** reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.

3. **Category 3** – All other discharges of untreated or partially treated wastewater resulting from the District's sewer system failure or flow condition.

4. **Private Lateral Sewage Discharge (PLSD)** – Discharges of untreated or partially treated wastewater resulting from blockages or other problems **within a privately owned sewer lateral** connected to the enrollee's sanitary sewer system or from other private sewer assets. PLSDs that the District becomes aware of may be voluntarily reported to the California Integrated Water Quality System (CIWQS) online SSO Database.

NOTIFICATION REQUIREMENTS

1. For any Category 1 SSO greater or equal to 1,000 gallons that results in a discharge to a surface water or spilled in a location where it probably will be discharged to surface water, either directly or by way of a drainage channel or MS4, the District shall, as soon as possible, but no later than two (2) hours after (A) the District has knowledge of the discharge, (B) notification is possible, and (C) notification can be provided without substantially impeding cleanup or other emergency measures, notify the Cal OES and obtain a notification control number.

2. To satisfy notification requirements for each applicable SSO, the enrollee shall provide the information requested by Cal OES before receiving a control number. Spill information requested by Cal OES may include:

i. Name of person notifying Cal OES and direct return phone number.

ii. Estimated SSO volume discharged (gallons).

iii. If ongoing, estimated SSO discharge rate (gallons per minute).

iv. SSO Incident Description

a. Brief narrative

b. On-scene point of contact for additional information (name and cell phone number).

c. Date and time enrollee became aware of the SSO

d. Name of sanitary sewer system agency causing the SSO

e. SSO cause (if known).

v. Indication of whether the SSO has been contained.

vi. indication of whether surface water is impacted.

vii. Name of surface water impacted by the SSO, if applicable.

viii. Indication of whether a drinking water supply is or may be impacted by the SSO.

ix. Any other known SSO impacts.

x. SSO incident location (address, city, state, and zip code).

3. Following the initial notification to Cal OES and until such time that the District certifies the SSO report in the CIWQS Online SSO database, the District shall provide updates to Cal OES regarding substantial changes to the estimated volume of untreated or partially treated sewage discharged and any substantial change(s) to known impact(s).

4. PLSDs: It is strongly encouraged, but not required, that the District notify Cal OES of discharges greater than or equal to 1,000 gallons of untreated or partially treated wastewater that result or may result in a discharge to surface water resulting from failures or flow conditions <u>within a privately owned sewer lateral</u> or from other <u>private</u> sewer asset(s) if the District becomes aware of the PLSD.

REPORTING REQUIREMENTS

1. **<u>CIWQS Online SSO Database Account</u>:** The District shall maintain the CIWQS Online SSO Database account with registered “Username” and “Password”.

2. **<u>SSO Mandatory Reporting Information</u>:** For reporting purposes, if one SSO event results in multiple appearance points in a sewer system asset, the enrollee shall complete one SSO report in the CIWQS Online SSO Database which includes the GPS coordinated for the location of the SSO appearance point closest to the failure point, blockage or location of the flow condition that caused the SSO, and provide descriptions of the locations of all other discharge points associated with the SSO event.

3. **<u>Timelines and SSO Reporting Requirements</u>**

i. **Category 1 and Category 2 SSOs** – All SSOs that meet the above criteria for Category 1 or Category 2 SSOs shall be reported to the CIWQS Online SSO Database.

a. Draft reports for Category 1 and Category 2 SSOs shall be submitted to the CIWQS Online SSO Database <u>within three (3) business days</u> of the District becoming aware of the SSO.

Minimum information that shall be reported in a draft Category 1 SSO report shall include the following (Draft Category 2 SSOs need only items 1-14 below):

1. SSO Contact Information: Name and phone number of District representative who can answer specific questions about the SSO being reported.

2. SSO Location Name.

3. Location of the overflow event (GPS Coordinates). If multiple appearance points, provide GPS coordinates for the appearance point closest to the failure point and describe each additional appearance point.

4. Whether or not the SSO reached surface water, a drainage channel, or entered and was discharged from a drainage structure.

5. Whether or not the SSO reached a municipal separate storm drain system.

6. Whether or not the total SSO volume that reached a municipal separate storm drain system was fully recovered.

7. Estimate of the SSO volume, inclusive of all discharge point(s).

8. Estimate of the SSO volume that reached surface water, a drainage channel, or was not recovered from a storm drain.

9. Estimate of the SSO volume recovered (if applicable).

10. Number of SSO appearance point(s).

11. Description and location of SSO appearance point(s). If a single sanitary sewer system failure results in multiple SSO appearance points, each appearance point must be described.

12. SSO start date and time.

13. Date and time the District was notified of, or self-discovered, the SSO.

14. Estimated operator arrival time.

15. For spills greater than or equal to 1,000 gallons, the date and time Cal OES was called.

16. For spills greater than or equal to 1,000 gallons, the Cal OES control number.

b. A final Category 1 or Category 2 SSO report shall be certified through the CIWQS Online SSO Database within 15 calendar days of the end date of the SSO. Minimum information that shall be reported in a final Category 1 SSO report shall include all the draft reporting requirements as well as the following (final Category 2 SSO report to include items 1-14 above and items 1-9 and 17 below):

1. Description of SSO destination(s).

2. SSO end date and time.

3. SSO causes (mainline blockage, roots, etc.).

4. SSO failure point (main, lateral, etc.).

5. Whether or not the spill was associated with a storm event.

6. Description of spill corrective action, including steps planned or taken to reduce, eliminate, and prevent reoccurrence of the overflow; and a schedule of major milestones for those steps.

7. Description of spill response activities.

8. Spill response completion date.

9. Whether or not there is an ongoing investigation, the reasons for the investigation and the expected date of completion.

10. Whether or not a beach closure occurred or may have occurred as a result of the SSO.

11. Whether or not health warnings were posted as a result of the SSO.

12. Name of beach(s) closed and/or impacted. Use N/A if none were impacted.

13. Name of surface water(s) impacted.

14. If water quality samples were collected, identify parameters the water quality samples were analyzed for.

Northstar Community Services District
Sewer System Management Plan Organizational Chart

Chain of Command for Reporting Sewer System Overflow (SSO) Events

Board of Directors

General Manager
Mike Geary

Director of Public Works
Eric Martin

Technical Program Administrator
Josh Detwiler

Utility Operations Supervisor
Shaun Evans

Senior Utility Services Worker
Teto Contardi

Utility Services Workers
Chris Bott
Garrett Carvolth
Steve Crush
Brendan Driscoll
Travis Dwyer
Chris Raymer
Conan Savage
Devin Walsh

Board of Directors
- Establishes Policy

General Manager
- Enforces Policy
- Plans Strategy
- Legally Responsible Official

Director of Public Works
- Coordinated development and implementation of SSMP
- Reviews and certifies SSMP
- Authorizes outside contractors to perform services
- Assists in investigating and reporting SSOs

Utility Operations Supervisor
- Manages field operations and maintenance activities of sewer system
- Reports SSOs in CIWQS Online Database
- Reports SSOs to Director of Public
- Heads emergency response

Senior Utility Service Workers
- Reports SSOs to Utility Operations Supervisor
- Assists in heading of emergency response
- Assists in coordinating field operations and maintenance activities of sewer system

Utility Services Workers
- Performs preventative maintenance activities
- Mobilize and respond to reports of sewer overflows and stoppages

Technical Program Administrator
- Assists Director of Public Works in development and implementation of SSMP

ELEMENT 3: LEGAL AUTHORITY

This section of the SSMP describes NCSD's legal authority to operate and maintain its sewer system.

3.1 Regulatory Requirements for the Legal Authority Element

The SWRCB requirements for the legal authority element are as follows:

1. Prevent illicit discharges into its sanitary sewer system, including infiltration and inflow (I/I), stormwater, and unauthorized materials and debris.

2. Require proper design and construction of sewers and connections.

3. Ensure access for maintenance, inspection, and repairs to publicly owned portions of sewer system.

4. Limit the discharge of fats, oils, and greases (FOG) and other debris that may cause blockages.

5. Enforce violations of its sewer ordinances.

3.2 Discussion of Legal Authority

NCSD was founded in 1990 to provide several services within the Community of Northstar. One such service is the collection, treatment or disposal of sewage waste. At this time the District operates a collection system only. Sewage is treated under contract at TTSA and District sewage must also pass through a section of TSD's collection system enroute to the TTSA treatment facility. NCSD is under contract with TSD for use of their collection system.

As of April 2023, the District provides 1,884 residential sewer connections and 68 commercial sewer connections. The District's ownership ends at the property line cleanout on all service laterals (District ownership includes the cleanout). Service laterals are all privately owned and must be maintained by the property owner to the property line cleanout. For certain commercial connections, manholes are denoted as the point of connection.

The legal authority that addresses the SWRCB required items listed above are contained in the NCSD Code: Sewer Ordinance 22-05. The discussion that follows provides more detail in addressing the SWRCB requirements for this element.

- ***Legal authority to prevent illicit discharges to the sanitary sewer system***

  Section 11 of the NCSD Sewer Ordinance addresses prohibited uses of the sewer system, and those that are deemed unlawful. Numerous activities are listed as being prohibited including, but not limited to:

  - The deposit of any materials that may obstruct the sewer system.

  - The deposit of any water, wastewater, or liquid waste of any kind containing chemicals, greases, oils, tars, or other matters in solution or suspension, in concentrations greater than 100 parts per million which may obstruct the sewer, interfere with or prevent the effective use, necessitate frequent maintenance, or increase the cost of treatment.

  - The discharge of any storm water, surface water, ground water, roof runoff, surface drainage, subsurface drainage, cooling water or waters of similar quality into any public sewer.

- The discharge of any gasoline, benzene, oil or other flammable or explosive liquid or substance into any public sewer.

- The discharge of any toxic or other pollutants in amounts or concentrations that (1) endanger public safety; (2) adversely impact the physical integrity of the T-TSA treatment works; (3) cause a violation of effluent to water quality limitations imposed by the Lahontan Regional Water Quality Control Board or other public entity; or (4) preclude the selection of the most cost-effective alternative for waste water treatment and sludge disposal.

- The connection to the District's sanitary sewer system of sanitary sewer pipelines or laterals from any septic tanks or cesspools.

- The discharge of uncontaminated water into a public sanitary sewer except by written permission from the District.

- The discharge of food waste that will not pass through a 3/8-inch screen.

- The discharge of waste in excess of 140 degrees Fahrenheit.

- The discharge of waste outside the pH range of what is deemed by staff to be acceptable.

In addition, Section 11.06 of the NCSD sewer ordinance requires that any and all toxic chemical substances shall be subject to the industrial waste discharge permit requirement of the Tahoe Truckee Sanitation Agency. Additionally, all toxic and chemical waste substances shall be retained on site by the permittee until they have been pretreated sufficiently to meet the discharge standards specified in the applicable Permit for the premise. The discharge of any toxic chemical substance into sanitary sewer facilities will result in the declaration of a violation and the prosecution thereof in accordance with the District Code.

- ***Legal authority requiring that sewers and connections be properly designed and constructed***

Section 1.02 of the NCSD Sewer Ordinance states that the purpose of the District Code is to provide the public with an accessible document stipulating requirements and guidelines applicable to all sanitary sewer facility construction and maintenance within the District boundaries. Additionally, in section 2.02, it's stated that whenever new sanitary sewer facilities are to be dedicated to the District for operation and maintenance, said facilities shall be constructed and tested in accordance with the District Code requirements that are in force on the date the improvement plans were approved by the District. Appendices A-5 (Materials for Construction of Sanitary Sewers) and A-6 (District Standard Specifications and Drawings) to the NCSD sewer ordinance govern the installation of new sewer facilities.

- ***Legal authority ensuring access for maintenance, inspection, or repairs***

Section 3.02 of the NCSD Sewer Ordinance governs access to sanitary sewer facilities. It reads as follows:

The District or its authorized agents or employees shall have access at all reasonable times to enter the customer's premises for any purpose properly *connected with the providing of sewer service, including inspection of the same to determine that the District Code and Ordinances are being observed. No person shall place on any sewer pipeline any obstruction, such as wires, fences, trees, or buildings, which may impede or otherwise interfere with the District's ready access to any portion of the sanitary sewer system owned by the District. Upon the District's written request, such obstruction shall be immediately removed by the owner or their agent at no cost to the District or, at the District's option, shall be removed by the District at the owner's expense.*

California Health and Safety Code Section 6523.2 also governs access to private property for the purpose of inspection and maintenance of sanitary sewer facilities. This Code section is referenced in section 12.12 of the NCSD Sewer Ordinance.

- ***Legal authority limiting the discharge of fats, oils, and grease and any other debris that may cause blockages***

Specifically, section 11.02 b) of the NCSD Sewer Ordinance states that it shall be unlawful for any person to do the following:

> *To deposit or discharge, or cause or permit to be deposited or discharged, into any public sewer or District sewer main pipeline any water or wastewater or liquid waste of any kind containing chemicals, greases, oils, tars, or other matters in solution or suspension, in concentrations greater than 100 parts per million, by weight, which may clog or obstruct the sewer, or which may in any way damage or interfere with or prevent the effective use, operation, maintenance or repair of the sewer, or which may necessitate or require frequent repair, maintenance or flushing of such sewer to render it operable, or which may obstruct or cause an unwarranted increase in the cost of treatment of the wastewater.*

- ***Legal authority to enforce violations of the sewer ordinance***

Section 12 of the NCSD Sewer Ordinance specifies enforcement authority. The following are a few excerpts from this section:

- Section 12.02 (Authority of District): …*The District shall make and enforce the regulations as necessary to ensure the public health, safety, and welfare. The District shall also ensure the economical and efficient management and protection of the District's sanitary sewer system and such regulating, collections, rebating and refunding of such charges and fees, levees and assessments as deemed appropriate by the Board of –Directors.*
  In the event of a violation of any of the laws of the State of California, Placer County, or the ordinances of the District or, rules and regulations so established referring to the discharge of wastewater, the District shall notify the person or persons causing, allowing, or committing such violation and upon the failure of such person or persons to cease or prevent further violation within 5 days after the receipt of such notice, the District shall have authority to disconnect the property from the District sanitary sewer system.

- Section 12.03 (Public Nuisance): *Continued habitation of any building or continued operation of any commercial or industrial facility in violation of the provisions of the District Code or any other ordinance, rule or regulation of this District is hereby declared to be a public nuisance. The District may cause* *proceedings to be brought for the abatement of the occupancy of the building or industrial facility during the period of such violation.*

- 12.12 (Enforcement of Provisions): *The provisions of the District Code, and a violation or failure to comply with any provision of the District Code, may be enforced, prosecuted and/or corrected pursuant to Health and Safety Code Sections 6523, 6523.2 and 6523.3, the penalty provisions of the District ordinance that adopted this code by reference, and/or other applicable provisions of law.*

Element 3 Appendix

Northstar Community Services District Code: Sewer Ordinance 22-05

NORTHSTAR COMMUNITY SERVICES DISTRICT

CODE

SEWER ORDINANCE 22-05

Effective: April 20, 2005

NORTHSTAR COMMUNITY SERVICES DISTRICT

CODE

SEWER ORDINANCE 22-05

Adopted: April 20, 2005

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1. ADMINISTRATION

1.01 Title

The Northstar Community Services District Sewer Code represents, and may be referred to as the District Sewer Code. The District Sewer Code meets or exceeds the Uniform Plumbing Code, the Uniform Building Code, National Electrical Code, National Fire Protection Code, and other codes as listed in Definitions and Abbreviations.

1.02 Introduction

The purpose of the District Code is to provide the public with an accessible document stipulating requirements and guidelines applicable to all sanitary sewer facility construction and maintenance within the District boundaries. The District Code also establishes charges for services and provides a method for the collection of said charges.

Formed in 1991, the Northstar Community Services District (District) provides the Northstar community with a full range of public services, including; Sewer, Water, Fire Suppression, Snow Removal, Street Lighting, Solid Waste contracting, Multi-use Recreational Trails, and Road Maintenance. Throughout the years, the Northstar, Truckee and Tahoe areas has changed considerably. At the same time, sanitary sewer technology continues to improve. The rapidly changing community, improved technology, and a progressive District Board attitude have combined to maintain the excellence of the sanitary sewer facilities that exist today. The District operates and is governed by rules and laws set forth in the Health and Safety Code of the State of California. This code is adopted pursuant to Government Code Section 61000 et seq.

The District is governed locally by a five-member Board of Directors elected at the general elections held in November. The Board of Directors is responsible for setting policy and general administrative procedures for the District. The policies and procedures set by the Board are then administered by the General Manager of the District.

This document constitutes a compilation of standards for sewer system design, development, repair, and construction, while guiding the development of new services and guarantees continuance of excellent service to existing customers.

All requests for variances or deviations from these standards shall be submitted, in writing, by the owner or their agent to the General Manager. It is incumbent upon the requestor to secure such written permission and not to assume that permission will be forthcoming for said variances or deviations.

1.03 Revenue Program

The District may, by an order approved by a majority vote of the members of the Board of Directors, prescribe, revise, and collect fees, rates, rentals, or other charges for services and facilities furnished by the District in connection with its sanitary sewer system. Revenues derived by the District from said fees, rates, rentals or other charges for service or facilities may be used for any purpose except the acquisition or construction of additional local street sewers or laterals which are solely for private use.

The District is empowered with this authority in accordance with the Health and Safety Code of the State of California, Section 6400 et seq.

1.04 Scope

The provisions of the District Code shall apply to sewer construction, use, maintenance, discharge, deposit or disposal of all waste water, both directly and indirectly into and through all of the District's sanitary sewer system, and to the issuance of permits and collection of fees.

2. GENERAL POLICIES

2.01 Dwelling Unit Equivalent Transfer Policy

In the event that DUE's are established and utilitized as a basis for development within the District then a policy of approving or disapproving transfers of available dwelling unit equivalents (DUE's)[1] between parcels is as follows: Such transfers may be approved by the Board of Directors only when all of the criteria stated herein are satisfied.

- Each application for transfer of DUE's shall be in writing and shall be signed by the owner(s) of the affected real property and shall be accompanied by a map describing the general location of the affected parcels.

- The parcels involved in the proposed transfer, both transferor and transferee parcels, shall be in common ownership, with evidence of ownership accompanying the application.

- Transfers of DUE's shall be permitted only between parcels both located within a given sub-watershed service area of sufficient size to handle the total number of DUE's, without regard for allocation of DUE's between parcels. Nothing herein is intended to increase the number of DUE's available within a given sub-watershed service area of the District.

- Each transfer of DUE's shall be for a use which is consistent with applicable zoning requirements imposed by the appropriate land use regulatory agency and no DUE's shall be transferred without prior approval of the appropriate land use regulatory agency for the area within which the parcels involved in the proposed transfer are situated. The applicant shall file with the appropriate land use regulatory agency for the proposed use prior to making application to the District for transfer of DUE's.

- No approval of transfer of DUE's shall give any vested right to any number of DUE's which is not consistent with the land use density as approved by the appropriate land use regulatory agency, at or subsequent to the time the application for transfer is approved.

[1] A single family residential unit. Based on the occupancy of 3.2 persons per single family residence, producing 100 gallons of wastewater per person per day. One DUE is equal to 320 gallons of wastewater per day.

- A notice, in form suitable for recording, shall be provided to the District and recorded by the District at the applicant's expense. Said notice shall contain the name of the owner of record of all parcels involved in the transfer application, a legal description of the parcel from which DUE's are transferred (transferor parcel) and of the parcel to which DUE's are transferred (transferee parcel) as well as a certificate of consent of such transfer executed by the mortgagor, trustee and/or beneficiaries of all parcels involved in the transfer or in the alternative a statement by the record owner that there is no mortgage or, trustee or beneficiary affected by the transfer application.

- All cost and expenses related to the preparation and recording of such notice shall be paid by the applicant.

- Only one transfer of DUE's from or to a parcel of real property shall be permitted within a 12-month period immediately following the filing of an application for transfer by any owner of record. More than one Transfer Request within the 12-month period will require Board of Director approval. Such restriction upon transfer shall apply notwithstanding a change in ownership of the parcels involved in such transfer during the 12-month period immediately following the date of application for transfer of DUE's from or to a parcel which has been previously requested and approved.

- All District service charges, fees and assessments shall be paid current as of the date of filing an application for transfer.

- No application for transfer of DUE's shall be submitted to the Board of Directors of the District for review and approval until all items above have been completed.

2.02 Dedication of Sanitary Sewer Facilities

New Facilities: Whenever new sanitary sewer facilities are to be dedicated to the District for operation and maintenance, said facilities shall be constructed and tested in accordance with the District Code requirements that are in force on the date the improvement plans were approved by the District, provided such construction is completed within 1 year of the plan approval date.

Improvement plans not completed within 2 years of the approval date, as indicated by the General Manager's dated signature on the plans, shall be updated to current District Code requirements.

Acceptance of dedication of new sanitary sewer facilities occurs after all District Code requirements are met. Dedication acceptance is approved, by resolution, by the Board of Directors.

Existing Facilities: Existing sanitary sewer facilities to be dedicated to the District for operation and maintenance shall be repaired, upgraded and tested in accordance with the current District Code requirements.

Acceptance of dedication of existing sanitary sewer facilities occurs after all District Code requirements are met. Dedication acceptance is approved, by resolution, by the Board of Directors.

2.03 Disasters

Should a disaster occur, and the appropriate governing agencies deem a property uninhabitable, the District may elect to temporarily suspend user fees. The owner or their agent of a property involved may notify the District, in writing, and request a temporary suspension of fees.

The District disaster policy allows for a maximum 2-year time period during which user fees will not be charged. At the end of the 2-year time period, or at such time occupancy is granted on said property within the 2-year time period, user fees will resume.

The owner or their agent shall also be responsible for capping building lateral(s) on the property as soon as this procedure can be safely completed. A District Inspector will witness the capping. The District will require a pressure test of the building lateral(s) prior to re-connection and seal cap removal.

This policy shall be implemented on a "case by case" basis only, under the direction of the General Manager.

2.04 Authority to Receive District Services

The owner or their agent shall pay all the appropriate fees and/or deposits and have all necessary approvals regarding sanitary sewer facility improvements prior to receiving services from the District. For the purpose of this section, "services" include, but are not limited to, issuance of a sewer permit, plan check review, field visits and inspections.

2.05 Extension of and/or Alterations to Sanitary Sewer Facilities

An owner or their agent may request an extension of sanitary sewer facilities and/or alterations to existing sanitary sewer facilities in order to obtain sanitary sewer service from the District. The owner or their agent shall be required to design and install, in accordance with District Code requirements, and at the owner or their agent's expense, all such sanitary sewer facilities required by said extension and/or alteration.

The District at its option, however, may require the owner or their agent to install sanitary sewer facilities with more capacity, of greater length, or of a different route than would be required for the service requested, ('excess facilities'). In such events, the District may reimburse the owner or their agent for the costs of such excess facilities if such excess facilities are required solely to benefit, improve or upgrade service to existing or other District customers.

If, however, such excess facilities are deemed necessary by the District for the orderly development of an integrated sanitary sewer system in the area of the proposed pipeline extension and/or alteration, the District may require the owner or their agent to design, install, and pay the cost of such excess facilities. Under such case, the owner or their agent may be entitled to reimbursement pursuant to "Buy Back Agreements" as outlined on page 6.

Dedication: If the sanitary sewer facilities installed under the premises described above are offered for dedication to the District, all requirements as specified in Appendix A-6.7, Guarantee and Delivery of Title, page 90, shall be met before said dedication is accepted by the District Board of Directors.

Specifications and Fees: The size and location of the sanitary sewer facilities installed shall be specified by the District. Type and quality of material used in the installation of the sanitary sewer facilities shall meet the requirements specified in Appendix A-5, District Standard Specifications, page 75. The installation of sanitary sewer facilities does not alleviate the owner or their agent from any other fee requirements as specified within this document.

Buy Back Agreements: At the District's option, the District may enter into an agreement with the owner whereby adjacent properties connecting to the sanitary sewer facilities installed by the owner or their agent, will be required to reimburse the owner or their agent, through the District, for a prorated share of the cost for the sanitary sewer facility design and construction. Administration of reimbursement monies will continue until all such prorated shares have been paid, but no longer than a period of 10 years after completion of the sanitary sewer facilities.

2.06 Initiation of Sanitary Sewer Facility Construction

It shall be the responsibility of the owner or their agent to obtain approval of all the appropriate agencies before commencement of construction of sanitary sewer facilities proposed for connection to the District sanitary sewer system. Procurement of approvals and/or permits from such agencies shall be the full responsibility of the owner or their agent.

Residential: District and TTSA sewer permits will be paid for at the District Administration office. A Will Serve letter will be presented to the owner/agent in order to complete the building permit process at Placer County. A signed/issued building permit and plans must be presented to District personnel at the District Administration office prior to start of construction.

Commercial: Submitted improvement plans will not be considered approved by the District or sewer construction authorized until such time that the General Manager signifies approval by letter or by dated signature on the mylars in the approval block provided within the improvement plans.

There shall be no changes permitted to approved improvement plans unless such changes, corrections and/or additions are resubmitted to the General Manager for consideration and subsequent approval. All changes, corrections and/or additions shall be noted, dated and initialed on the improvement plans as such by the owner or their agent.

3. GENERAL PROVISIONS AND REGULATIONS

3.01 Validity of the District Code

If any part, section, subsection, paragraph, sentence, clause or phrase of the District Code is held invalid or unconstitutional for any reason by a court of law having jurisdiction, that decision does not affect the validity or constitutionality of the remainder of the District Code. The Board of Directors declares that it would have adopted each provision of the District Code irrespective of the validity of any other provision.

3.02 District Personnel Duties

Delegation of Authority: The General Manager shall administer, implement and enforce the provisions of the District Code. Any powers granted to or duties imposed on the General Manager may be delegated by the General Manager to persons in the employ of and/or acting in the general interest of the District.

Identification: All District personnel shall identify themselves upon request when entering the work site or property for any inspection of work or other purposes required or provided for by the District Code.

Access: The District or its authorized agents or employees shall have access at all reasonable times to enter the customer's premises for any purpose properly connected with the providing of sewer service, including inspection of the same to determine that the District Code and Ordinances are being observed.

No person shall place on any sewer pipeline any obstruction, such as wires, fences, trees, or buildings, which may impede or otherwise interfere with the District's ready access to any portion of the sanitary sewer system owned by the District. Upon the District's written request, such obstruction shall be immediately removed by the owner or their agent at no cost to the District or, at the District's option, shall be removed by the District at the owner's expense.

3.03 Sanitary Sewer Installation

Minimum Sanitary Sewer Facility Standards: Facilities shall be designed so as not to pollute underground or surface waters, create a nuisance, or menace the public health or safety. The General Manager shall consult with the health officers and officials of public agencies, and from time to time, promulgate standards, which may vary according to location, topography, physical conditions, and other pertinent factors.

Rain and Surface Water Drainage: No pool, receptacle, area, or roof which receives or disposes of rain water or surface water shall be connected to any private or public wastewater disposal system.

Winter Construction: No sewer construction or excavation shall be performed during winter conditions. **Determination of winter conditions shall be the sole responsibility of Placer County**. Winter conditions generally run from October 15th through April 15th.

If allowed by the District, a trench may be excavated for installation of a sewer pipeline only when:

- An appointment is scheduled for a visual inspection during normal working days and hours.
- The trench must be backfilled the same day as the visual inspection. This may require another inspection to verify completion of backfill.

Notice of Noncompliance: Whenever any construction is being performed contrary to the provisions of the District Code, the General Manager shall issue written notice to the responsible party to stop work on that portion of the construction on which the violation has occurred. No work shall proceed on that portion until corrective measures have been taken and approved by the General Manager.

Mandatory Sanitary Sewer Connections: All buildings requiring sanitation facilities, as defined in the Uniform Building Code and/or the District Code, shall be connected to the District sanitary sewer facilities when available.

Availability shall mean a public sewer with uncommitted capacity within 200 feet of the property. The further maintenance and use of septic tanks, cesspools and other on-site waste disposal facilities contained on any property within 200 feet of a District sanitary sewer, with uncommitted capacity, are hereby declared a public nuisance pursuant to Government Code Section 54352 and may be enjoined, and/or abated in a manner provided by law.

No person shall cause or permit the disposal of wastewater or other liquid waste into any drainage system which is not connected to the public sewer when such connection is required by this section.

Connection to the District's sanitary sewer facilities shall be accomplished by the owner or their agent at their sole risk and expense:

- Within 1 construction season, following written notification by the District, in the event the dwelling is serviced by a septic tank or other on-site waste disposal system; or
- Before occupancy of a building occurs.

The customer or user shall at his/her sole risk and expense remove from service and render harmless any and all septic tanks, cisterns, vessels or similar underground vaults in accordance with Placer County/District Regulations, the Uniform Plumbing Code and any State law, within 30 days following the date the dwelling is connected to the District's sanitary sewer facilities. District verification and approval is required for all abandoned wastewater facilities (see Abandoned Sewers and Sewage Disposal Facilities, Section 7.16, page 38).

3.04 Multiple Units on Same Premises

Separate houses, buildings, living or business and commercial quarters, or adjoining premises under a single control or management may be provided with sewer service, at the discretion of the District, by any of the following means:

- Through separate service connections to each unit or combination thereof,

- Through a single service connection to supply the entire premises, or any combination thereof, or units thereon, in which case the combined rate or charge may be applied by the District; such combined rates or charges to be assumed by the applicant unless otherwise modified by agreement or by the District Code.

3.05 Joint Lateral Connections

The shared use of a *private building lateral* by two or more parcels shall constitute the drafting, executing, and recording (with the County) of a "Joint Lateral Agreement" between each of the parties sharing the private building lateral. Executing and recording of the Joint Lateral Agreement shall be the responsibility of the parties involved. Through the Joint Lateral Agreement, the parties (owners) agree to share equally the operation, maintenance, and testing costs associated with the shared private building lateral. The Joint Lateral Agreement shall be binding upon the heirs, successors and assigns of each of the parcels.

3.06 Easement Abandonment

All persons requesting an abandonment of easement may incur a charge for the processing of said request. The said charge will not exceed the actual expense to the District in researching and processing such request. A non-binding estimate of expenses will be provided upon request to those desiring an abandonment of easement and such estimates shall be the basis of the required deposit.

3.07 District Records and Maps

The locations shown on the District's records, maps, as builts, etc. are believed to be accurate. The District does not warrant that all facilities are located as shown, and does not represent that all facilities are in fact shown.

3.08 Liability for Damage to District Sanitary Sewer Facilities

Prior to and whenever any underground construction is to be performed, the owner or their agent responsible for the proposed excavation shall contact the District and review the appropriate record drawings on file at the Utilities Office.

The owner or their agent responsible for the excavation shall:

- Make such calculations, findings and conclusions as may be necessary to determine the approximate location of the District sanitary sewer facilities in relationship to the proposed excavation. In the event of conflicting positions, the District sanitary sewer facilities shall have prior rights to its location.

- Be responsible for the proposed excavation shall explore for and expose the District sanitary sewer facilities using reasonable care. Once the District sanitary sewer facilities are exposed, the owner or their agent responsible for the excavation shall verify the clearances and compatibility of the proposed works.

- Be solely responsible for any and all necessary modifications and/or damage to the District's sanitary sewer facilities regardless of the cause. This includes consequential damage due to improper pipe protection and backfill procedures.

- Call **Underground Service Alert** (1-800-227-2600) 48 hours prior to any start of excavation.

- Be responsible and liable for all costs involved in the repair of damages to any District sanitary sewer facilities caused by said work.

3.09 Location of Points of Service Inconsistent with District Record Maps

It is the owner or their agent's responsibility to expose the stub out and determine adequate fall before construction. The service lateral connection point location stake shall be replaced by backfilling around the stake and cut off flush to grade. The stake shall not be driven into the ground. The owner or their agent shall be responsible for maintaining the stake location during any clearing operation.

Whenever the stub out, wye or other point of service is not located as shown on the District's "as built" or record maps, the District shall assist the owner or their agent, to the extent reasonably possible after reasonable effort has been made by the owner or their agent to locate the stub out, in determining the location of the stub out, wye or point of service by use of surface and underground pipeline detectors. However, the District shall bear no expense for equipment, excavation, time and/or labor expenses incurred by any person in determining the location of stub-outs, service laterals, wye's and/or points of service or other District sanitary sewer facilities.

3.10 Non-existing Laterals, Wye's and/or Points of Service Shown on Record Maps

Before a stub out, wye or point of service which is shown to exist on District maps is determined to be "nonexistent," the person attempting to locate the service lateral connection point shall contact the District for assistance. The District shall not be liable for any expense, equipment, excavation and/or labor incurred by any person in determining the existence or the "nonexistence" of any stub out, wye, point of service and/or other facility.

When the District has previously been provided with "as-built" or record maps, and the General Manager has made a determination that no service lateral, wye or point of service exists as shown on the "as-built" or record maps, **the General Manager may:**

- Waive any applicable sewer main tapping fee.
- Install or cause to be installed a service lateral at the District's expense, provided there is a sewer main servicing the property with uncommitted capacity.

3.11 Time Limits

Any time limit provided for in the District Code may be extended by mutual written consent of both the District and the permittee or applicant, or other person affected.

4. SEWER PERMIT, RESIDENTIAL

4.01 Will Serve Letter

A Will Serve Letter for an individual parcel must be issued by the District and a copy faxed, mailed or delivered to the Placer County Building Department. The purpose of the Will Serve Letter is to provide Placer County, an owner or their agent assurance that the District has sufficient capacity to provide sanitary sewer service for the parcel. Each Will Serve Letter is issued by the District based upon 1) plan check and acceptance of the land use/building plans provided by the owner/agent. 2) payment to the District and TTSA of all connection and permitting fees. The inspection and acceptance of land use/building plans are based simply on the planned use of the parcel with respect to sanitary sewer flows, including type, concentration, and amount of waste to be discharged into the District’s sanitary sewer system.

Any change in the land use/building plans from the date the Will Serve Letter was issued may impose a different or greater demand upon the District's sanitary sewer system. The District shall be notified of any change in the statement of facts. Failure to do so is a violation subject to penalties as provided by Section 6523 of the Health and Safety Code.

The Will Serve Letter in addition to all other terms and conditions required by the District, shall not provide any unconditional guarantee, priority or reservation of capacity, but that the owner their agent or subsequent purchaser must provide information and sign a Receipt for Collected Fees and Deposits for the purpose of acquiring a Sewer Permit prior to initiation of any sanitary sewer improvements. The reception of a Will Serve Letter provides that such sewer permit will be issued by the District solely upon a first come, first served basis and only to the extent there is then remaining available capacity in the physical facilities for conveyance and treatment. The Will Serve Letter also provides that District services such as plan check review, field visits, and inspections will be authorized only after a building permit is issued and payment has been made and recorded of all applicable deposits, fees and charges, and subject to all then applicable District requirements.

4.02 Sewer Permit

The owner or their agent desiring to connect to the sanitary sewer shall be required to provide, in person, information and sign a Receipt for Collected Fees and Deposits for the purpose of acquiring a Sewer Permit. The District shall provide the Sewer Permit, indicating thereon the information to be furnished by the owner or their agent. The District may require, in addition to the information furnished by the printed form, any additional information, specifications, and improvement plans from the applicant, which will enable the District to determine that the proposed work or use complies with the provisions of the District Code.

All applicable fees and deposits are required prior to issuance of a District Will Serve letter.

The owner or their agent must obtain the Sewer Permit in person.

A Will Serve Letter and the Sewer Permit shall be issued on a first come, first served basis, and shall be valid for 1 year. Any Sewer Permit not utilized within 1 year may be extended for an additional year, provided all applicable requirements are met and provided all deposits, fees, and charges are paid as detailed on Appendix A-1, A-2, A-3 and A-4, pages 67, 69, 71, and 73.

Except by special agreement with the District, no customer or user of the District's sanitary sewer system shall connect, or permit any other person to connect additional sanitary sewer facilities other than those specified in the statement of facts and/or the Sewer Permit.

4.03 Excessive Projected Waste Flows

Any owner or their agent proposing to have wastewater discharged from any property to the District's sanitary sewer system in quantities, or at a rate greater than the capacity for which the sewer was designed, when such additional quantity will immediately overload the sewer, shall be denied the right to discharge more than the proportionate share allotted to the property. If, however, the capacity will not be exceeded immediately, but will be exceeded sometime in the future, the General Manager may enter into an agreement with the property owner to permit connection to the sewer. Such agreement shall be in a form acceptable to the District and shall include, at a minimum:

- A covenant requiring the owner to construct, cause to be constructed, or share in the cost of constructing improvements to the sewer system in order to enlarge the capacity of the sewer at such future time as the General Manager determines.
- A provision binding subsequent owners of the property.
- A bond or other form of security acceptable to the General Manager to guarantee compliance with the terms of the agreement.

5. SEWER PERMIT, COMMERCIAL

5.01 Will Serve Letter

A Will Serve Letter for an individual parcel may be issued by the District at the request of the owner or their agent. The purpose of the Will Serve Letter is to provide an owner or their agent assurance that the District has sufficient capacity to provide sanitary sewer service for the proposed commercial project on the parcel. Each Will Serve Letter is issued based on a "statement of facts" provided by the owner or their agent on the date of that issuance. The statement of facts is simply the planned use of the parcel with respect to sanitary sewer flows, including type, concentration, and amount of waste to be discharged into the District's sanitary sewer system.

Any change in the statement of facts from the date the Will Serve Letter was issued may impose a different or greater demand upon the District's sanitary sewer system. The District shall be notified of any change in the statement of facts. Failure to do so is a violation subject to penalties as provided by Section 6523 of the Health and Safety Code.

The Will Serve Letter for sewer availability, in addition to all other terms and conditions required by the District, shall not provide any unconditional guarantee, priority or reservation of capacity. The reception of a Will Serve Letter provides that sanitary sewer service is solely upon a first come, first served basis and only to the extent there is then remaining available capacity in the physical facilities for conveyance and treatment. The Will Serve Letter also provides that District services such as plan check review, field visits, and inspections will be authorized only upon payment of all then applicable deposits, fees and charges and in accordance with and subject to all then applicable District requirements.

5.02 Plan Check Review

The owner or their agent desiring to connect to the sanitary sewer shall be required to meet the requirements of Plan Check Review as outlined by the District. The District shall provide a Plan Check Review checklist form, indicating thereon the information to be furnished by the applicant. The District may require in addition to the requirements of the printed form, any additional information, specifications, and improvement plans from the applicant which will enable the District to determine that the proposed work or use complies with the provisions of the District Code.

All applicable fees and deposits are required upon submittal of a request for Plan Check Review.

The owner or their agent must make the Request for Plan Check Review in person. A valid, signed Grading Permit or Building Permit issued by the appropriate agency is required upon submittal of a Request for Plan Check Review.

A Request for Plan Check Review shall be issued on a first come, first served basis.

Improvement plans are not approved until signed by the General Manager. Improvement plans approved as acceptable to District Code requirements within Plan Check Review are authorized for construction, provided all deposits, fees, and charges are paid as detailed on Appendix A-1, A-2, A-3, and A-4, pages 67, 69, 71, and 73.

Project improvement plans approved by the District that are not constructed within 2 years of signature approval by the General Manager shall be subject to existing District Code requirements and may require additional Plan Check Review by the District.

Any change in the drawings with respect to the sanitary sewer after Plan Check approval is granted involving design changes to the sanitary sewer system, more construction, or an increase in the number of units, hookups, taps, or fixture units than that for which the Plan Check approval was issued shall be considered an unauthorized usage and is prohibited until an additional review is completed, permission to proceed is granted, and all appropriate deposits, fees and charges are paid.

Except by special agreement with the District, no customer or user of the District's sanitary sewer system shall connect, or permit any other person to connect additional sanitary sewer facilities other than those authorized within the Plan Check Review process.

5.03 Transfer of Title of a Partially Completed Project

A person or party to which Plan Check approval has been issued may transfer title of a partially completed project to another person solely for the same lot or premises for which the Plan Check approval was issued, subject to all terms and conditions under which the Plan Check approval was issued. The transferee shall meet all requirements of the District relating to the transfer. The usage of Plan Check approved improvement plans for a lot or premises other than the lot or premises for which the approved improvement plans were issued shall be considered an unauthorized usage and is prohibited.

Prior to the District's approval of the title transfer for the same lot or premises, the District shall inspect the lot or premises for which the Plan Check approval was issued. The purpose of this inspection shall be for the District to verify that the amount of construction and the number of units, hookups, taps, fixture units and facilities had not increased from that authorized by the Plan Check approval.

The District may require that the permittee or applicant first provide a revised set of improvement plans showing the different design and pay all deposits, fees and charges required by the District.

These requirements are in addition to other requirements or limitations imposed upon the usage of permits as set forth in the District Code.

5.04 Excessive Projected Waste Flows

Any owner or their agent proposing to have wastewater discharged from any property to the District's sanitary sewer system in quantities, or at a rate greater than the capacity for which the sewer was designed, when such additional quantity will immediately overload the sewer, shall be denied the right to discharge more than the proportionate share allotted to the property. If, however, the capacity will not be exceeded immediately, but will be exceeded sometime in the future, the General Manager may enter into an agreement with the owner to permit connection to the sewer. Such agreement shall be in a form acceptable to the District and shall include, at a minimum:

- A covenant requiring the owner to construct, cause to be constructed, or share in the cost of constructing improvements to the sewer system in order to enlarge the capacity of the sewer at such future time as the General Manager determines.

- A provision binding subsequent owners of the property.

- A bond or other form of security acceptable to the General Manager to guarantee compliance with the terms of the agreement.

5.05 Large Land Developments

Large land developments that require connection to the District's sanitary sewer system may require the owner or their agent to enter into an improvement agreement with the District outlining the terms and conditions applicable to the particular project.

5.06 When Sewer Permit is not Required

The provisions of this Division requiring Sewer Permit shall not apply to sewer contractors constructing public sewers and appurtenances under contracts awarded by the Board of Directors.

6. FEES AND CHARGES

6.01 Deposits and Refunds

Any person requesting permission to construct facilities in accordance with Sections 4 and 5, shall pay deposits in advance to the District to cover actual fees, charges and costs to be incurred by the District that are associated with said permitting process and the construction of sanitary sewer facilities in accordance with the District Code, and as detailed in Appendix A-1, A-2, A-3, and A-4, pages 67, 69, 71, and 73.

The deposits received by the District for services as provided by the District Code shall be identified by applicant and by project. The status of the funds on deposit shall be reconciled monthly by the District and copies of such reconciliation shall be made available to the applicant upon request. It is the intent of the District to maintain a positive balance in the applicant's project deposit account. In the event of a pending or projected shortfall, the District shall provide written notice to the applicant stating the amount of supplemental deposit that must be provided and terms or conditions that may, in the opinion of the General Manager, be appropriate.

The unused portion of all funds remaining on deposit with the District shall be returned to the applicant without interest, upon completion of plan check review, connection to the District sanitary sewer system, finalization and acceptance of the system by the District or cancellation of the permit.

6.02 Residential Plan Checking and Inspection Fees

No fees are charged for any review of improvement plans and/or specifications for a single family residential connection; however, improvement plans must be made available to the District upon request. Inspections are charged as outlined in Appendix A-1, page 67, with a minimum of one inspection collected in advance with the Sewer Permit.

6.03 Commercial Project Application Fees

Plan Check Review: The District shall review the improvement plans, with respect to the sanitary sewer, of all proposed commercial projects. This includes, but not limited to, proposed subdivisions, retail businesses, apartments, condominiums, office buildings, motels, food establishments, etc.

Prior to request for Will Serve Letter and Sewer Permit for a commercial project, the applicant shall submit two sets of improvement plans (no photocopies) to the District for Plan Check Review to assure compliance with District requirements. Prior to the District performing the Plan Check Review, the applicant shall pay a deposit to the District as specified in Appendix A-1, page 67, of the District Code from which Plan Check Review fees will be charged.

Commercial Project Deposit: After Plan Check Review has been completed and approval of the improvement plans for sanitary sewer facilities have been granted, the applicant shall deposit with the District a sum of money estimated by the General Manager to cover the cost of inspections, testing of materials, processing of design revisions, procuring or preparing record improvement plans, estimated connection fees, user fees, assessments, related construction activities, automobile mileage, and all overhead and indirect costs. Said deposit shall be paid prior to commencement of construction of the sanitary sewer facilities. The General Manager's estimate shall be based on the best information available, including the owner's and their engineer's estimate of the cost of the facilities to be constructed. The deposit estimated by the General Manager will be based on reasonable periods of time for the completion of the contractor's work.

6.04 Connection Fees

Payment of sewer connection fees is the responsibility of the owner of the property, regardless of who is deriving benefit from, submitting payment for, or receiving sewer service as a result of the connection. Connection charges are non-refundable unless the Sewer Permit is canceled prior to final connection approval by the District.

- Residential connection fees are determined in accordance with Appendix A-2, page 69. Initial Connection Fees are due and payable prior to receipt of Will Serve Letter and Sewer Permit. Additional connection fees shall be assessed for any increase thereafter in the factor rating of the property.

- Commercial and industrial connection fees shall be determined in accordance with Appendix A-1, A-2, A-3, and A-4, pages 67, 69, 71, and 73. Estimated Connection fees are estimated based on the factor rating as determined by the Plan Check Review. Appendix A-2, page 69, equates a single family living unit to 15 plumbing fixture units. Initial connection fees are included in the Commercial Project Deposit. Additional connection fees shall be assessed for any increase thereafter in the factor rating of the property.

Buildings which existed within the boundaries of the District on or before April 15, 1977, and were served by septic tanks until tied into the system, will be exempt from the regular connection charge applicable at the time the building is connected to the system for the factor rating, at the time of connection. This exemption is provided only when such connection is made within 1 year from the time sanitary sewer service becomes available to the property. An accessible sewer within 200 feet of the property will generally fulfill the definition of availability. The sewer allocation provided for the fore-mentioned buildings is neither refundable nor transferable.

6.05 Assessments

(blank)

6.06 Billing of User Fees

Each lot or premises which are connected to, and each owner or customer receiving sewer service from the District shall pay a periodic user fees in accordance with the District's Fee Structure set forth in the appendices. These rates are effective July 1, 1998. These schedules provide an appropriate additional administrative and overhead charge for users from whom the District does not receive property tax monies.

All sewer use, service charges and fees may be billed on the same bill and collected together with fees and charges for any other District services. Except as provided herein, estimated first year user fees are included in the Sewer Permit fees and deposits and are prorated from the date of issuance to the coming July 1st of that fiscal year. The Residential User fees: Single family residential and Multiple family residential (condo's) will be billed on the property tax rolls annually. Commercial billing will be billed bi-monthly (every two months) on August 30th, October 31st, December 31st, February 28th, April 30th and June 30th and shall become due and payable 30 days from the date of that billing statement. In the event of delinquency, a 10 percent penalty shall be added to the balance due. The District shall include a statement on its bill to each customer or owner or, shall provide such statement to each owner by any other means, that any charges remaining delinquent for a period of 90 days shall constitute a lien against the lot or parcel of land against which the charges were imposed. The District shall provide Notice of Public Hearing pursuant to Section 6066 of the Government Code to each affected owner. After Public Hearing, the District will request by resolution, that the County Auditor include the amount of said delinquencies on the property tax bill against the respective lot or parcel. Once the transfer of delinquent amounts has been turned over to the County Auditor's office for collection, no payment shall be received by the District on said delinquent amounts except as collected by the County Auditor's office.

User fees shall be billed to the owner of the property served. The payment of user fees shall be the responsibility of the owner of the property regardless of who is deriving the benefit from, submitting payment for, or receiving the sewer service as a result of the connections. Each owner shall be liable to the District for payment of sewer charges and fees, regardless of whether service is provided through an individual service lateral or multi customer service lateral.

The District may elect to send a composite bill to groups of customers when each of the following conditions are met:

- the owners to be billed as a group own lots or premises in a multi-unit living building,
- the owners have formally organized in writing into a homeowner’s or similar association,
- the homeowners' or similar association, through properly executed covenants, conditions, articles of incorporation or by laws, has the power to act as the sole agent for the owners concerning sewer charges in a manner which binds individual owners.

Providing the above conditions are met, the District may bill to and the association shall pay all delinquent penalty and interest charges on the composite bills. The composite bill or other notices to the association shall constitute a bill or other notice to each individual owner or customer, who shall agree that no other notice or bill to individual owners or customers shall be necessary for, or a prerequisite to, the District's exercise of its powers to terminate service, or place liens on each owner's property or exercise other legal remedies necessary to collect delinquent bills and charges. The composite bill shall consist of the sum of the total semiannual sewer charges for each owner or customer represented by the association. Service to a common area shall be treated as service to a single unit.

6.07 Annexation Fees and Charges

Annexation fees and charges as detailed in Appendix A-1, page 67, are required for all areas outside of the District boundaries applying for annexation to the District on or after the effective date of the District Code.

The annexation fees shall be due and payable on the date of any such annexation approval by the District and payment shall be a condition of said approval. Non-monetary conditions of annexation shall be specified in an annexation agreement executed between the owner(s) and the District prior to the Local Agency Formation Commission hearings and approval of the proposed annexation.

The owner or their successor in title or interest of any such parcel or lot as herein described shall be responsible for payment of the annexation fee provided in this section.

The Clerk or other designated official of the District shall receipt the payment of all such annexation fees and shall record the name of the payer and a description of the parcel to which such payment is applicable. A record of all such payments shall be maintained by the District, including the date and amount of payment, the name of the payer, their mailing address, and a description of the parcel, or lot, to which such payment or payments are applicable.

6.08 Fees for Preparing and/or Reviewing Special Documents

Before proceeding with the preparation of any special study, Environmental Impact Report, or related document, the General Manager shall collect from the person making the request a deposit in the amount determined by the General Manager to be fair and equitable. If, after the fee is paid, a change in the study or documents is requested which will increase the cost to the District, supplemental fees shall be collected in the amount of the estimated additional cost.

6.09 Penalties on Unpaid Connection Fees

In the event that any connection charges are not paid within 30 days of the date of invoice, a basic penalty of 10 percent shall be added to such unpaid connection charges. The owner may request, in writing, to extend payment of additional connection charges over a 12-month or lesser period. The request may be granted upon approval of the General Manager.

6.10 Delinquent Account Penalty Fee

Any owner whose account is found to be delinquent shall be assessed a basic penalty of 10 percent of the delinquent amount.

6.11 Returned Check Fee

A fee may be required by the District for each check tendered as payment to the District that is returned unpaid. Future payments made to the District may be required to be in the form of cash, a Cashiers Check or a money order.

6.12 Billing Basis for User Fees

The District shall use a flat rate billing basis, based on the billing factor units of the user as determined by the General Manager, and in accordance with Appendix A-2, page 69, and A-3, page 71.

6.13 Initial Billing of User Fees

User Fees shall be based on connection type and/or fixture units derived from information supplied on the Sewer Permit and additional information as may be available to the General Manager. Unless otherwise stated, billing shall commence after the first day of permit payment and issue of Will Serve Letter.

6.14 Billing Adjustments

An adjustment of user fee charges will be made when the District is notified of a change in use, when the District discovers a change or when the change is made. Any amount paid in excess of the actual computed user fee charge shall be credited against the account. Any deficiency in the amount paid and the actual computed user fee charge shall be added to the account.

Deficiencies or credits may not be made for a period more than 2 years prior to the date the General Manager determines that a billing discrepancy exists; except in the event of an unreported connection or discharge, in which case all charges and fees shall be assessed under Section 6.16, page 25.

Periodically, there are changes in the sewer use of property that affects the factor rating. The District will notify the owner in writing of these changes and of any possible reduction or increase in the factor rating.

- Increased Factor Rating: The owner, upon written notification by the District of an increase in the factor rating, may choose to remove the additional plumbing fixtures to avoid increased connection and user fees. Removal of the additional plumbing fixtures must be completed by the owner and verified by the District within 30 days of the written increased factor rating notification.

- Reduced Factor Rating: The owner may elect to pay lesser user fees for the lower factor rating by signing an Agreement for the Reduction of District Factor Rating. In Accordance with this agreement, the factor rating for the property shall be reduced and the owner shall forfeit all rights to the allocations that have been reduced. Connection charges shall be assessed for any increase thereafter in the sewer capacity of the property which, is represented by any subsequent increase in its factor rating. The owner may elect to continue paying the user fees for the higher factor rating of a property with no reduction and thereby not forfeit all rights to the allocations for the higher factor rating.

In the event of a disaster, adjustments to billing may be made as specified in Section 2.03, Disasters, page 5.

6.15 Collection Remedies

Remedies for collecting and enforcing user fees and connection charges set out by the District Code are cumulative. Any and all remedies may be used alternatively. None of the remedies are exclusive.

Delinquent charges for sanitary sewer service together with all penalties thereon, when recorded as in Chapter 6, Division 2, of the Government Code of California shall constitute a lien upon the real property served and such liens shall continue until the charges thereon and penalties thereon are fully paid or the property sold therefore in the manner more particularly provided in Sections 54354, 54354.5 and 54355 of said Government Code of California.

Delinquent charges for sanitary sewer service together with penalties thereon, which remain delinquent as of June 30 of each year, shall be collected in the same manner as the general taxes for the District for the forthcoming fiscal year provided that the District shall give notice as provided by law.

Delinquent charges, together with all penalties thereon, may be collected by an action in any court of competent jurisdiction against a person or persons who owned the property when the service was rendered for the collection of all delinquent charges and penalties.

An action may be instituted in any court of competent jurisdiction to enforce any lien on the land for the user fees and connection charges together with all penalties thereon.

Reasonable attorneys' fees and court costs of any action in any court for collection of user fees, together with any penalties thereon, or for a preliminary or permanent injunction, or for the issuance of an order stopping or disconnecting sanitary sewer service, or to enforce a lien, shall be an additional charge for such sanitary sewer service.

If sewer service is furnished by the District to the real property and is disconnected for unpaid charges, re-connection shall not be made until all user fees and connection charges including penalties and disconnection and re-connection charges have been paid to the District.

6.16 Unreported Connections and Discharges

An unreported connection is a connection that has not been inspected and approved by the District. An unreported discharge is a discharge on property previously connected to the public sewer system that increases the factor rating and/or fixture unit use on the property or for which all applicable charges have not been paid.

Upon discovery of unreported connections or unreported discharges to the sewer system which increase the factor rating or fixture units of the property or for which a Sewer Permit has not been issued or for which user fees have never been paid, the District shall charge all current user fees, and current connection charges and fees, including all basic penalties and additional penalties thereon, from the time the unreported connection or discharge was made. All such charges and fees shall be deemed to be user fees, including all current connection charges and all service charges and penalties thereon retroactive to the date of the unreported connection.

The District for any unreported connections and unreported discharges shall assess connection charges and service charges at the time of discovery by the District.

6.17 Collection of Delinquent Assessment District Bonds

For any applicable period, when property taxes for a parcel within any existing or future Sewer Assessment District (SAD) become delinquent with the County Tax Collector, the portion of the unpaid tax assessed for that SAD remains as a lien against the property, until such time said assessment, penalties, interest and fees are collected by the District.

7. INSTALLATION OF SANITARY SEWER FACILITIES

7.01 Connection Policy

Connection to the District collection system will be made when the sewer system is inspected tested and approved, and meets or exceeds all District criteria as set forth in these codes.

7.02 Alternate Connection Option

The building lateral will be installed, backfilled, tested and boxed per cleanout specifications before the structure is framed and covered. If the line, cleanouts or boxes are damaged or appear to be damaged during construction, the District may require an additional test, per original specifications, at the sole cost of the permittee.

- The building lateral must be tested and approved by the District.

- The building lateral must be secured with an approved contractor furnished watertight cap or,

- Rough plumbing is approved and connected to the building lateral. Before connection, the rough plumbing is to be approved by the building department and all test/flush water removed from the building waste piping.

- The watertight cap shall be reasonably accessible by District personnel. Watertight caps that are unreasonably obstructed by construction debris, structural features, or lack of space will not be removed until accessibility is improved.

- If the watertight cap is broken or removed, the sewer lateral must be TV'd and retested per original test specifications.

In the event the sewer lateral has not been approved within the time period of the permit, and an extension of the permit is not requested the owner will forfeit their connect fee. The sewer lateral may be disconnected from the sewer main as deemed necessary by the District. If the sewer is disconnected, a reconnect fee and retest of the pipeline will be required before re-connection. Additional inspection fees will be required.

If for any reason the Sewer Permit is canceled prior to the final connection, the sewer pipeline shall be disconnected either by the owner or, their agent or, the District. If the District disconnects the lateral, the owner or their agent will be charged for all work incurred by the District for said disconnection. Such charges will be deducted from any funds remaining with the District.

7.03 Responsibility for Building Lateral Installation

It shall be the responsibility of the owner or their agent, to install all building lateral pipelines and appurtenances from and within the premises of the owner or their agent to the service connection pipeline provided by the District.

Unless otherwise agreed by the District, all building lateral pipelines and related appurtenances within the premises of the owner or their agent shall be installed at the owner’s or their agent's expense.

7.04 Size and Type of Building Laterals

Building lateral pipelines connecting to the District's sewerage works shall meet the requirements listed below and the criteria listed in Appendix A-5, page 75, and Appendix A-6, page 77.

Residential Building Laterals: The diameter of gravity building laterals shall not be less than the pipeline diameter exiting the structure, or less than 4 inches for a single residence or two residences. A 6-inch diameter pipeline or larger shall be used for more than two dwelling units.

Commercial Building Laterals: The minimum pipeline diameter for new gravity building laterals shall not be less than 6 inches. Existing 4-inch building laterals proposed for commercial use shall be tested in accordance with Section 10.03, page 50. If the existing 4-inch building lateral fails the test, the entire 4-inch pipeline shall be removed or abandoned and the commercial building lateral shall be upgraded to a 6-inch diameter pipeline.

Appropriate fittings shall be used in connecting to the service connection provided by the District. On double sewer services, both wye's shall be uncovered prior to connection to the system for District inspection and the appropriate wye shall be used.

Joints in all building laterals shall be of a collar type as recommended by the manufacturer and shall pass the District's inspection and required tests.

7.05 Trench Requirements

All trenching for building lateral and service lateral pipeline installation shall be performed in accordance with the California Occupational Safety and Health Act. All trenches shall be excavated and backfilled in accordance with the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169.

All encroachment permits and/or easements necessary for trenching shall be the responsibility of the owner or their agent, and shall be delivered to the District prior to inspection of pipeline installation.

The surface of ground or pavement of any public road or other public way intercepted or in which trenching work has been performed, shall on completion of backfilling, be restored as nearly as practicable to the condition it was prior to trenching.

7.06 Minimum Pipeline Cover Requirements

A minimum of 30 inches compacted earth fill shall cover all gravity and force building and service laterals. Cover less than 48 inches in vehicular traveled ways requires heavier walled pipe as listed in Appendix A-5, page 75.

7.07 Minimum Slope Requirements

Residential Building Laterals: Trenches shall be on an even grade with a minimum slope of 0.0208 (1/4 inch fall per linear foot) for 4-inch diameter pipeline and 0.0035 (1/24 inch fall per linear foot) for 6-inch diameter pipeline. Holes for connecting pipe collars shall be dug so that each joint of pipe will have an even bearing over 6-inches of sand bedding placed on the trench bottom.

Commercial Building Laterals: Trenches shall be on an even grade with a minimum slope of 0.0035 (1/24 inch fall per linear foot) for 6-inch diameter pipeline. Minimum slope for pipelines greater than 6 inches in diameter are listed in Appendix A-6, page 78.

7.08 Backfilling Building and Service Laterals

The native soil in the trench bottom shall be compacted to 90 percent relative compaction before placement of Class 1 Backfill for pipeline bedding. Class 1 Backfill shall meet the gradation requirements listed in Appendix A-6, page 99. It is recommended that Class 1 Backfill material have a specific gravity of at least 2.5 to assure proper compaction. Class 1 Backfill bedding material shall also be compacted to a relative compaction as specified in the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169, before laying the pipeline. Class 3 Native Backfill may be substituted for Class 1 Backfill if the substitution is approved by the District Inspector **prior** to installation of the building lateral and placement of the Class 3 Native Backfill.

A District inspector prior to backfilling above the spring line shall visually inspect the new building and service laterals. After the visual inspection by a District inspector, the trench shall be backfilled. All trenches for building and service laterals shall be backfilled in accordance with the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169.

Material for Class 1, Class 2, Class 3, and Class 4 Backfill, as listed in Appendix A-6, page 99, shall be placed in uniform horizontal layers not exceeding 0.67 feet in thickness before compaction, and shall be brought up uniformly on all sides of the trench.

Each layer of backfill shall be compacted to a relative compaction as indicated in the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169. The District reserves the right to perform compaction tests, or have compaction tests performed through a licensed geotechnical testing firm, to verify compaction of the backfilled trench section. All tests by the District will be performed in such a manner as will not unnecessarily delay the work. The owner or their agent shall not be required to reimburse the District for the initial tests performed. If subsequent tests are required due to compaction failures, the owner or their agent shall pay for all subsequent compaction tests.
In the event that heavy groundwater is encountered in the excavated trench, Class 4 Backfill may be substituted for Class 1 Backfill if the substitution is approved by the District inspector **prior** to placement of Class 4 material. If Class 4 Backfill material is substituted for Class 1 material, filter fabric must be placed on top of the Class 4 Backfill before proceeding with additional approved backfill.

Water stop impervious plugs (trench cutoff blocks) shall be installed in trenches where Class 4 Backfill is used, in all areas of ground water movement, and in all trenches containing pipeline slopes of 10 percent or greater.

The location and spacing of trench cut-off blocks for private building laterals shall be the responsibility of and shall be determined by the owner or their agent. The General Manager shall determine the location and spacing of trench cut-off blocks for sanitary sewer mains. Trench cut-off blocks shall be constructed as shown in the Standard Drawings, Trench Cut-Off Block, Figure 17, page 171.

The use of backfill material other than Class 1, Class 2, Class 3, and Class 4 is not permitted unless approval is granted, in writing, from the General Manager.

7.09 Installation of Cleanouts

A cleanout shall be installed in each building lateral at the property line of the premises being provided with sewer service and within 5 feet of where the lateral exits the structure foundation. Cleanouts located under the house are not accepted, the cleanout must be located *outside* the building foundation. Additional cleanouts shall be installed at intervals not to exceed 75 feet, and at any other point the owner or their agent may select for the purpose of keeping said sewer pipeline clean and free of obstruction. A cleanout shall also be installed on the upstream side of the fitting at all 45 degree or greater bends.

All cleanout risers must be installed 4 inches below finished grade and boxed to finished grade with an appropriate removable watertight plug in the end of the riser. Cleanout risers and appropriate boxes are required at the property line cleanout and at the cleanout installed nearest the building. Cleanout boxes shall be constructed of concrete with cast iron lids for vehicular traveled areas (Christy G-5 or equivalent) or reinforced plastic with cast iron lids for non-vehicular areas (Carson Industries, Inc., series 608 or 910, or equivalent). Cleanout boxes shall be set to grade and backfilled to prevent accidental displacement or removal. Lids shall have "SEWER" or equivalent imprinted on the lid. Lids with verbiage other than a sewer utility designation (i.e., Water, Gas, etc.) imprinted on the lid are <u>not</u> permitted. See Standard Drawings, Lateral Cleanout Assembly, Figure 10, page 157.

A sewer lateral stub out to vacant land shall contain a wye (two wyes for double service) with approved removable plugs in the bell ends. A cleanout riser must be installed 4 inches below finished grade and shall be boxed to finish grade with an appropriate removable, watertight plug installed in the end of the riser. The box shall be fitted with a metal lid marked “sewer”. The stub out shall be placed at the property line at the appropriate depth to service the parcel.

Dual swing ties are required for all stub outs and cleanout risers. Permanent objects such as property corners, power poles, water boxes, structures, etc. shall be used for swing ties.

7.10 Backflow Prevention Devices

The District is not responsible for interruption of sewer service or flows, damage to existing system beyond the Districts control or backflow any to any residential or commercial buildings. Installation and maintenance of backflow prevention devices are the sole responsibility of the permittee or owner.

Private or commercial building laterals which, connect to a joint lateral (a privately owned *shared* lateral pipeline that receives wastewater flow from two or more parcels) or District sewer service line may require the installation of a backflow prevention device to protect private property.

In the event of a pipeline stoppage, a backflow prevention device installed on each commercial or private building lateral would inhibit wastewater in the joint lateral from backing-up through the private building lateral into the building served.

Backflow prevention devices are especially useful in areas where any sewer or lateral provides service to parcels or connections of significantly different elevations.

7.11 Sewer Lateral Testing

All new building laterals shall be tested by either an air or water method, at the discretion of the District. The test section shall be from the wye at the service lateral connection point to the building cleanout, or from the cleanout at the property line to the building cleanout, corresponding to the new pipeline installed.

A District inspection shall be required for approval of workmanship and materials in compliance with District requirements. Testing will be completed in the presence of a District Inspector. The system must be completely ready for inspection at the appointed time; failure to comply with this will result in an additional inspection service charge for each occurrence. The owner or their agent must be present at the time of inspection and test.

Once the backfill is complete and the cleanout boxes are installed, the new building lateral shall be tested in accordance with one of the following:

- Air Testing consists of plugging each end of the building lateral and applying a pressure of 4.0 pounds per square inch to the section under the test. The pipeline shall be allowed a maximum loss in pressure of 1/2 pound per square inch in 5 minutes. If the loss exceeds 1/2 pound per square inch, the test may be attempted one additional time. A second loss of pressure constitutes a failure of the pipeline.

- Water Testing consists of plugging the downstream end of a building lateral, placing a section(s) of pipe in the vertical branch of the building cleanout and filling the test section with water. Additional cleanouts may have to be installed in steep pipelines and the pipeline tested in sections. In no case shall the total depth of water exceed 15 feet to any point in the pipeline. The water level in the pipeline shall remain constant for 5 minutes for a 4-inch or 6-inch lateral. If a loss occurs, the pipeline may be retested one additional time. If a second loss occurs, this constitutes a failure of the pipeline.

If a pipeline fails the test, the owner or their agent shall be responsible for notifying the District when corrective work has been completed and for scheduling a new test.

1-90 sewer lateral tests will be in accordance with the following criteria:

1. It is the recommendation of the District that all single family residential homes should be tested every ten (10) years at a minimum.

2. All condominium blocks shall be tested every ten (10) years.

3. All single family residential homes shall be tested prior to the sale of the home if,

   - The home is over five (5) years old from the date of new construction or,

   - Five (5) years have passed from the date of last testing or,

   - Upon determination by a District representative that testing may be required due to possible leakage, age, location, construction or other District concerns which may be cause for testing.

- Sewer lateral testing is required on all remodels if 50% or more of the home is remodeled or, if more than 50% of the plumbing fixtures and/or piping are replaced.

It is the recommendation of the District that a residential home be tested prior to all sales regardless of the date of last testing.

Winter rules provide for deferment of the test due to weather and ground conditions until such a time as weather or ground conditions support the testing or repairs of approved lateral services. It is the sole responsibility of the owner to ensure that a test is completed in a timely manner. The District is responsible for providing the visual inspection and recording of the lateral test. The test must be performed by a certified plumber or plumbing company and visually inspected, recorded and filed by a District representative. The District will provide a copy of the test results and lateral location to the owner or owner's representative.

7.12 Testing of Manholes, Grease Interceptors, Sand/Oil Interceptors

Testing shall be in accordance with one of the following:

- Water test by plugging all inlet and outlet pipes and filling the test section with water to the top of the frame rim. The water should be introduced into the test section at least 4 hours in advance of the official test period to allow the concrete and joint material to become saturated. The test section shall then be refilled to the original water level.

  At the beginning of the test, the elevation of the water in the test section shall be carefully measured from a point on the frame rim. After a period of 4 hours, the water elevation shall be measured from the same point on the frame rim and the loss of water during the test period calculated. If this calculation is difficult, enough water shall be measured into the test section to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage. The allowable leakage shall not exceed 0.13 gallons per hour. Manholes, Grease Interceptors, and Sand Oil Interceptors showing leakage in excess of that allowed shall be repaired or reconstructed as necessary to reduce the leakage to that specified. All failures shall be retested after the necessary repairs have been completed.

- ➢ Vacuum test by using acceptable equipment approved by the District. Vacuum test equipment shall be used per the manufacturer's specifications. A vacuum of 10-inches mercury should be drawn on the manhole. The time, in seconds, for the vacuum to drop to 9-inches mercury shall be measured and shall not be less than the times listed below for various manholes and interceptors.

Time (seconds)	**Manhole Diameter** (inches)	**Interceptor Size** (gallons)
60	48	
75	60	
90	72	
80		500 to 999
120		1,000 to 1,499
150		1,500 to 1,999
180		2,000 to 2,499

Note: Grease interceptors and sand/oil interceptors shall be completely drained and cleaned before initiation of the water or vacuum test.

7.13 Residential Pump Systems

For all building sites in which the improvement plans designate a pumped service or for any owner wishing to construct a structure on a portion of a lot or parcel for which gravity service was not provided, the owner shall install a sewage pump as specified herein for the purpose of lifting sewage to the public sewer. **All means necessary to provide gravity flow shall be exhausted prior to acceptance by the District regarding pumped service applications.**

A pumped sewer service shall consist of a gravity sewer, a wastewater holding tank, one or more pumps, a force main, electrical controls, and an alarm system. The pump and holding tank shall be installed in a location such as to be reasonably accessible for inspection and maintenance. If the holding tank is located outside of the building foundation it shall <u>not</u> be located within 5 feet of any building used as a dwelling, within 10 feet of any property line or within 50 feet of any lake, stream, or reservoir. Where installed, the owner at the owner's expense shall maintain such installations.

Installation:

Gravity Pipeline - The gravity sewer lateral from the building sewer to the waste water holding tank shall be tested in accordance with Sewer Lateral Testing, Section 7.11, page 32. Pipe must be grouted or sealed to a watertight condition at the point of holding tank penetration.

Waste Water Holding Tank - The holding tank shall be a solid impervious walled container. All openings in the walls of the tank, including pipe or conduit penetrations, are to be sealed to prevent inflow of surface water, infiltration of ground water, or exfiltration of contained wastewater. The tank shall have a minimum capacity of 150 gallons. The tank shall be vented with a 1 1/4 inch minimum vent line. The tank shall be buried to a depth such that the top cover of the tank is 18 inches below finished grade. A weatherproof housing, with adequate insulation, shall be installed and extended to 6 inches above finished grade. It shall be the owner's responsibility to determine groundwater conditions that may cause the tank to float when empty and to provide the appropriate solutions to prevent it. Internal ballast that reduces the tank capacity below 150 gallons will not be acceptable.

Pumping Equipment - Pumps shall be centrifugal of the non-clog or grinder type. Pumps shall be capable of passing a minimum of a 2-inch diameter sphere. Pumps and motors shall be sized so as to maintain a minimum of 4-feet per second flow velocity throughout the entire discharge piping system when a maximum of one pump is pumping under actual installed conditions. A copy of the pump specifications and pump curve shall be required and made available to the District inspector before testing is allowed.

Electrical - The electrical control cabinet shall be isolated from the holding tank. All wiring, controls, conduits, boxes, etc. shall meet or exceed National Electrical Code (NEC) requirements for materials, ratings, placement, and installation etc. All equipment located in the holding tank shall be U.L. approved for its specific and proper use. All wiring in the area above the holding tank shall be provided with protection from physical damage by a combination of cable routing and/or conduits. Any wiring that hinders entry or view into the holding tank when opened will not be acceptable. All electrical connections shall be in an approved electrical junction box. All conduits leaving the holding tank, or the enclosed area above or surrounding the holding tank, shall be sealed. A circuit disconnecting means for all circuits must be located within sight of the holding tank unless a lockout device is installed on the disconnecting means for each individual circuit attached to or related to the pump system at the holding tank.

Alarm System - The holding tank and electrical controls shall include an alarming system that produces an audible and visual alarm when the liquid level in the holding tank exceeds a predetermined safe level. The audible and visual devices indicating such an alarm state shall be located within the building or structure served by the sewage system with the intent to notify the occupant of the possibility of a wastewater spillage. The alarm system power shall be supplied through a dedicated circuit, separate from the pump power supply. It is recommended that the alarm system include a battery backup to provide alarm functionality during an electrical power outage.

Discharge Piping - The discharge pipeline shall be ductile iron, polyvinyl chloride (PVC), polyethylene, or an approved pressure rated material designed for wastewater. The piping shall be pressure class 150 minimum and rated for the pressure service being installed. The pipeline size shall be 2 inch diameter minimum and not be of a size smaller than the pump discharge port. The discharge pipeline shall be fitted with an approved pressure rated check valve and a gate valve. The discharge pipeline shall also include a 1/4-inch pressure test port located between the check portion of the check valve and the gate valve. The gate valve shall be located on the discharge side of the check valve. Both valves and the test port shall be located as close to the pump or holding tank as possible and in such a manner that they are accessible for operation and for maintenance or repairs. It is recommended that valves are installed with unions and boxed to grade.

Discharge pipelines shall have a trench cutoff block located every 50 linear feet of pipe, at changes in pipeline type and/or grade, and at the pump tank. Thrust blocks shall be located at all fittings that change the direction of the pipe. Thrust blocks shall be constructed of concrete with a minimum size of 2 cubic feet.

A siphon break shall be installed on the discharge pipeline at its connection point to the gravity sewer. A cleanout in accordance with Installation of Cleanouts, Section 7.09, page 31, shall be placed in the discharge pipeline at the property line, if the siphon break can be placed in a practical manner such that sufficient gravity slope can be maintained from the property line to the District main pipeline.

Inspection and Testing:

The gravity portion of the pipeline from the building to the holding tank shall be tested in accordance with the Sewer Lateral Testing, Section 7.11, page 32.

A visual inspection shall be performed to check for the following:

- Proper venting of the holding tank.
- An acceptable weather proof, insulated box with an insulated lid directly above the holding tank.
- A weather tight seal on the holding tank lid and at all pipe or conduit penetrations.

The discharge pipeline shall be pressure tested with air or water to a pressure of 150 percent of the calculated maximum possible working pressure (the Total Dynamic Head, or TDH) for the installed pump. The maximum possible working pressure for the system can be assumed to occur at the pump’s shut off point. The pump shut off point can be obtained from the pump's performance curve by following the curve to the point at which it meets the axis representing the head of liquid.

The pressure must remain constant for 10 minutes. The required test equipment shall be provided by the owner or owner's agent and be acceptable to the District.

The electrical system and controls shall be inspected and approved by the local governing authority for building electrical inspection. Pumping and alarm tests shall only be performed after the electrical system has been inspected and approved by the proper authority. The District Inspector shall require proof of such approval before starting any of the following functional tests:

- The pump shall be started and stopped so the check valve can be tested for proper operation.
- The pumping system shall be tested for a discharge pipeline velocity of 4 feet per second. The flow velocity test shall be performed with the discharge pipeline full of water and the pumping system functional under normal operating conditions.
- The pump shall be run to pump down the holding tank to allow a visual inspection of the tank and to check it for leaks.

- The alarm system shall be checked for proper function of audio and visual alarms.

Septic tanks converted for use as holding tanks shall be air, water, or vacuum tested. The test shall be the same as specified for sanitary sewer pipelines, manholes, and grease and sand oil interceptors. If the converted septic tank fails the test, it shall be abandoned in accordance with Abandoned Sewers and Sewage Disposal Facilities, Section 7.16, page 38 and a new holding tank meeting the requirements for Residential Pump Systems shall be installed in its place.

Deviation from Requirements:

Any deviation from the above stated requirements shall be approved in writing by the General Manager.

7.14 Delay in Sanitary Sewer Facility Testing

Testing or inspection for final may be delayed when inclement weather or other conditions will not allow the required testing to be performed during winter months. When such a situation arises, the owner or their agent may enter into a written agreement with the District to delay the required testing with a specific deadline date upon which testing must be completed.

7.15 Owner-builder Temporary Hook up to Sanitary Sewer

An owner-builder, who plans to place a trailer on a parcel for the owner-builders sole use and living quarters while building a residence, may request a temporary trailer be connected to the sanitary sewer system by completing the following administrative steps:

- Present the appropriate valid Placer County Building Permit at the District's office and request a Sewer Permit.

- Pay connection fees and prorated user fees to the District and connection fees to the Tahoe-Truckee Sanitation Agency (T-TSA).

- Pay a $500.00 deposit for the connection. This deposit is refundable upon the District's approval of the disconnect of the temporary system.

- Pay a $100.00 fee for administrative costs.

Once the above administrative requirements are completed, the temporary trailer may be connected to the District sanitary sewer system under the following conditions:

Installation of Pipelines: The building lateral and the temporary sewer lateral have been installed, backfilled and tested by the owner-builder and inspected by a District inspector. The type of pipe used for the temporary sewer lateral shall be in accordance with District Code requirements.

The temporary sewer lateral shall be located in a trench with at least 30 inches of cover. The temporary sewer lateral shall have a slope of at least 1/4 inch fall per foot of length. The temporary sewer lateral shall be connected to the house building lateral using a wye.

The temporary sewer lateral riser shall be provided with a sewage drain inlet not less than 3 inches in diameter (if a trap is required as described) or 4 inches in diameter if no trap is required, to receive the wastes of the temporary trailer. A 4-inch thick slab of concrete extending at least 6 inches away from the outside diameter of the riser pipe shall protect the riser. The riser shall extend 3 inches above the top of the concrete slab.

Connection of the temporary trailer to the temporary sewer lateral shall be a watertight connection to prevent the entrance of groundwater or surface water at all times. Trailer facilities shall not be used to wash or dispose of construction tools or materials.

Location: The temporary trailer shall be parked a distance of no more than 3 feet from the temporary connection point riser. The riser shall be placed in concrete as described below. If a cleanout riser on the house sewer lateral can be utilized, a concrete box can be used in place of the concrete. The connection of the trailer to the riser shall be watertight.

Venting: In the case that the trailer waste fixtures are not properly vented, the drain inlet shall be provided with an effectively vented trap not less than 3 inches in diameter for inlets designed to receive the discharge of vehicles equipped with toilets.

If the temporary trailer fixtures are not properly vented, the drain inlet trap shall be individually vented with a vent pipe not less than 2 inches interior diameter. All vent pipes, in outdoor locations, shall be located at least 10 feet from an adjoining property line and shall extend at least 10 feet above the ground level. All vent pipes shall be adequately supported.

Connection of Temporary Trailer: The house sewer lateral and the temporary sewer lateral shall be tested as required by the District Code. After the test, a seal cap and numbered seal shall be placed on the house connection point and the temporary trailer shall be connected to the temporary sewer lateral as described above.

The temporary sewer lateral may be used during the house construction for a maximum of 1 year, whichever is less, beginning with the date the trailer fee is paid. If the house construction is not complete after the 1-year period, the owner may solicit the District to extend the allowed use of the temporary sewer lateral for an additional year. An extension will require an additional $100.00 administrative fee. After the end of the second year of use, the temporary sewer lateral shall be removed and the wye plugged as described above.
User fees shall commence on the date payment is made for the temporary trailer. Unpaid user fees will be deducted from deposits when final inspection has been completed.

Upon completion of the house and subsequent granting of occupancy by Placer County, the temporary sewer lateral shall be completely removed by the owner-builder within 5 days of occupancy of the house. The temporary sewer lateral shall be removed from its trench. The wye (fitting that joined the building lateral with the temporary lateral) shall be rotated upward and a cleanout riser pipe installed to grade. The cleanout shall be boxed to grade as shown in Lateral Cleanout Assembly, Figure 10, page 157. All temporary sewer lateral materials shall be removed from the property and the temporary sewer lateral trench shall be completely backfilled. The seal cap shall be removed and the house sewer lateral retested as required by the District Code.

7.16 Abandoned Sewers and Sewage Disposal Facilities

Every abandoned building (house) sewer, or part thereof, shall be plugged or capped with an approved watertight plug within 5 feet of the property line. A District Inspector shall witness this procedure.

Once the lateral is plugged at the property line, one of two options is available. The owner may continue to pay User Fees or may choose to stop User Fee payments. If User Fees are discontinued, Connection Fees will be required at the time of re-connection at the current Connection Fee rate. If the owner continues to pay User Fees, no Connection Fees will be required at the time of re-connection.

Every cesspool, septic tank and seepage pit which has been abandoned or has been discontinued otherwise from further use or to which no waste or soil pipe from a plumbing fixture is connected, shall have the sewage removed from and be completely filled with earth, sand, gravel, concrete or other approved material.

The top cover or arch over the cesspool, septic tank, or seepage pit shall be removed before filling and the filling shall not extend above the top of the vertical portions of the sidewalls or above the level of any outlet pipe until the cesspool, septic tank or seepage pit has been inspected. After such inspection, the cesspool, septic tank or seepage pit shall be filled to the level of the top of the ground.

Where disposal facilities are abandoned consequent to connecting any premises with the public sewer, the permittee making the connection shall fill all abandoned facilities as required within 30 days from the time of connecting to the public sewer (Uniform Plumbing Code, Section 1119). The District shall verify such abandonment.

8. GREASE REDUCTION PROGRAM

8.01 Commercial Food Establishments

Any commercial establishment serving food such as, but not limited to:

restaurants	coffee shops
delicatessens	drive-in eating establishments
bakeries	donut shops
take-out	ice cream or milk drive-in stations

or commercial food manufacturing facilities such as, but not limited to:

packing establishments	slaughter houses
canneries	

or commercial facilities such as, but not limited to:

hospitals	motels/hotels
markets	recreation or reception halls
schools	conference centers
churches	

Where any grease or other objectionable materials may be discharged into a public or private sanitary sewer system shall have installed on the premises an appropriately sized grease interceptor or grease trap as required by Chapter 7, Uniform Plumbing Code.

The facilities listed above can be classified into the following categories based on the type of facility, the nature and volume of the waste flow produced, the hours of operation, and the number of meals served per day:

- **Industrial** - commercial facilities as defined in sections 709 and 710 of the Uniform Plumbing Code, and those facilities designated by the General Manager.

- **High Volume** - full menu type establishments operating more than 16 hours per day and/or serving 500 or more meals per day.

- **Medium Volume** - full menu or specialty menu type establishments serving full meals 8 to 16 hours per day, and/or 100 to 400 meals per day.

- **Small Volume** - fast food, take-out or specialty type food establishments with limited menus, a minimum of dish washing, and/or minimal seating capacity.

The General Manager or his/her designated representative shall approve the size, type and location of each grease trap or interceptor.

Waste in excess of 140 degrees Fahrenheit (60 degrees Celsius) shall not be discharged into a grease trap or interceptor.

For the purpose of this division, the term "fixture" shall mean and include each plumbing fixture, appliance, apparatus or other equipment required to be connected to or discharged into a grease trap or interceptor by any provision of this division.

Waste discharge from fixtures and equipment in the above-mentioned types of establishments which may contain grease or other objectionable materials, including, but not limited to, scullery sinks, pot and pan sinks, dishwashers, food waste disposal, soup kettles, etc., and floor drains located in areas where such objectionable materials may exist, may be drained into the sanitary waste through a grease trap or interceptor when approved by the General Manager. **Exception: Toilets, urinals, and other fixtures containing fecal material may not flow through interceptors, traps, or sand/oil interceptors.**

District personnel will periodically schedule inspections of grease traps and interceptors. It shall be the responsibility of the owner or their agent to maintain grease traps and interceptors in an efficient operating condition by periodic removal and proper disposal of the accumulated grease. No such collected grease shall be introduced into any drainage piping or public or private sanitary sewer facility.

The owner or their agent shall post and maintain a current grease trap/interceptor cleaning and maintenance log on the premises and shall have the log available for review by District personnel at all times.

8.02 Grease Interceptors

Industrial facilities and High Volume food establishments as defined in Commercial Food Establishments, Section 8.01, page 41, are required to install a grease interceptor. Medium Volume food establishments may require a grease interceptor as determined by the General Manager.

Interceptors shall be constructed and installed at the expense of the owner, in accordance with the Standard Drawings, Grease Interceptor, Figure 24, page 185.

Each grease interceptor shall be so installed and connected that it shall be easily accessible at all times for inspection, cleaning, and removal of the intercepted grease. A grease interceptor may not be installed in any part of a building where food is handled. Proper location of the grease interceptor shall meet the Uniform Plumbing Code Requirements and the approval of the General Manager.

Each commercial facility or business establishment for which a grease interceptor is required shall have an interceptor which shall serve only that business establishment.

Buildings remodeled for use requiring interceptors shall be subject to these regulations.

Grease interceptors shall have a minimum 750-gallon capacity.

Interceptors shall be installed in such a manner that surface drainage may not enter. Interceptors located in vehicle traffic areas shall be capable of withstanding an H-20 axle load. The access port cover shall be at least 1/2 inch below finished grade and shall also be capable of withstanding an H-20 axle load. Except as otherwise provided, the cover and access ports shall be gas-tight. The waste shall enter the interceptor through the inlet pipe only. Interceptors shall be so designed that they will not become air bound. Each interceptor shall be properly vented, as required by Section 708(d), Uniform Plumbing Code.

Grade rings may be used to establish final grade for the access ports and shall be installed using Kent Seal or, Ram-Nek and Ram-Nek primer.

Interceptors shall be tested in the same manner as manholes. The test shall be witnessed by a District Inspector.

Abandoned grease interceptors shall be emptied and filled in the same manner as required for abandoned septic tanks as described in Section 1119, Uniform Plumbing Code.

8.03 Grease Traps

Small Volume food establishment as described in Commercial Food Establishments, Section 8.01, page 41, may choose to install a grease trap in place of a grease interceptor. Medium Volume food establishments, after careful review of UPC requirements based on actual or estimated waste flows, may also be allowed to install a grease trap in lieu of a grease interceptor.

No grease trap shall be installed which has an approved rate of flow of more than 55 gallons per minute, nor less than 20 gallons per minute, except with prior written approval of the General Manager.

Each plumbing fixture or piece of equipment connected to a grease trap shall be provided with an approved type flow control or a restricting device installed in a readily accessible and visible location in the tailpiece or the drain outlet of each such fixture. Flow control devices shall be so designed that the flow through such device or devices shall at no time be greater than the rated capacity of the grease trap. No flow control device having adjustable or removable parts shall be approved.

Each grease trap required by this section shall have an approved rate of flow, expressed in gallons per minutes, which is not less than 40 percent of the total capacity in gallons of fixtures discharging into said trap.

The grease retention capacity of the trap, expressed in pounds of grease, shall not be less than two times the approved rate of flow in gallons per minute.

Any grease trap installed with the inlet more than 4 feet lower in elevation that the outlet of any fixture discharging into such grease trap shall have an approved rate of flow which is not less than 50 percent greater than that given in the preceding paragraph. No more than four separate fixtures shall be connected to or discharged into any one grease trap.

Each fixture discharging into a grease trap shall be individually trapped and vented in an approved manner. An approved type grease trap may be used as a fixture trap for a single fixture when the horizontal distance between the fixture outlet and the grease trap does not exceed 4 feet and the vertical tailpipe or drain does not exceed 2 1/2 feet.

No water jacketed grease trap or grease interceptor shall be approved or installed. No mechanical grease trap shall be allowed.

Each grease trap shall have an approved water seal of not less than 2 inches in depth or the diameter of its outlet whichever is greater.

8.04 Sand/Oil Interceptors

Every private or public wash rack used for cleaning vehicles, machinery or machine parts or facilities used for vehicle maintenance shall drain or discharge into a sand/oil interceptor of an approved design for this use.

The minimum internal dimensions of the interceptor shall be approximately 24 inches wide by 72 inches long with 57 inches between the tank bottom and the bottom opening of the 90-degree bend at the outlet for a 490-gallon minimum liquid capacity (see Standard Drawings, Sand/Oil Interceptor, Figure 25, page 187).

The inlet and outlet sewer piping shall conform to District specifications. The sewer outlet pipe shall have a downward pointing 90-degree bend inside the tank. The bottom entrance to the 90-degree bend shall extend 6 inches below the invert of the outlet pipe. The top of the sewer inlet and outlet pipes shall be at least 30 inches below the pavement surface where they enter and exit the tank.

The tank shall have a minimum of one self sealing access port and shall be maintained in a leak tight condition so there is no entry of surface storm water. There shall also be no leakage of groundwater into the tank, and waste flow shall not be allowed to flow into the surrounding ground. Grade rings may be used to establish final grade for the access ports and shall be installed using Kent Seal or Ram-Nek and Ram-Nek primer.

When the tank is located in a vehicle traffic area, the access port(s) shall be set at least 1/2 inch below finished grade. Tank covers and access ports located in vehicle traffic areas shall be capable of withstanding an H-20 axle load.
District personnel will periodically schedule inspections of sand/oil interceptors. It shall be the responsibility of the owner or their agent to maintain the sand/oil interceptor in an efficient operating condition by periodic removal and proper disposal of the accumulated sand and oil. No such collected sand and oil shall be introduced into any drainage piping or public or private sanitary sewer facility.

The owner or their agent shall post and maintain a sand/oil interceptor cleaning and maintenance log on the premises and shall have the log available for review by District personnel at all times.

All trapped materials removed from the interceptor, including filters and filter media, shall be disposed of in accordance with current existing environmental codes and regulations. It is the responsibility of the owner or their agent to determine the governing agency and comply with the code requirements.

Sand/oil Interceptors shall be tested in the same manner as manholes. The test shall be witnessed by a District Inspector.

Abandoned sand/oil interceptors shall be emptied and filled in the same manner as required for abandoned septic tanks as described in Section 1119, Uniform Plumbing Code.

Vehicle Wash Installations: All vehicle wash installations shall be equipped with an appropriate sand/oil interceptor. Potable water piping to the wash installation shall be metered to verify water consumption. No other facility other than the wash installation shall be fed potable water through the meter.

Vehicle wash installations shall utilize a recycle system. The clarification, filtration and recycle system shall be designed by the owner or their agent and approved by the District. When a recycle system is used, there shall be a closed shutoff valve in the sewer outlet pipeline external to the interceptor tank. It shall have the necessary access and protection.

It shall be the responsibility of the owner or their agent to maintain the system for proper operation. The District shall be notified at least 72 hours in advance of any emptying and/or flushing of the system into the sanitary sewer.

The design automated full service vehicle wash installations must be approved by the District on an individual basis.

Vehicle Maintenance Facilities: Each vehicle maintenance facility shall have a sand/oil interceptor that meets the minimum tank requirements described above.

8.05 Time of Compliance

All commercial establishments serving food, commercial food manufacturing facilities, and commercial facilities described in Commercial Food Establishments, Section 8.01, page 41, and all private or public wash facilities used for cleaning vehicles, machinery or machine parts, or facilities used for vehicle maintenance as described in Sand/Oil Interceptors, Section 8.04, page 44, shall be required to install a grease interceptor/trap, or a sand/oil interceptor within the 60 day period after the first occurrence of any of the following events:

- transfer of ownership or interest in the parcel, the facility, or the business;
- the issuance by the County/District of any building permit for the construction, reconstruction or related work to be performed on the premises costing more than $5,000;
- the backup or discharge of wastewater on or from the premises due to grease, oil, or sand build up in their building plumbing or building lateral;
- or 90 days after receiving written notice from the General Manager of the necessity for installation of such facilities.

9. INSPECTION

9.01 Pre-Inspection Requirements

All work completed under the provisions of the District Code shall be subject to inspection by and shall meet the approval of the General Manager. Approval by the General Manager shall not relieve the owner or their agent or any other person from complying with any other applicable law or ordinance.

Residential: All applicable fees and deposits must be paid and a Sewer Permit and Will Serve Letter must be issued prior to scheduling and receiving an inspection by District personnel. District personnel shall inspect all sanitary sewer facilities installation for compliance with all requirements of the District Code.

Commercial: All applicable fees and deposits must be paid and District Plan Check Review must be completed before scheduling and receiving inspections by District personnel. District personnel shall inspect all sanitary sewer facilities installation for compliance with all requirements of the District Code.

9.02 Request for Inspection of Sanitary Sewer Facilities

The owner or their agent shall notify the District at least two business days (48 hours) prior to the time any inspection is to be made, unless a full time inspector representing the District is assigned to the project.

9.03 Conditions Required at Time of Inspection

At the time of the inspection, the owner or their agent shall have all work uncovered and convenient to facilitate the inspection. The owner or their agent shall provide and make available, to the inspector, any necessary special equipment and/or facilities to accomplish a thorough and complete inspection of the work. No inspections of sanitary sewer facilities will be made if the inspector's view of the facilities is blocked or obscured. The owner or their agent shall, at their sole cost, remove all materials, equipment, backfill and other objects, at the direction of the inspector, so as to facilitate the inspection.

9.04 Correction of Defective Work

If the construction/installation of sanitary sewer facilities does not conform to the provisions of the District Code, the District shall issue a Notice of Sewer Inspection, in writing, to notify the owner or their agent concerning the defective construction/installation. The owner or their agent shall correct the defective construction/installation before subsequent inspection by the District. If the owner or their agent fails to comply and correct the items listed on the Notice of Sewer Inspection, the Sewer Permit may be suspended and/or revoked in accordance with the provisions of the District Code.

9.05 Facilities Not to Be Used Prior to Final Inspection

No sanitary sewer facility constructed under the provisions of the District Code shall be placed in use until the work has been approved by the District and a Certificate of Final Inspection has been issued. Deviations from this requirement may be made only when the work is substantially complete and has been inspected and found to be in conformance with the provisions of the District Code. The General Manager shall make a determination in writing that the best interest of the public will be served by permitting such use prior to the completion of the total work under consideration.

10. MAINTENANCE OF EXISTING FACILITIES

10.01 Maintenance and Testing of Private Sanitary Sewer Facilities

The owner or their agent of a property served by the District's sanitary sewer system shall be responsible for the operation and maintenance of the private sanitary sewer facilities, including all devices or safeguards required by this section, which are located upon said property. The owner or their agent's operation and maintenance responsibility is from the building to the connection at the sanitary sewer easement or property line.

The owner or their agent shall, at their own risk and expense, install, keep and maintain in good repair all ***sanitary sewer facilities*** (sanitary sewer pipelines, force mains, manholes, equipment, pump stations, and related appurtenances) situated on the premises so served. The District shall not be responsible for any loss or damage caused by improper or defective installation of sanitary sewer facilities, whether inspected and/or approved by the District. All such installations of sanitary sewer facilities shall conform with all federal, state, county, District and local laws, rules, regulations and ordinances.

The owner or their agent served by the District's sanitary sewer system shall be responsible and liable for all costs involved in the repair of all damages caused by the owner, customer, or agents thereof, to the District's sanitary sewer facilities, including but not limited to sewer obstructions, wherever located.

All sanitary sewer facilities found in need of repair as a result of testing procedures required by this chapter shall be repaired and/or installed to the standards set forth in the District Code.

10.02 Conditions Requiring Testing of Existing Sanitary Sewer Facilities

It shall be unlawful for any owner of a house, building, or property connected to the District's sanitary sewer system to maintain private sanitary sewer facilities in a condition such that the tests contained herein cannot be successfully accomplished.

All private sanitary sewer facilities, including those serving residential, multiple residential, commercial, and industrial connected to the District's sanitary sewer system shall be tested when any of the following conditions occur:

(a) remodeling of the house, building or property served to an extent of more than 50 percent, as determined by Placer County assessed valuation or,

(b) installation of additional plumbing fixtures in the house, building or property served, or,

(c) change of use of the house, building or property serviced from residential to business or commercial, or from non restaurant commercial to restaurant commercial or,

(d) repair or replacement of all or part of the building lateral(s) or,

(e) the addition of living quarters, such as guest cabins on the property served or conversion of garages into living quarters with plumbing fixtures or,

(f) prior to the close of escrow upon a sale of the house, building or property served, or,

(g) the transfer of ownership or interest in the parcel, the facility, or the business. (A transfer of ownership between immediate family members, shall not require testing if it has been tested and passed in the prior 5 years) or,

(h) change of ownership (multiple owners) on the deed selling their portion to other partners/investors or,

(i) an inspection by the District indicates reasonable cause or,

(j) upon a determination of the General Manager that testing or sanitary sewer facility replacement is required for the protection of the public health, safety and welfare.

10.03 Testing Procedures for Existing Sanitary Sewer Facilities

The owner or their agent of a house, building, or property connected to the District's sanitary sewer system shall conduct all sanitary sewer facility upgrades and testing required at their sole expense and shall notify the District 48 hours prior to testing. Testing shall be witnessed by a District Inspector.

Sanitary Sewer Pipelines: All building laterals, joint laterals, and privately owned main pipelines shall be tested by either an air or water method, at the discretion of the District.

In the case of building and joint laterals, the test section shall be from the building cleanout to the District service connection point. The test section includes all private pipelines, including joint laterals, which provide sanitary sewer service to the parcel in question.

Privately owned main pipelines shall be tested their full length.

Testing shall be in accordance with one of the following (Note: test failures of non-metallic asphaltic composite pipe shall require entire replacement of the defective pipeline. Installation and testing of the new pipeline shall be in accordance with Section 7, Installation of Sanitary Sewer Facilities, page 27):

- Air test consisting of plugging each end of the pipeline and applying a pressure of 3.5 pounds per square inch to the section being tested. The pipeline shall be allowed a maximum loss in pressure of 1/2 pound per square inch in 5 minutes. If the loss exceeds 1/2 pound per square inch, the test may be attempted one additional time. A second loss of pressure constitutes a failure of the pipeline, whereupon the pipeline shall be replaced, as needed, and re-tested in accordance with this section.

- Water test consisting of plugging the downstream end of a pipeline, placing a section(s) of pipe in the vertical branch of the building cleanout and filling the test section with water. Additional cleanouts may have to be installed in steep pipelines and the pipeline tested in sections. In no case shall the total depth of water exceed 15 feet to any point in the pipeline. The pipeline shall be allowed a maximum loss of water level of 1 inch in 5 minutes for a 4-inch or 6-inch pipeline per 100 feet in length. If the loss exceeds the allowable, the pipeline may be re-tested one additional time. A second loss exceeding the allowable constitutes a failure of the pipeline, whereupon the pipeline shall be replaced, as needed, and tested in accordance with this section.

If a cleanout has not been installed at the easement/property line, a cleanout shall be installed prior to testing. If there is no cleanout located outside the building foundation (within five feet of the foundation wall), then a cleanout shall be installed. If the building lateral exits the foundation under an existing deck or concrete patio, the location of the building cleanout near the foundation may be modified on a case-by-case basis as determined by the General Manager. The Cleanouts shall be installed and boxed as specified in Installation of Cleanouts, Section 7.09, page 31. The owner or their agent shall be responsible for such installation. A cleanout underneath the house is not acceptable.

Manholes, Grease Interceptors, Sand/Oil Interceptors: Testing shall be in accordance with one of the following:

- Water test by plugging all inlet and outlet pipes and filling the test section with water to the top of the frame rim. The water should be introduced into the test section at least 4 hours in advance of the official test period to allow the concrete and joint material to become saturated. The test section shall then be refilled to the original water level.

  At the beginning of the test, the elevation of the water in the test section shall be carefully measured from a point on the frame rim. After a period of 4 hours, the water elevation shall be measured from the same point on the frame rim and the loss of water during the test period calculated. If this calculation is difficult, enough water shall be measured into the test section to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage.

  The allowable leakage shall not exceed 0.13 gallons per hour. Manholes, Grease Interceptors, and Sand/Oil Interceptors showing leakage in excess of that allowed shall be repaired or reconstructed as necessary to reduce the leakage to that specified. All failures shall be re-tested after the necessary repairs have been completed.

- Vacuum test by using acceptable equipment approved by the District. Vacuum test equipment shall be used per the manufacturer's specifications. A vacuum of 10-inches mercury should be drawn on the manhole. The time, in seconds, for the vacuum to drop to 9-inches mercury shall be measured and shall not be less than the times listed below for various manholes and interceptors.

Time (seconds)	**Manhole Diameter** (inches)	**Interceptor Size** (gallons)
60	48	
75	60	
90	72	
80		500 to 999
120		1,000 to1,499
150		1,500 to1,999
180		2,000 to 2,499

Note: Grease interceptors and sand/oil interceptors shall be completely drained and cleaned before initiation of the water or vacuum test.

Pump Systems Testing: The gravity portion of the pipeline from the building to the holding tank shall be tested in accordance with Section 10.03, Testing Procedures for Existing Sanitary Sewer Facilities, Sanitary Sewer Pipelines, page 50.

A visual inspection shall be performed to check for:

- proper venting of the holding tank.
- acceptable weather proof, insulated box with an insulated lid directly above the holding tank.
- a weather tight seal on the holding tank lid and at all pipe or conduit penetrations.
- a properly functioning check valve on the discharge pipeline.

In the event that there is no check valve and/or pressure test port installed on the existing discharge pipeline, a check valve and a valved 1/4-inch pressure test port shall be installed in accordance with Section 7.13, Residential Pump Systems, page 33.

A pressure gage shall be connected to the test port and the pressure test port valve shall be opened. The pump shall be started and the holding tank pumped down to allow a visual inspection of the holding tank to check it for leaks. The check valve shall also be inspected for proper operation.

Immediately after the holding tank is pumped down and the pump turned off, the gage pressure shall be noted in the discharge pipeline. The pressure shall remain constant for 10 minutes. Any drop in pressure shall constitute a test failure and the check valve and/or the discharge pipeline shall be repaired and/or replaced.

After the check valve and/or the discharge pipeline is repaired and/or replaced, another test shall be attempted. A subsequent loss of pressure constitutes a failure of the check valve and/or discharge pipeline, whereupon the defective check valve and/or discharge pipeline section shall be replaced and tested as described above.

The alarm system, if so equipped, shall be checked for proper function of audio and visual alarms.

In the event that the holding tank or the force main needs replacement the pump and controls must be updated to meet District Code. In the event that the controls need replacement an alarm system must be installed as specified in Residential Pump Systems, Section 7.13, page 33.

Septic tanks and concrete vaults converted for use as holding tanks shall be air, water, or vacuum tested. The test shall be the same as specified for sanitary sewer pipelines, manholes, and grease and sand/oil interceptors. If the converted septic tank/concrete vault fails the test, it shall be abandoned and a new holding tank meeting the requirements for residential pump systems shall be installed in its place.

10.04 Time Limits for Completion of Testing Procedures

Testing shall be completed in a timely manner as follows:

- Prior to the close of escrow upon the sale of the residence, building, or property, or
- Within 30 days of standard notification by the District, or
- Immediately if the General Manager determines that testing and repair are necessary to protect public health and the integrity of the sanitary sewer system.

In the event that testing would be required during the period from November 1to April 15 or, during such other periods when such work would be impractical due to weather conditions; The General Manager may defer such requirement upon posting of a performance bond with the District in an amount equal to 125 percent of the General Manager's estimate of the cost of replacing the sanitary sewer facility.

In place of a performance bond, the owner may escrow funds in an amount equal to 125 percent of the General Manager's estimate, if the property or business is being sold or transferred. Funds held in escrow will not be released without written notification by the District to the Title company holding such funds. In such case, the testing must be performed by the following June 15.

If a sanitary sewer facility fails any of the above described tests, the owner or their agent shall cause corrective work and re-testing to be performed within 30 days from the date of the original test. The District shall approve all repairs. Repairs or replacement of 50 percent or more of a sanitary sewer pipeline or force main shall be cause for total pipeline replacement meeting current District standards.

After a second failure of any sanitary sewer facility, the owner shall be charged an additional inspection fee for further inspections.

In the event that a sanitary sewer facility has not been tested within the required time period, the District shall initiate procedures for sewer disconnection.

10.05 Waiver of Testing Requirements

The General Manager shall have the power to waive testing requirements if:

(a) the sanitary sewer facility has been installed and tested within a prior 5 year period for new construction, or tested within a prior 5 year period and there is good reason to believe that such testing is not necessary.

(b) the sanitary sewer pipeline or force main is of such a length that testing is not practical.

(c) the sanitary sewer facilities are part of a central private sanitary sewer system as described in Shared Use Facilities, Section 10.06, page 54, and the District has an established written agreement concerning specific testing requirements.

Nothing herein shall constitute a warranty by the District of the soundness or ability of the sanitary sewer facility to accomplish its purpose or remain in compliance with the District Code.

10.06 Shared Use Facilities/Shared ownership-residential

The District may choose to allow the owner or their agent of a ***Shared-Use Facility*/Shared ownership – residential** (common interest subdivisions, commercial shopping centers, mini malls, apartment complexes, condominium complexes, schools, office buildings, and hospitals, etc.) one of the following option agreements for the maintenance and testing of sanitary sewer facilities. Any agreement must be in writing and acceptable to the District and the owner or their agent of the Shared-Use Facility.

Option No. 1: The owner or their agent of the Shared-Use Facility/Shared ownership agrees to complete required testing, repair or replacement of ***all*** the sanitary sewer facilities servicing the Shared-Use Facility/Shared ownership upon notification by the District that testing is required. Under this option, sales, leases, or changes in tenant/ownership of individual units or suites are allowed to proceed prior to testing and without approval from the District.

After 5 years from the latest test date, ***all*** the sanitary sewer facilities servicing the Shared-Use Facility/Shared ownership shall be re-tested when any of the conditions outlined in Section 10.02, page 49 occur, ***or*** Option No. 2 may be chosen and applied.

Option No. 2: The owner or their agent of the Shared-Use Facility/Shared Ownership agrees to complete required testing, repair or replacement of ***all*** the sanitary sewer facilities servicing the Shared-Use Facility upon notification by the District that testing is required, and will complete said testing over a 5 year period of time. The owner(s) or their agent of the Shared-Use Facility/Shared ownership shall be required to test a minimum of 20 percent of the total number of sanitary sewer facilities per year, beginning at the time of initial notification by the District that such testing is required. Under this option, sales, leases, or changes in tenant/ownership of individual units or suites are allowed to proceed without approval from the District *if the conditions of the agreement have been fully honored by the owner or their agent of the Shared-Use Facility*.

After 3 years from the latest test date associated with the 5 year testing period, 20 percent of the total number of sanitary sewer facilities servicing the Shared-Use Facility shall be retested when any of the conditions outlined in Section 10.02, page 49 occur, ***or*** Option No. 1 may be chosen and applied.

Testing or sanitary sewer facility replacement may be required at any time upon a determination of the General Manager for the protection of the public health, safety and welfare.

10.07 Cleaning Manholes

When septic tank contents are dumped into a specified manhole under permission from the General Manager, it shall be discharged through a pipe or hose in such a manner that none of the contents shall be left adhering to the sides or shelf of the manhole.

11. PROHIBITED USES OF SEWER

11.01 Discharge Permit Required

No person shall discharge, or cause to be discharged, any industrial waste into the District sanitary sewer system without having obtained an Industrial Waste Permit from T-TSA. Such permit is required in addition to any other permits that may be required by the District Code, County Code, State Statute or other Ordinance, rule or regulation applicable to the industrial discharge.

11.02 General

It shall be unlawful for any person to do any of the following:

(a) To place, throw, or deposit, or cause or permit to be placed, thrown, or deposited in any public sewer or District sewer main pipeline any dead animal, offal, or any other solid matters, or materials or obstructions of any kind whatever of such nature as may clog or obstruct such sewer, or which may interfere with or prevent the effective use, operation, maintenance or repair of the sewer.

(b) To deposit or discharge, or cause or permit to be deposited or discharged, into any public sewer or District sewer main pipeline any water or wastewater or liquid waste of any kind containing chemicals, greases, oils, tars, or other matters in solution or suspension, in concentrations greater than 100 parts per million, by weight, which may clog or obstruct the sewer, or which may in any way damage or interfere with or prevent the effective use, operation, maintenance or repair of the sewer, or which may necessitate or require frequent repair, maintenance or flushing of such sewer to render it operable, or which may obstruct or cause an unwarranted increase in the cost of treatment of the wastewater.

(c) To discharge, or cause discharge or permit to be discharged to the sanitary sewer system any storm water, surface water, ground water, roof runoff, surface drainage, subsurface drainage, cooling water or waters of similar quality into any public sewer.

(d) To discharge any gasoline, benzene, oil or other flammable or explosive liquid or substance into any public sewer.

(e) To discharge, or cause or permit to be discharged, any toxic or other pollutants in amounts or concentrations that (1) endanger public safety; (2) adversely impact the physical integrity of the T-TSA treatment works; (3) cause a violation of effluent to water quality limitations imposed by the Lahontan Regional Water Quality Control Board or other public entity; or (4) preclude the selection of the most cost effective alternative for waste water treatment and sludge disposal.

(f) To connect sanitary sewer pipelines or laterals from any septic tank or cesspool to the District's sanitary sewer system.

(g) To discharge uncontaminated water into a public sanitary sewer except by written permission from the District.

11.03 Garbage

Garbage resulting from the preparation of food may be discharged into the public sewer provided the materials are ground to a size sufficient to pass through a 3/8-inch screen. The garbage grinding operation shall utilize a balanced water supply and cutting heads combination such that the operation will produce approximately 500 milligrams per liter settleable materials. The General Manager shall have sole authority to regulate the permittee's water supply and fineness gradation based on the special conditions at the site.

11.04 Temperature of Effluent

A person shall not discharge into the public sewer effluent to a temperature exceeding 140 degrees Fahrenheit.

11.05 Control of pH

Before any person shall discharge acids or alkalies into the public sewer, he shall control the pH to the extent the District finds adequate.

11.06 Toxic Substances

Any and all toxic chemical substances shall be subject to the industrial waste discharge permit requirement of the Tahoe Truckee Sanitation Agency. Additionally, all toxic and chemical waste substances shall be retained on site by the permittee until they have been pre treated sufficiently to meet the discharge standards specified in the applicable Permit for the premise. The discharge of any toxic chemical substance into sanitary sewer facilities will result in the declaration of a violation and the prosecution thereof in accordance with the District Code.

11.07 Removal of or Damage to Sewer

An unauthorized person shall not remove or cause to be removed, or damage or cause to be damaged, any portion of any public sewer, District sanitary sewer facility, or any appurtenances thereto.

11.08 Unauthorized Opening of District Sanitary Sewer Facilities

An unauthorized person shall not open or enter, or cause to be opened or entered, for any purpose whatsoever, any District sanitary sewer facility. The opening of any public sewer facility may lead to a penalty. This specifically includes all manholes and vaults used as access points by District personnel. Individuals may schedule a District employee to assist them if there is a need to have a facility opened.

12. ENFORCEMENT

12.01 Violations

The permittee shall be held solely responsible for all costs that the District may incur during the investigation, correction and/or prosecution of any and all violations to the District Code. Any and all such costs shall be reviewed by the Board of Directors and, if found appropriate, the Board of Directors may institute collection procedures in accordance with the District Code.

12.02 Authority of District

The charges, fees, levees and assessed monetary levees pursuant to the District Code shall be collected by the District and/or Placer County. The District shall make and enforce the regulations as necessary to ensure the public health, safety, and welfare. The District shall also ensure the economical and efficient management and protection of the District's sanitary sewer system and such regulating, collections, rebating and refunding of such charges and fees, levees and assessments as deemed appropriate by the Board of Directors.

In the event of a violation of any of the laws of the State of California, Placer County, or the ordinances of the District or, rules and regulations so established referring to the discharge of wastewater, the District shall notify the person or persons causing, allowing, or committing such violation and upon the failure of such person or persons to cease or prevent further violation within 5 days after the receipt of such notice, the District shall have authority to disconnect the property from the District sanitary sewer system.

12.03 Public Nuisance

Continued habitation of any building or continued operation of any commercial or industrial facility in violation of the provisions of the District Code or any other ordinance, rule or regulation of this District is hereby declared to be a public nuisance. The District may cause proceedings to be brought for the abatement of the occupancy of the building or industrial facility during the period of such violation.

12.04 Public Nuisance, Abatement

During any period of disconnection, habitation of such disconnected premises by human beings shall constitute a public nuisance, whereupon the District may cause or petition legal proceeding to be brought for the abatement of the occupancy of said premises by human beings during the period of such disconnection. In such events, and as a condition of re-connection, the applicant for re-connection shall pay to the District all costs incurred by the District associated with the disconnection and the legal proceedings. Such costs shall include but not be limited to reasonable attorney's fees and the costs of suit(s) arising out of any such action.

12.05 Discontinuance of Service

Service may be discontinued for any one of the following reasons:

(a) Delinquency in the payment of any bill, except that service shall not be discontinued for nonpayment in any of the following situations:

1. During the pendency of any investigation by the District of a customer dispute or complaint.

2. When a customer has been granted an extension of the period for payment of a bill.

3. On the certification of a licensed physician or surgeon that to do so will be life threatening to the customer.

4. If the customer is financially unable to pay for service within the normal payment period, yet is willing to enter into an amortization agreement with the District and requests permission to amortize, over a period not to exceed 12 months, the unpaid balance of any bill asserted to be beyond the means of the customer to pay within the normal payment period.

(b) Any violation by the customer of any rules and regulations of the District governing sewer service.

(c) Unsafe Apparatus or Damaging Conditions. If an unsafe or hazardous condition is found to exist on the customer's premises, or if the customer's use of sewer service is found to be detrimental or damaging to the District or its other customers, the District may discontinue sewer service without notice, provided that the District shall notify the customer immediately of the reasons for the discontinuance and the corrective actions to be taken by the customer before service can be restored. If the District determines that the need for the discontinuance stems from the customer's failure to adequately maintain the customers' building lateral or the customer's improper use of the building lateral or is otherwise caused by the customer's actions/inactions, then the customer will be liable for the District's cost of discontinuance and re-connection, if any, as well as any corrective actions required by the District.

12.06 Notice and Hearing Prior to Discontinuance of Service for Non Payment

At least 10 days before any proposed discontinuance of service for nonpayment of a delinquent account, the District shall mail a notice, postage prepaid to the customer to whom the service is billed of the proposed discontinuance. Such notice shall be given not earlier than 19 days from the date of mailing the District's bill for such service and the 10 day period shall not commence until 5 days after the mailing of the notice. In addition to the 10 day notice provided for in the preceding sentence, the District shall make a reasonable, good faith effort to contact an adult person residing at the premises of the customer by telephone or in person at least 48 hours prior to any discontinuance of such service.

Every notice of discontinuance of service required by this section, shall include all of the following information:

- The name and address of the customer whose account is delinquent.
- The amount of the delinquency.
- The date by which payment or arrangements for payment is required in order to avoid discontinuance.
- The procedure by which the customer may initiate a complaint or request an investigation concerning service or charges, unless the District's bill for services contains a description of that procedure.
- The procedure by which the customer may request amortization of the unpaid charges.
- The procedure for the customer to obtain information on the availability of financial assistance including private, local, state or federal sources, if applicable.
- The telephone number and name of a representative of the District who can provide additional information or institute arrangements for payment.

12.07 Notice and Hearing Prior to Discontinuance other than a Discontinuance of Service for Non-Payment

At least 10 days before discontinuing service, other than the discontinuance of service for nonpayment of a delinquent account which is provided for in Notice and Hearing Prior to Discontinuance of Service for Non-Payment, Section 12.06, page 63, the District shall provide the customer with a written notice which shall specify the reason for the proposed discontinuance and inform the customer of the procedure for and the availability of the opportunity to discuss the reason for the proposed discontinuance with the General Manager, who is empowered to review disputes and rectify errors and settle controversies pertaining to such proposed discontinuance of service. The name and phone number of the General Manager, shall be included in any such notice of proposed discontinuance given to a customer.

12.08 Discontinuance of Service on Weekends, Holidays or after Hours

No sewer service shall be discontinued to any customer or user because of any delinquency in payment on any Saturday, Sunday, legal holiday, or at any time during which the business offices of the District are not open to the public.

12.09 Amortization of Delinquent Bill for Service

Every complaint or request for investigation by a customer that is made within 5 days of receiving the disputed bill, and every request by a customer that is made within 13 days of the mailing of the notice required by Discontinuance of Service, Section 12.05, page 62, for an extension of the payment period of a bill asserted to be beyond the means of the customer to pay in full during the normal period for payment shall be reviewed by the General Manager. The review shall include consideration of whether the customer shall be permitted to amortize the unpaid balance of the account over a reasonable period of time, not to exceed 12 months. Any customer whose complaint or request for an investigation has resulted in an adverse determination by the General Manager, may appeal the determination to the Board of Directors.

12.10 Authority to Settle Controversies Relating to Discontinuance and to Permit Amortization of Delinquent Bills

The General Manager, is hereby authorized to investigate complaints and review disputes pertaining to any matters for which service may be discontinued and to rectify errors and settle controversies pertaining to such matters. The General Manager, is also authorized, upon a proper showing by a customer of the customer's inability to pay a delinquent bill during the normal period, to grant permission to amortize the unpaid balance over a reasonable period of time, not to exceed 12 months. At the discretion of the General Manager, controversies may be brought to the Board of Directors for settlement prior to the discontinuance of any such service.

12.11 Notice Required Prior to Discontinuance of Service for Failure to Comply with Amortization Agreement

If an amortization agreement is authorized, no discontinuance of service shall be affected for any customer complying with such agreement, if the customer also keeps the account current as charges accrue in each subsequent billing period. If a customer fails to comply with an amortization agreement, the District shall not discontinue service without giving notice to the customer at least 48 hours prior to discontinuance of the conditions the customer is required to meet to avoid discontinuance, but the notice does not entitle the customer to further investigation by the District.

12.12 Enforcement of Provisions

The provisions of the District Code, and a violation or failure to comply with any provision of the District Code, may be enforced, prosecuted and/or corrected pursuant to Health and Safety Code Sections 6523, 6523.2 and 6523.3, the penalty provisions of the District ordinance that adopted this code by reference, and/or other applicable provisions of law.

12.13 Means of Enforcement Only

The District hereby declares that the foregoing procedures are established as a means of enforcement of the terms and conditions of its ordinances, rules and regulations, and not as a penalty.

12.14 Cumulative Remedies

All remedies set forth herein for the collection and enforcement of charges, rates, and penalties are cumulative and may be pursued alternatively or consecutively.

12.15 Appeals Procedure

Any person aggrieved by a ruling under or interpretation of the provisions of the District Code may submit a written appeal to the General Manager of the District 30 days of the date that the applicant is advised by the member entity or by the Agency of any action. The appeal shall set forth the events and circumstances leading to the appeal, the nature of the ruling or interpretation from which relief is sought, the nature of the impact of the ruling on appellants' property or business, together with any other reason for the appeal.

Should the aggrieved person not be satisfied with the determination of the General Manager, he/she shall ask to appeal the decision of the General Manager to the Board of Directors within 30 days of the date that the General Manager's determination is made. The General Manager shall then submit such appeal together with his/her recommendations to the Board of Directors at the next regularly scheduled meeting, which shall forthwith study the matter, hear testimony and reasons for such appeal, and prepare a written decision summarizing the findings and ruling of the Board which shall be sent to the appellant within 30 days following that meeting.

After a decision is reached by the Board of Directors which results in the granting, denying, or revocation of a permit, the appellant must bring any legal action against the District within the time limits set forth in Section 1094.6 of the Code of Civil Procedure which provisions are applicable to the District.

12.16 Re-connection to the District's Sanitary Sewer System

After disconnection of sanitary sewer service to any premises for any cause, the re-connection of such premises shall be subject to all provisions of the District Code and/or Ordinances applicable thereto.

12.17 District Code Authority

To the extent that the terms and provisions of this ordinance may be inconsistent or in conflict with the terms or conditions of any prior District ordinances, resolutions, rules or regulations governing the same subject, the terms of this ordinance shall prevail with respect to the subject matter thereof, and such inconsistent and conflicting provisions of prior ordinances, resolutions, rules or regulations are hereby repealed.

If any provision of this ordinance or applications thereof to any person or circumstances is held invalid, no other provision of this ordinance shall be affected thereby.

APPENDIX A-1
INSPECTION CHARGES AND SPECIAL FEES FOR SEWER SYSTEM

PAYMENT FOR INFRASTRUCTURE INSTALLATION

Payment of $250.00 shall be made prior to acceptance of improvement plans. All other District incurred costs for plan review, inspections, testing of materials, processing of design revisions, calculation of connection fees, user fees, assessments, related construction activities, automobile mileage, and all overhead and indirect costs will be billed to developer at cost.

Sewer Main Tapping Deposit $500.00
(Only applicable for non-existing services)

Other .... Determined by the General Manager*

INSPECTION CHARGES

Residential (free first time, re-inspection cost)..$50.00
Other .... At Cost

SPECIAL FEES AND CHARGES

Cancellation $25.00
Annexation Fee per acre .... Determined by the General Manager*
Annexation Fee sub-division .... Determined by the General Manager*
Other .... Determined by the General Manager*

* Based in part upon project/plan review and District engineers determination of mitigation for annexation or development's impact on the District.

APPENDIX A-2
NORTHSTAR COMMUNITY SERVICES DISTRICT
SEWER FEE STRUCTURE

TYPE OF CONNECTION	UNIT OF MEASURE	CONNECTION FEE PER UNIT 2011/12	2012/13	2013/14	2014/15	2015/16	FEE TYPE	MONTHLY USER FEE CHARGE PERUNIT OF MEASURE (a) 2011/12	2012/13	2013/14	2014/15	2015/16
Residential	Living Unit	$1,119.24	$1,158.42	$1,198.96	$1,240.93	$1,284.36	OPERATIONS	$55.70	$57.65	$59.67	$61.76	$63.92
							CAPITAL	$3.23	$6.47	$9.70	$12.94	$16.17
							TOTAL	$58.94	$64.12	$69.37	$74.70	$80.09
Hotel (without kitchen)	Living Unit	$301.95	$312.51	$323.45	$334.77	$346.49	OPERATIONS	$32.77	$33.92	$35.11	$36.33	$37.61
							CAPITAL	$1.90	$3.81	$5.71	$7.61	$9.51
							TOTAL	$34.67	$37.72	$40.81	$43.95	$47.12
Hotel (with kitchen)	Living Unit	$389.36	$402.98	$417.09	$431.69	$446.80	OPERATIONS	$40.36	$41.77	$43.23	$44.74	$46.31
							CAPITAL	$2.34	$4.69	$7.03	$9.37	$11.71
							TOTAL	$42.70	$46.45	$50.26	$54.12	$58.02
Campsite (with sewer)	# of Sites	$278.11	$287.85	$297.92	$308.35	$319.14	OPERATIONS	$20.11	$20.82	$21.54	$22.30	$23.08
							CAPITAL	$1.17	$2.34	$3.50	$4.67	$5.84
							TOTAL	$21.28	$23.15	$25.05	$26.97	$28.92
Campsite (without sewer)	# of Sites	$211.14	$218.53	$226.17	$234.09	$242.28	OPERATIONS	$16.85	$17.44	$18.05	$18.68	$19.33
							CAPITAL	$0.98	$1.96	$2.93	$3.91	$4.89
							TOTAL	$17.83	$19.39	$20.98	$22.59	$24.22
Other Businesses, Ski Clubs, Snack Bars, Service Stations, etc.	# of Plumbing Fixture Units	$88.54	$91.64	$94.85	$98.17	$101.60	OPERATIONS	$5.80	$6.00	$6.21	$6.43	$6.65
							CAPITAL	$0.34	$0.67	$1.01	$1.35	$1.68
							TOTAL	$6.13	$6.67	$7.22	$7.77	$8.33
Markets/Grocery	# of Plumbing Fixture Units	$88.54	$91.64	$94.85	$98.17	$101.60	OPERATIONS	$11.80	$12.21	$12.64	$13.08	$13.54
							CAPITAL	$0.68	$1.37	$2.05	$2.74	$3.42
							TOTAL	$12.48	$13.58	$14.69	$15.82	$16.96
Laundries	# of 10 lb machines	$357.57	$370.09	$383.04	$396.45	$410.32	OPERATIONS	$21.74	$22.51	$23.29	$24.11	$24.95
							CAPITAL	$1.26	$2.52	$3.79	$5.05	$6.31
							TOTAL	$23.01	$25.03	$27.08	$29.16	$31.26
	# of 20-50 lb machines	$715.14	$740.17	$766.07	$792.88	$820.63	OPERATIONS	$21.74	$22.51	$23.29	$24.11	$24.95
							CAPITAL	$1.26	$2.52	$3.79	$5.05	$6.31
							TOTAL	$23.01	$25.03	$27.08	$29.16	$31.26
Restaurants & Bars	# of Inside Seats	$85.14	$88.12	$91.20	$94.40	$97.70	OPERATIONS	$4.50	$4.66	$4.82	$4.99	$5.16
							CAPITAL	$0.26	$0.52	$0.78	$1.05	$1.31
							TOTAL	$4.76	$5.18	$5.60	$6.03	$6.47
	# of Outside Seats	$45.41	$46.99	$48.64	$50.34	$52.10	OPERATIONS	$1.80	$1.86	$1.93	$2.00	$2.07
							CAPITAL	$0.10	$0.21	$0.31	$0.42	$0.52
							TOTAL	$1.90	$2.07	$2.24	$2.41	$2.59
	# of Banquet Seats	$26.11	$27.03	$27.97	$28.95	$29.97	OPERATIONS	$1.16	$1.20	$1.25	$1.29	$1.34
							CAPITAL	$0.07	$0.14	$0.20	$0.27	$0.34
							TOTAL	$1.23	$1.34	$1.45	$1.56	$1.67
Theaters/Churches	# of Seats	$15.89	$16.45	$17.02	$17.62	$18.24	OPERATIONS	$0.55	$0.57	$0.59	$0.61	$0.63
							CAPITAL	$0.03	$0.06	$0.10	$0.13	$0.16
							TOTAL	$0.58	$0.64	$0.69	$0.74	$0.79
Car Wash	# of Bays	$1,119.24	$1,158.42	$1,198.96	$1,240.93	$1,284.36	OPERATIONS	$35.28	$36.51	$37.79	$39.12	$40.48
							CAPITAL	$2.05	$4.10	$6.14	$8.19	$10.24
							TOTAL	$37.33	$40.61	$43.94	$47.31	$50.73
Barber Shops	# of Service chairs	$313.30	$324.26	$335.61	$347.36	$359.52	OPERATIONS	$14.81	$15.33	$15.86	$16.42	$16.99
							CAPITAL	$0.86	$1.72	$2.58	$3.44	$4.30
							TOTAL	$15.67	$17.05	$18.44	$19.86	$21.29
Beauty Salons	# of Service chairs	$313.30	$324.26	$335.61	$347.36	$359.52	OPERATIONS	$20.34	$21.05	$21.79	$22.55	$23.34
							CAPITAL	$1.18	$2.36	$3.54	$4.72	$5.90
							TOTAL	$21.52	$23.41	$25.33	$27.27	$29.24
Temporary Discharge	Per 1,000 gallons	(b)	(b)	(b)	(b)	(b)	OPERATIONS	$3.46	$3.58	$3.70	$3.83	$3.97
							CAPITAL	$0.20	$0.40	$0.60	$0.80	$1.00
							TOTAL	$3.66	$3.98	$4.30	$4.63	$4.97
Pools and Spas	Equivalent Dwelling Units (EDU)	$1,119.24	$1,158.42	$1,198.96	$1,240.93	$1,284.36	OPERATIONS	$55.70	$57.65	$59.67	$61.76	$63.92
							CAPITAL	$3.23	$6.47	$9.70	$12.94	$16.17
							TOTAL	$58.94	$64.12	$69.37	$74.70	$80.09
Other Commercial (b)	(b)	(b)	(b)	(b)	(b)	(b)	OPERATIONS	(b)	(b)	(b)	(b)	(b)
							CAPITAL					
							TOTAL					

(a) Connection fees and first year's User Fees shall be due upon the earlier of the District's approval of Building Improvement Plans, initial use of the system, or as otherwise ordered by the Board of Directors of the District. First year's User Fees will be prorated to the end of the fiscal year.

(b) Determined by General Manager

APPENDIX A-3
PLUMBING FIXTURE UNIT EQUIVALENTS

FIXTURE	PRIVATE	PUBLIC
Bathtub (with or without shower)	2	4
Dental Unit or Cuspidor	-	1
Drinking Fountain (each head)	-	1
Kitchen Sink	2	4
Laundry Tub (each pair faucets)	2	4
Clothes washer	2	4
Lavatory	1	2
Shower (each head)	2	4
Sink (Bar)	1	2
Sink or Dishwasher	2	4
Sink (Flushing rim, Clinic)	-	10
Sink (Wash up, each set of faucets)	-	2
Sink (Wash up, circular spray)	-	4
Sink (with garbage disposal)	3	4
Sink (Use by Medical Professional only)	1	-
Urinal	3	5
Toilet	3	5
Floor Drain	1	2
Hot Tub	2	4

APPENDIX A-4
MULTIPLE USE FORMULA TABLE

When restrooms are shared by both restaurant patrons and other business patrons (as they are in some major ski areas, for example), and where restrooms are not located in the restaurant and are not provided solely for the use of restaurant patrons, the following table will be used to determine the number of business fixture units to be applied as a credit toward the actual number of business fixture units for the use of both restaurant and other business patrons.

# of Restaurant Seats	# of Fixture Units
0-50	12
51-100	15
101-200	21
201-300	27
301-400	33
401-500	39
501-600	45
601-700	51
701-800	57
801-900	63
901-1000	69
1001-1100	75

The multiple use policy applies to both connection fees and semi-annual user fee billing. Existing accounts will retain any excess connection fee allocation resulting from the application of the multiple use credit.

In the table above, an eating establishment of each incremental seat count is eligible for the corresponding number of business fixture units to be credited toward the actual number of business fixture units counted. However, the above listed table also represents the minimum business fixture units for a restaurant of each incremental seat count. In the event that a limited number of toilets and lavatories are provided and the application of a multiple use credit leaves fewer business fixture units than the minimum, the multiple use credit is reduced so that the minimum number of business fixture units remain. Example: A restaurant with seating of less than 100 would be eligible for a multiple use credit of 15 business fixture units. If after applying the multiple use credit toward the actual business fixture unit count, the remaining business fixture units fall below 15, then the credit applied would be reduced so that the required number of business fixture units remain.

APPENDIX A-5
MATERIALS FOR CONSTRUCTION OF SANITARY SEWERS

GRAVITY INSTALLATIONS

Type of Pipe	Class of Pipe	Minimum Cover Non-Traffic	Minimum Cover Traffic	Maximum Cover
PVC	SDR 35	36"	48"	12'
PVC	DR 25	36"	48"	16'
PVC	DR 18	36"	36"	16'
PVC	DR 14	36"	36"	-
PVC	CL 200 (C900)	36"	36"	-
DI	CL 51 or greater	36"	36"	-

PRESSURE INSTALLATIONS

Force main pipelines shall be designed and approved on a case by case basis. Considerations shall include; design static and dynamic pressures, pressure cycling, alignments, and any other condition considered unique to the project.

Type of Pipe	Minimum Class of Pipe	Minimum Cover Non-Traffic	Minimum Cover Traffic
PVC	CL 150	30"	36"
DI	CL 51	30"	36"

TRANSITION JOINTS AND FLEXIBLE COUPLINGS

Transition joints between different physical materials shall be Bond Seal, Fernco, Indiana Seal, or other approved flexible coupling.

NOTE: Any other pipe used for construction of sanitary sewer facilities must have written approval from the District.

APPENDIX A-6
DISTRICT STANDARD SPECIFICATIONS

A-6.1 Scope

The District Standard Specifications constitute a compilation of standards for sewer system design, development, repair and construction. The purpose of these standards is to establish quality guidelines for sewer system design and construction within the District. These standards shall apply to all sanitary sewer facilities constructed within the boundaries of the District.

The owner or their agent shall, at all times, keep themselves fully informed of, and shall observe and comply with all applicable Federal and State laws; Placer County, and special district ordinances, resolutions, rules, and regulations which in any manner effect the design construction or operation of the sanitary sewer system and its appurtenances.

All developments/projects are handled on a first come, first serve basis. There are specific administrative requirements for developments and projects that involve the installation of sewer facilities. The District has produced a "Development Guidelines" packet to assist you. The owner or their agent shall be required to submit the necessary application and associated forms to the District to facilitate this procedure. "Development Guidelines" packets may be obtained at the District office.

A-6.2 Design Standards

Design Flow: An average flow of 100 gallons per person per day shall be used for design purposes. District flow data indicates an average occupancy rate of 3.2 persons per residence. In larger sanitary sewer systems, consideration should be given to concentration of peak flows. All sewers shall be designed with sufficient capacity to handle peak flows with pipes running full but without surcharging the pipeline.

Population densities will vary, being controlled largely by the number of residential lots per acre and other land uses. All design population estimates including equivalent population for schools, commercial, and industrial uses, shall be indicated on the set of improvement plans submitted for approval.

Gradient: Sanitary sewer grades shall be designed to provide a minimum velocity of 2 feet per second when flowing full. The following table indicates the slopes, which will provide that velocity, and these shall be used as the standard for design. Minimum acceptable slopes are also shown. These minimum slopes shall be used only when topographic features preclude standard slopes and require written approval from the General Manager for their use.

SLOPE IN FEET/FOOT

Diameter	**2 feet/Second Flow**	**Minimum Acceptable**
4"	0.0208 (1/4" per foot)	0.0208 (1/4" per foot)
6"	0.0050	0.0035
8"	0.0035	0.0025
10"	0.0025	0.0015
12"	0.0020	0.0008
18"	0.0012	0.0006

Whenever a change in the size of the pipe, or an angle of 20 degrees or greater in alignment occurs, the flowline of the pipe flowing into manholes shall be a minimum of 0.17 feet above the flowline of the pipe flowing from the manhole, or an amount necessary to match the inside crowns of the pipe, whichever is greater.

Location and Alignment of Sanitary Sewer Facilities: All sanitary sewer facilities to be dedicated to the District shall be constructed and installed within rights-of-way dedicated for public streets or roads, or within sanitary sewer easements, unless such construction or installation is determined to be impractical by the General Manager.

Whenever it is essential that curved alignment be used for sanitary sewer pipelines, a radius of not less than 200 feet will be used, and shall be greater whenever possible. No sanitary sewer facility, including building laterals, shall be located within 50 feet of a water well. Any sanitary sewer pipeline located between 50 feet and 100 feet of a water well shall be constructed of ductile iron with rubber type ring joints.

Location of Sanitary Sewer Facilities with Respect to Water Pipelines: Sanitary sewer main pipelines running parallel to water mains must maintain at least a 10 foot horizontal separation. Sanitary sewer main pipelines crossing water mains shall maintain at least 1 foot vertical separation and shall meet Uniform Plumbing Code requirements for pipeline types, joint locations, and encasement or sleeving.

The location of building laterals with respect to water service connections running parallel in a common trench shall meet the requirements of the Uniform Plumbing Code, Section 1108 that states in part:

- The bottom of the water pipe, at all points, shall be at least 12 inches above the top of the sewer pipeline, and

- The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a minimum clear horizontal distance of at least 12 inches from the sewer.

The spring line of building lateral crossing water pipes shall be at least 12 inches below the bottom of the water pipe and shall meet Uniform Plumbing Code requirements for pipeline types, joint locations, and encasement or sleeving.

Pipe Cover: The depth of any sanitary sewer main pipeline or lateral shall be adequate to obtain a minimum cover of 30 inches. Any exception to this rule must have prior approval of the General Manager.

Manhole Spacing: Normal maximum spacing for manholes shall be 400 feet. Where the location of two manholes are determined by intersecting lines, the distances between intervening manholes shall be approximately equal. Sewers on curved alignment with a radius of less than 400 feet shall have manholes spaced at a maximum of 300 feet and adjusted down to fit the individual case. Curved alignment shall not be used unless specifically permitted by the General Manager.

The maximum spacing of manholes on outfall sewer pipelines of 12 to 24 inches shall be 500 feet.

End of Line Cleanouts: An end of line cleanout may be used in lieu of a manhole for any stub pipeline with a length of 300 feet or less. Any pipeline more than 300 feet in length shall terminate with a manhole. Sewer pipelines less than 200 feet in length which are installed for future extension shall have an end of line cleanout at the end if there are any building laterals attached to it. Sewer pipelines longer than 200 feet shall terminate in a manhole with a stub for future extension. See Standard Drawings, End of Line Cleanout Assembly, Figure 5, page 147.

Sanitary Sewer Service Connections: In all new subdivision work, the sewer service lateral from the sewer main pipeline to the property line shall be installed at the time the sewer main pipeline is constructed.

Whenever a sewer main pipeline is installed which will serve existing houses or other buildings, a sanitary sewer service connection shall be constructed for each such existing house or building. Each sanitary sewer service connection shall be referenced to the plan stationing.

A plan and profile of any sanitary sewer service connection, other than for a single family or two family dwelling, shall be submitted in accordance with the District Code.

Sanitary sewer service laterals may be connected to outfall sewer pipelines at manhole locations only, and only when the depth of the outfall sewer pipeline does not exceed 12 feet from finished grade.

Wastewater Lift Stations and Force Mains: Whenever the design of a sanitary sewer system includes the necessity of a wastewater lift station and a force main, the following data shall be submitted for tentative approval prior to construction:

Pumps

- The design flows computations for the pumping system that includes either the pumps or ejectors, and the force main.

- The types, size, and model of pump to be used. Pumps shall be similar in design and manufacture to existing District equipment if possible. Pump curves shall be supplied with all design parameters and system curves marked.

Site

- A plot plan showing the dimensions of the site and its location with respect to homes or other structures. Minimum distance from a lift station to any residence shall be 50 feet except with advance approval of the General Manager for each specific case.

- Section and plan views of the wet well and all other structures to be constructed.

Electrical and Telemetry

- The design computations for electrical loads for pumps and all other equipment.

- Control equipment electrical diagrams. Control equipment shall be equal to design and manufacture of currently used control equipment in the District if possible.

- Telemetry electrical diagrams. Telemetry equipment shall be equal to design and manufacture of currently used telemetry equipment. All telemetry equipment shall be compatible with the District's most current telemetry system whether that system is in use or being implemented.

- Electrical standby system design. Electrical system shall incorporate a standby power system consisting of a safety switch and generator plug combination. Larger stations shall also include a generator and transfer switch combination depending on pumping station size, design flow, and type. Designation shall be by the General Manager

Force Main

- The size and type of pipe to be used.

- The size and type of fittings to be used.

- The tentative alignment of pipe and locations of bypass ports if required. Bypass ports shall incorporate valve and fitting types that match current District bypass port design and usage (see Standard Drawings, Bypass Port (Single), Figure 22, page 181, and Bypass Port (Double), Figure 23, page 183).

- A single bypass port shall be located at the pump station. Additional double bypass ports shall be located at accessible locations with a maximum distance between ports of 1,500 feet.

The force main shall be marked with tracer wire. Tracer wire shall consist of 10 AWG minimum with THW, THHW, TW, THWN, or other approved wet location insulation. Wire shall be attached to the top of the force main with tape at maximum 5 foot intervals. Wire shall be continuous between vaults and other access points where excess wire shall be spooled to provide connection points. Splices shall incorporate approved underground splice kits. Each run of tracer wire shall be tested for continuity following backfill.

Mobile Home and Recreational Vehicle Parks: Whenever the design of a sanitary sewer system involves mobile home and/or recreational vehicle parks, additional requirements to those in the Uniform Plumbing Code, may be necessary due to the environment (see Standard Drawings, Utility Pad Installation, Figure 11, page 159).

A-6.3 Criteria for Improvement Plans

Format of Improvement Plans: Improvement plans for sanitary sewer improvements shall be prepared on standard FAS sheets (24 x 36 inches). Scales are to be as follows except in unusually rough terrain where the scales may be variable. Horizontal 1 inch = 100 feet or 1 inch = 40 feet, Vertical 1 inch = 10 feet or 1 inch = 5 feet.

On subdivision or improvement plans exceeding three sheets in the set, a title sheet shall be prepared showing the entire subdivision or project, Assessment District, Streets Names, Section and/or grant lines and corners; and the location within the County. The owner or their agent shall provide a list of symbols and abbreviations either on the title sheet or in the specifications.

The title sheet also shall include the Engineer's name, and license number and signature; the date and scale of the drawing; and the blocks for the necessary approval of the General Manager and other officials.

Each set of improvement plans submitted to this office shall have a suitable index map showing the overall area to be developed and the sheet index referring to the construction improvement plans.

Each sheet within the set of drawings shall have an approved title block showing the sheet title, number, date, scale and the Engineer's name and license number; and the name of the Subdivision or Assessment District.

Approval blocks shall appear on the title sheet and all detail sheets that have details to be approved by the District. There shall be one block for "Approved" to be signed by the General Manager. The block shall have space to be dated.

Example:

These improvement plans have been reviewed and approved for construction of the sanitary sewer.

Approved: NORTHSTAR COMMUNITY SERVICES DISTRICT

______________________________	______________________________
General Manager	**Date**

Special notes shall be clearly indicated, and it shall be conspicuously noted on the improvement plans that all construction work and installations shall conform to the District Code and that all work is subject to the approval of the General Manager. The following phrase shall be noted on the improvement plans:

"All sewerage works to meet or exceed Northstar Community Services District Code requirements"

Plan and Profile Sheet Requirements: The improvement plans shall clearly show the existing and proposed alignments and profiles of the sanitary sewer(s) in relation to road ways, drainage ditches, storm drains or any other underground utility. The improvement plans shall show all areas of conflict and minimum clearances between sanitary sewer and water facilities. Ground surface profiles must be shown.

The stationing on plan and profile shall read from left to right. Insofar as practical the improvement plans shall be so arranged that the north arrow is either pointed toward the top or to the right edge of the sheet.

Detail Sheet Requirements: Detail sheets of all sanitary sewer facilities (manholes, cleanouts, traps, interceptors, wet wells, pump stations, etc.) shall be included in the improvement plans. Typical trench sections shall also be included in the improvement plans.

Cross Sections shall be included in the improvement plans, where determined necessary by the General Manager.

Inclusion of Datum and Legal Boundaries: The bench marks and datum shall be clearly pointed out on the improvement plans both as to location, description and elevation. The datum shall be U.S. C & G.S., 1927 North American Datum.

It is desired and encouraged that proposed improvements be tied into the California Coordinate System if monumented coordinate points are available within a reasonable distance of said improvement.

Right-of-way lines, the boundaries of lots fronting on the street, drainage easements, utility easements, section lines and corners, land grant lines, and temporary construction easements both existing and proposed shall be shown on the improvement plans. All right-of-way and easement lines shall be properly dimensioned.

Topographic Features: All pertinent topographic features shall be shown such as street lines, curbs, sidewalks, shoulders, existing structures, houses, trees and other foliage drainage ditches, utility poles, fire hydrants, and all other features of the area which may affect the design requirements for the project.

Existing and proposed substructure location and size; i.e., storm and sanitary sewer pipelines; water and gas pipelines; electrical, telephone, cable T.V. conduits; and any other buried utilities which may affect the design requirements of the project, shall be noted.

A-6.4 As Built Drawings/Electronic Data

The owner or their agent shall have reproducible improvement plans (mylar sheets) prepared with all approved construction changes or final dimensions delineated on the improvement plans. All improvement plans produced on computer with the aid of computer design software shall be saved on 3 1/2 inch HD disk(s) or CD. A single set of reproducible improvement plans ***and*** a computer disk or CD containing the same data as the reproducible improvement plans shall be presented to the District.

The set of "as built" improvement plans shall have the words "as built" in one inch high letters on each sheet.

Dimensions and locations shall be sufficient for locating the constructed improvements. Dual swing ties are required for all stub outs and cleanout risers. Permanent objects such as property corners, power poles, water boxes, structures, etc. shall be used for swing ties. The General Manager shall approve the "as built" improvement plans prior to any District acceptance of the completed system.

A-6.5 Construction Administration

Installation of new sanitary sewer facilities or alternation to existing sewer facilities requires inspection during construction by an authorized representative of the District. Each phase of construction must be inspected and approved prior to proceeding to subsequent phases.

Any improvements constructed without inspection as provided herein or construction contrary to the orders or instructions of the authorized representative of the District will be deemed as not complying with these specifications and will not be accepted by the District.

Adequate notice shall be given the District prior to the beginning of construction operations in constructing sanitary sewer facilities so that arrangements may be made by the District to provide adequate inspection.

Conformity with Improvement Plans and Allowable Deviation: Deviations from the approved improvement plans, as may be required by field conditions during construction, shall require written approval by the General Manager.

Alteration of Improvement Plans: All authorized alterations affecting the requirements and information given on the approved improvement plans shall be in writing. No changes shall be made of any plan or drawing after the same has been approved by the District except by direction of the General Manager.

Working drawings or plans for any facility not included in the improvement plans furnished by the owner or their agent shall be approved by the District prior to commencement of any work involving such facility.

Authority of the District Inspector: The periodic inspection performed by the various inspectors employed by the District shall not constitute approval or ratification of work improperly completed by the contractor.

Final Inspection: Upon completion of any improvements which are constructed under and in conformance with this Code, and prior to requesting final inspection, the area shall be thoroughly cleaned of all rubbish, excess material and equipment; and all portions of the work shall be left in a neat and orderly condition satisfactory to the District. The final inspections may include: Ball and Flush of the pipelines, Mandrel Tests, Television Inspection, Air, Water, or Vacuum tests and/or any other tests deemed necessary by the District.

The General Manager will require copies of all Grant Deeds for easements given to the District as a part of sanitary sewer facility installation. Field verification of such easements may be required.

After receiving the request for final inspection, the District will inspect the work. The contractor and/or owner will be notified in writing as to any particular defects or deficiencies to be remedied. The contractor shall proceed to correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, a second inspection shall be made by the District to determine if the previously mentioned defects have been repaired, altered and completed in accordance with this Code. At such time as the General Manager approves and accepts the work for the District, the contractor and/or owner may request in writing, for Board approval. The District Board of Directors will notify the owner in writing as to the date of final approval and acceptance.

A-6.6 Legal Relations and Responsibility

District Liability: Neither the District, the General Manager or any other officer or agent of the District shall be personally responsible for any liability arising under any contract between the developer and any contractor or subcontractor.

District Responsibility: The District shall <u>not</u> be held responsible for the care or protection of any material or parts of the work prior to final acceptance.

The District and its representatives, in establishing this Code, and in performing any services, or making any examinations, tests, or inspections hereunder, shall not be liable in any way to any person by reason of any injury, damage, costs, or expenses sustained or caused as a result thereof; nor shall any such services, examinations, tests or inspections constitute any warranty in reference thereto on the part of the District or its authorized representatives, and the relationship of the District to the contractor, or developer shall be solely that of independent contract and not joint venture, partnership, or otherwise.

That the developer shall at its sole cost and expense hold the District harmless from and defend the District against all claims, charges, demands or causes of action arising out of or in any manner whatever connected with any act, activity or work made, completed or undertaken hereunder by the developer, its contractor, engineer, or agents, or employees thereof.

Nothing herein contained shall be deemed to modify, limit, or restrict the rights, duties, and obligations given or granted to said District by the laws of the State of California now in effect or hereafter from time to time adopted, including without limitations the right to amend or modify this Code at any time, and if any part of this Code be determined to be unconstitutional, such determination shall not render ineffective or invalid the remaining provisions therein contained and set forth.

Responsibility for Damage: The District, the General Manager and all officers, agents and employees of the District shall not be answerable or accountable in any manner thereof; or for any of the materials or other things used or employed in performing the work; or for injury to any person or persons either workmen or the public, for damage to property from any cause which might have been prevented by the developer or anyone employed by him against all of which injuries or damages to persons and property the developer having control over such work, must properly guard.

The developer shall be responsible for any liability imposed by law of any damage to any persons or property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance.

The developer shall indemnify and save harmless the District, the General Manager and all officers, agents and employees of the District from all suits or actions of every name, kind, description brought for or on account of any injuries or damages received or sustained by any person or persons by or from the developer, his/her agents in the construction of the work or by or in consequence of any negligence in guarding the same, any improper materials used in its construction or by or on account of any act or omission of the developer or his/her agents.

Developer's Responsibility for Work: Except as provided above, until the formal acceptance of the work by the District, the developer or his/her contractor shall have the charge and care thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution, or from the non execution of the work. The developer or his/her contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof.

All public or private facilities, including but not limited to gravel surfacing at existing canals, structures, telephone cables, roadways, curbs, gutters, parking lots, private drives, levees and embankments for creeks, ponds and reservoirs disturbed during construction of the work shall be repaired and/or replaced by the contractor to match facilities existing prior to construction. In addition, the contractor shall be responsible for any settlement damage to such facilities or adjoining areas for a period of one year after acceptance of such required facilities.

Public Convenience: It shall be the owner or their agent's responsibility to provide for the passage of public traffic through the work during construction. When work is to be performed in existing traveled streets or roads, trench spoil shall be placed so as to offer the least possible obstruction and inconvenience to public traffic. The owner or their agent shall have under construction no greater length or amount of work than can be prosecuted properly with due regard to the rights of the public.

All public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible. Bridges of approved construction shall be installed and maintained across trenches at all crosswalks, intersections and such other points where, in the opinion of the General Manager, traffic conditions make it advisable.

Spillage resulting from hauling operations along or across any publicly traveled way shall be removed immediately by the owner or their agent at their expense.

Construction operations shall be conducted in such a manner as to cause as little inconvenience as possible to abutting property.

Convenient access to driveways, houses and buildings along the line of the work shall be maintained and temporary approaches to crossings or intersecting highways shall be provided and kept in good condition. When the abutting owner's access across the right-of-way line is to be eliminated, or to be replaced under the Contract by other access facilities, the existing access shall not be closed until the replacement access facilities are usable.

All fences, mailboxes, signs, etc. subject to interference shall be maintained by the owner or their agent until the work is completed, at which time they shall be restored to the condition existing prior to starting the work, or as shown on the improvement plans or specified by the General Manager.

Water or dust palliative shall be applied in accordance with Northern Sierra Air Quality Management District Rule 226.

In order to expedite the passage of public traffic through or around the work and where ordered by the District, the owner or their agent shall install signs, lights, flares, barricades, and other facilities for the sole convenience and direction of public traffic. Also, where directed by the District, the owner or their agent shall provide and station competent flagpersons whose sole duties shall consist of directing the movement of public traffic through or around the work.

Flagpersons and guards, while assigned to traffic control, shall perform their duties and shall be provided with the necessary equipment in accordance with the current "Instructions to Flagmen" of the State of California Department of Transportation. The equipment shall be furnished and kept clean and in good repair by the owner or their agent at their expense.

Safety: The owner or their agent shall be solely and completely responsible for the conditions of the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to all applicable Federal, State, and local laws, ordinances, and codes, and to the rules and regulations established by the California Occupational Health and Safety Administration, and to other rules of law applicable to the work.

The services of the District in conducting construction review of the owner or their agent's performance is not intended to include review of the adequacy of the contractor's work methods, equipment, bracing or scaffolding or safety measures, in, on, or near the construction site, and shall not be construed as supervision of the actual construction nor make the District responsible for providing a safe place for the performance of work by the owner or their agent, subcontractors, or suppliers; or for access, visits, use work, travel or occupancy by any person.

The owner or their agent shall carefully instruct all personnel working in potentially hazardous work areas as to potential dangers and shall provide such necessary safety equipment and instruction as is necessary to prevent injury to personnel and damage to property. Special care shall be exercised relative to electrical work, work involving excavation and in pump sump work.

All work and materials shall be in strict accordance with all applicable State, Federal and local laws, rules, regulations, and codes.

All electrical equipment furnished shall be grounded and provided with guards and protection as required by safety codes. Where vapor-tight or explosion-proof electrical installation is required by law, this shall be provided.

Shoring and Trench Safety Plan - Attention is directed to Section 832 of the Civil Code of the State of California relating to lateral and subjacent support, and the owner or their agent shall comply with this law.

In accordance with Section 6705 of the State Labor Code, the owner or their agent shall have provisions for worker protection from caving ground. Trench safety working drawings shall show the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. If such working drawings vary from the shoring system standards established by the Construction Safety Orders of the California Occupational Health and Safety Administration or the Federal safety standards of the Department of Health, Education and Welfare, improvement plans shall be prepared by a registered civil or structural engineer. In no event shall the owner or their agent use a shoring, sloping, or protective system less effective than that required by said Construction Safety Orders, or less effective than that required by said Federal Safety Standards.

Protection of Person and Property: The owner or their agent shall take whatever precautions are necessary to prevent damage to all existing improvements, including above ground and underground utilities, trees, shrubbery that is not specifically shown to be removed, fences, signs, mailboxes, survey markers and monuments, buildings, structures, the District's property, adjacent property, and any other improvements or facilities within or adjacent to the work. If such improvements or property are injured or damaged by reason of the owner or their agent's operations, they shall be replaced or restored, at the owner or their agent's expense, to a condition at least as good as the condition they were in prior to the start of the owner or their agent's operations.

The owner or their agent shall adopt all practical means to minimize interference to traffic and public inconvenience, discomfort or damage. The owner or their agent shall protect against injury any pipes, conduits or other structures, crossing the trenching or encountered in the work and shall be responsible for any injury done to such pipes or structures, or damage to property resulting therefrom. They shall support or replace any such structures without delay and without any additional compensation to the entire satisfaction of the District. All obstructions to traffic shall be guarded by barriers illuminated at night. The owner or their agent shall be responsible for all damage to persons and property directly or indirectly caused by their operations and, under all circumstances, they must comply with the laws and regulations of the County and the State of California relative to safety of persons and property and the interruption of traffic and the convenience of the public within the respective jurisdictions.

The owner or their agent is cautioned that they must replace all improvements in rights-of-way and within the public streets to a condition that shall comply with all general paving requirements and special requirements of Nevada County, Placer County, and the State of California Department of Transportation.

Type and time of construction required at any road subject to interference by Contract work will be determined by those authorities responsible for maintenance of said road. It shall be the responsibility of the owner or their agent to determine the nature and extent of all such requirements, including provision of temporary detours as required; however, the construction right-of-way obtained by the District at affected roadways will be adequate for provision of all required detours. As required at any road crossing, the owner or their agent shall provide all necessary flagpersons, guardrails, barricades, signals, warning signs and lighting to provide for the safety of existing roads and detours. Immediately after the need for temporary detours ceases, or when directed, the owner or their agent shall remove such detours and perform all necessary cleanup work, including replacement of fences, and removal of pavement. Included shall be all necessary replacement of existing roadway appurtenances, grading work, soil stabilization and dust control measures, as required and directed. The cost of all work specified under this Section shall be borne by the owner or their agent.

If required by law, the owner or their agent shall shore up, brace, underpin, and protect as may be necessary, all foundations and other parts of all existing structures adjacent to and adjoining the site of the project, which are in any way affected by the excavations or other operations connected with the completing of the work under his/her contracts.

The owner or their agent shall examine all bridges, culverts, and other structures over which they will move their materials and equipment, and before using them, they shall properly strengthen such structures where necessary. The owner or their agent shall be responsible for any and all injury or damage to such structures caused by reason of their operations.

A-6.7 Guarantee and Delivery of Title

General Guarantee: The developer/owners shall supply the District with a 1 year guarantee for all materials and workmanship which is incorporated into the system. To assure the District this will be completed, the developer/owners shall supply this guarantee as requested by the District in either of the following two forms. Failure to provide this maintenance agreement or maintenance bond will cause the District to withhold final approval.

- Maintenance Bond - The developer/owners shall supply a maintenance bond for 10 percent of the contract amount for the sanitary sewer facilities as specified in the District Development Guidelines.

- Maintenance Agreement - The developer/owners shall supply a maintenance agreement, depositing 10 percent of the contract amount for sewer facilities, in cash securities as specified in the District Development Guidelines.

If after a period of 48 hours has elapsed after the developer/owner and/or the bonding company have received written notice by certified mail that a condition of failure exists and no correction has been made, the bonds will be called or the securities withdrawn, and the work will be performed by the District and charged against them.

The developer shall be responsible for the full expense incidental to making good any and all of the above guarantees, the performance of which shall be binding upon the developer and his/her sureties.

Delivery of Title: Upon the completion and acceptance of the installations of the sewer facilities hereunder, the same shall be transferred to the District, without cost, and the owner shall provide and deliver to the District the following:

  - Duly executed warranty bill of sale transferring marketable title to the District of all such sewer works, installations and appurtenances, title thereto to be free and clear of all liens and encumbrances and;

  - Duly executed easements wherein said facilities and installations are located in favor of the District; which said bill of sale and easement shall be in form acceptable to the District.

A-6.8 Materials and Equipment

All materials, hardware, equipment, fittings and other miscellaneous items to be incorporated in the District sanitary sewer system shall conform to the following specifications. No changes from the specified products shall be made without written approval from the General Manager.

Samples and Tests: The General Manager may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance stating that the materials involved comply in all respects with the requirements of the specifications. The manufacturer of the material or the manufacturer of assembled materials shall sign the certificate. A Certificate of Compliance must be furnished with each lot of material delivered to the work and the lot so certified must be clearly identified in the certificate.

All materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the contractor of responsibility of incorporating material in the work which conforms to the requirements of the improvement plans and specifications and any such material not conforming to such requirements will be subject to rejection whether in place or not.

The District reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

At the option of the District the District shall approve the source of supply of each of the materials before delivery is started and before such material is used in the work. Representative preliminary samples of the character and quality prescribed shall be submitted by the contractor or producer of all materials to be used in the work for testing or examination as desired by the District.

All tests of materials furnished by the owner or their agent shall be made in accordance with commonly recognized standards of national organizations, and such special methods and tests as are prescribed in these specifications.

The owner or their agent shall furnish such samples of materials as are requested by the District, without charge. Samples will be secured and tested whenever necessary to determine the quality of material.

The owner or their agent shall deliver to the District two copies of certificates from the manufacturers of all materials and appurtenances incorporated in the District sanitary sewer system. These certificates shall certify that all goods manufactured by the manufacturer meet all applicable codes, District requirements and specifications.

The certificate shall show the type and quality of materials delivered the requirements and/or specifications that are complied with.

Should the owner or their agent fail to secure the certificates as required he shall at his/her expense have a commercial testing laboratory, approved by the General Manager, perform the necessary testing and deliver two copies of the results to the General Manager.

The owner shall submit representative preliminary samples of the character and quality prescribed or their agent or producer of all materials to be used in the work for examination as desired by the General Manager.

No material shall be used until the General Manager has approved it.

The District reserves the right to take any additional samples or make additional tests, as they may deem necessary.

C900 Pipe: C900 PVC pipe shall conform to and meet the requirements of AWWA C900-75.

Ductile Iron Pipe: Ductile iron pipe shall conform to and meet the requirements of ANSI/AWWA C151/A21.51. It shall be the thickness class required for supporting the imposed loads. Joints shall conform to ANSI/AWWA C111/ A21.11.

Push-on gasket joints and fittings may be used except where otherwise required by the District.

Fittings shall be ductile iron and shall meet the requirements of ANSI/AWWA C110/ A21.11. An exception to this is the 4 to 12 inch pipe size whereby ductile iron compact fittings may be used provided they meet the requirements of ANSI/AWWA C153/A21.53 and have a working pressure rating of 350 pounds per square inch.

Ductile iron gravity pipe used for single family residences shall be class 51 or heavier and may use "Calder" type couplings with stainless steel clamps.

Polyvinyl Chloride Pipe: Polyvinyl chloride pipe and fittings for gravity pipelines shall be a rubber ring jointed pipe as manufactured by Johns-Manville or other approved equivalent, and shall comply with the following specifications.

Polyvinyl chloride pipe and fittings shall conform to A.S.T.M. designation D-1784 and ASTM D-3034 for rigid PVC compounds. Pipe size and dimensions shall be submitted to the General Manager for approval prior to contractor's purchase.

- Size and Dimensions - Size and dimensions shall be such that the minimum "pipe stiffness" (F/Y) at 5 percent deflection shall be as specified in ASTM D 3034-72 for all sizes when calculated in accordance with A.S.T.M. designation D-2412, External Loading Properties of Plastic Pipe by Parallel-Plate Loading.

- Flattening-The flattening test shall comply with the requirements of ASTM D 3034-72.

- Extrusion Quality-The extrusion quality shall comply with the requirements of ASTM D 3034-72.

- Impact Resistance-The resistance shall comply with the requirements of ASTM D3034.

Nominal Pipe Size-Inches	Impact Strength Ft. - Lbs.
4	150
6	210
8	210
10	220
12	220
*	

*For larger diameter pipe, see ASTM Standards

- Markings-Markings shall comply with the requirements of A.S.T.M.

Conductor Pipe: Conductor pipes shall conform to County and State requirements and these specifications.

Pipe used as a conductor pipe shall be either welded steel pipe or corrugated metal pipe. The General Manager may specify which type shall be used in any instance. The protective lining and coating, if required by the General Manager shall be as shown on the improvement plans.

- **Welded Steel Pipe** shall be manufactured of steel meeting the requirements of ASTM Designation A245, Commercial Grade. The method by which the pipe is manufactured shall comply with one or more of ASTM specifications: A134, A135, A139 or A211. The pipe shall be welded by either the electric-resistance or electric-fusion process, with either spiral seam welded joint or straight seam welded. All end joints shall be butt welded.

  When the conductor pipe is to be installed by boring and jacking, the wall thickness shall be 1/4 inch for sizes up to and including 24 inches in diameter, and 5/16 inch for sizes 27 inches to 36 inches in diameter.

- **Corrugated Metal Pipe** shall conform to and meet all the requirements of "Standard Specifications for Corrugated Metal Culvert Pipe" (ASSHO Designation M36). Unless otherwise designated by the General Manager, the pipe may be fabricated of any of the base metals listed in the above specifications. Band couplers shall be of the same metal as the pipe.

  When the conductor pipe is to be installed by boring and jacking the material shall be No. 10 gauge or thicker. The sections of pipe shall be especially prepared for making field joints by riveting or bolting. If the joints are bolted, the bolts shall be 3/8 inch diameter and galvanized. Rivets shall be of the same material as the base metal used for the corrugated sheets, and shall be galvanized or sherardized.

Castings: All castings for manhole rings and covers, or other purposes, shall be tough grey iron, free from cracks, holes, swells and cold sheets and be of workmanlike finish, and shall conform to the pertinent Standard Drawing. The cast iron shall meet the requirements of Specification

ASTM Designation A48, Class 40. The quality shall be such that a blow from a hammer will produce an indentation on a rectangular edge of the castings, without flaking the metal. Before leaving the foundry, all castings shall be thoroughly cleaned.

Manhole covers shall fit tightly to the seat and shall not rock. All manhole covers which do not fit neatly and bear firmly in the frame will be rejected.

Manhole frame and covers shall be used to protect end of line cleanouts located in paved areas. Manhole covers shall fit tightly to the seat and shall not rock. The frame and cover shall be set on a concrete footing ring of at least 12 inches wide by 12 inches thick.

Pre-cast Manhole Sections: The manhole sections, adjustment rings and tapered sections with tongue and groove joints shall conform to ASTM Designation C478, except that cement and aggregate shall conform to the requirements of Structural Concrete, Appendix A-6.14, page 117, of the Standard Specifications. Concrete for poured portions of manholes shall conform to Structural Concrete, Appendix A-6.14, page 117, of the Standard Specifications. Joints shall conform to Installation of Sanitary Sewer Facilities, Appendix A-6.9, page 96, of the Standard Specifications under "Manholes." Metal forms shall be used in the manufacture of the pre-cast sections so as to obtain smooth surfaces. The concrete shall be well compacted by being centrifugally-spun, vibrated, or mechanically-tamped.

Pump Stations: (For private residential submersible pump stations see Residential Pump Systems, Section 7.13, page 33). Pump stations shall have a duplex pump configuration with controls designed to alternate pumps. Controls shall include Hand-Off-Auto switches and running lights for each pump. Pump electrical supply shall be single phase for pumps rated at 5 horsepower or less where possible. Pumps shall be sized for the ultimate design flow of the area being serviced by the station and with a minimum of 4 feet per second flow velocity in the force main.

Submersible Pump Stations: Submersible pumps shall be of the explosion proof type. If circumstances require, the pump shall incorporate a grinder or cutter type blade/impeller system. Pump design shall be of the Flygt rail and discharge base mount type or approved equal. Lifting chains shall be stainless steel and rated for the lifting requirements provided by the pump manufacturer. Each pump discharge pipeline shall include a swing check valve with external lever and weight and an eccentric plug valve before the two discharge pipelines join. Valves shall be located in a separate vault outside of the wet well where possible. External valve vaults shall have a valved drain pipeline plumbed into the wet well. The drain pipeline valve shall be accessible by means of a riser pipe boxed to grade between the vault and the wet well (see Standard Drawings, Figure 19, Submersible Pump Station (Section View), page 175 and Figure 20, Submersible Pump Station (Plan View, page 177). Wet well piping and fittings shall be flanged ductile iron only. Submersible pump controllers shall be of a type equal in design and manufacture to preferred current District submersible controllers. All site related issues shall be in accordance with Pump Station Structures, Appendix A-6.15, page 125. All electrical and telemetry equipment shall be in accordance with Pump Station Electrical Work, Appendix A-6.16, page 130.

Drywell Centrifugal Wastewater Pumps: Centrifugal pumps shall be of the vertical or horizontal close-coupled, self-priming centrifugal type specifically designed for the handling of raw, unscreened sanitary domestic wastewater. Each pump shall be of heavy, cast iron construction and shall include a motor with the pump impeller mounted directly on the one-piece motor-pump shaft.

Each pump at its rated speed shall be designed to retain adequate liquid in the pump casing to insure unattended automatic repriming in a complete open system without suction of discharge check valves and with a dry suction leg. Upon completion of repriming cycle, pumps shall deliver full rated capacity at rated Total Dynamic Head (TDH) at the designed total dynamic suction lift.

The openings and passages of the pump shall be large enough to permit the passage of a sphere 3 inches in diameter and any trash or stringy material which can pass through the average 4 inch building collection system. The pump must be equipped with a removable cover plate or rotating assembly allowing complete access to pump interior to permit service and repairs without disturbing suction or discharge piping. The pump volute casing shall contain no openings of a lesser diameter than the sphere size specified. Screens or any internal devices that create a maintenance nuisance or interfere with priming and performance of the pump will not be permitted.

The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two sections with registered fit. Both the stationary sealing member and mated rotating member shall be of Tungsten-Titanium carbide alloy.

The impeller shall be two-vane, semi-open or enclosed type, non-clog, cast in ductile iron, and shall be balanced. The impeller shall be keyed and secured to the motor-pump shaft by a stainless steel device. The impeller shall not be screwed or pinned to the motor-pump shaft and shall be readily removable without the use of special tools. To prevent the build up of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shroud. The shroud shall remain full diameter so that close, minimum clearance from shroud to volute is maintained.

The seal system lubricant shall be taken from the pump discharge through a 40-micron or better filter. The filter shall be readily accessible for cleaning and maintenance. The filter shall be isolated with brass valves. The seal system shall contain a brass valve connected near the top of the seal housing to permit the relief of any air trapped in the seal unit. A manually operated brass valve shall also be provided to vent the pump volute.

The pump volute shall be of heavy, cast iron construction, free from projections that might cause clogging or interfere with flow through the pump.

A heavy, cast iron base to provide maximum rigidity and balance shall support the pump. The height of a vertical pump base shall be sufficient to permit the use of an increasing suction elbow which, shall that be provided when the nominal pump size is smaller than the suction line. The suction and discharge openings shall be flanged, faced and drilled 125-pound American Standard.

Upon request, manufacturer must submit to the District for their evaluation and approval, a list of self-priming wastewater pump installations reflecting of satisfactory, automatic operations while permanently installed in an unattended wastewater lift stations.

Workmanship and materials throughout shall be of best quality per code and specifications.

Pump Motors: The motors shall be designed for continuous operation at full load with a temperature rise of not more than 40 degrees centigrade above ambient temperature. Motors shall be capable of frequent starts each hour as required to meet the flow requirements without overheating. Motors shall also be rated for the altitude at which they are to be installed.

A-6.9 Installation of Sanitary Sewer Facilities

Excavation and Bedding: Unless otherwise specified, the excavation for sewer pipe shall be an open trench, excavated to six inches below the flowline grade shown on the improvement plans, or 1 inch below the outside diameter of the bell, whichever is greater. The native soil in the trench bottom shall be compacted to 90 percent relative compaction before placement of Class 1 Backfill for pipeline bedding. Class 1 Backfill bedding material shall be compacted to a relative compaction as specified in the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169.

Pipe trenches shall not be left open farther than 300 feet in advance of pipe laying operations or 200 feet to the rear thereof, unless otherwise permitted by the General Manager.

All trench excavation within asphalt paved areas shall be saw cut in neat parallel lines to the limits of excavation. When the existing pavement is concrete, it shall be sawed to a neat line 6 inches wider on each side than the trench width.

Whenever the bottom of the trench is soft, yielding, or unsuitable as a foundation for the pipe, sufficient crushed rock or coarse clean gravel shall be rammed into the soft material. If such treatment does not provide a proper foundation, the unsuitable material shall be removed to a depth such that when replaced with bedding material, it will provide a stable foundation.

Whenever the trench bottom is in rocky material, the trench shall be excavated to 6 inches below the flowline shown on the improvement plans or 3 inches below the outside diameter of the bell, whichever is greater, and backfilled to grade with imported bedding material thoroughly compacted into place.

Water stop impervious plugs (trench cutoff blocks) shall be installed in trenches where Class 4 Backfill is used, in all areas of ground water movement, and in all trenches containing pipeline slopes of 10 percent or greater.

The location and spacing of trench cut-off blocks for private building laterals shall be the responsibility of and shall be determined by the owner or their agent. The location and spacing of trench cut-off blocks for sanitary sewer mains shall be determined by the General Manager.

Trench cut-off blocks shall be constructed as shown in the Standard Drawings, Trench Cut-Off Block, Figure 17, page 171.

Bracing and Shoring: Sufficient bracing and shoring shall be installed in trenches to insure the safety of workers, and to protect and facilitate the work. Where practicable all such bracing and shoring shall be removed from the trench as the backfilling proceeds. All bracing and shoring shall comply with current Construction Safety Orders of the California Occupational Heal and Safety Administration.

When shoring is used in the trench, the fill shall be carried to a height sufficient to prevent the surrounding ground from cracking or caving into the trench before the shoring is removed.

Pipeline Installation: A minimum of 30 inches compacted earth fill shall cover all gravity and force main pipelines. Cover less than 48 inches in vehicular traveled ways requires heavier walled pipe as listed in Appendix A-5, page 75.

The pipe shall be laid in conformity to the prescribed line and grade. The prescribed grade shall be set using the appropriate surveying tools (i.e., transit, rod, laser, etc.). In case any discrepancy exists from the prescribed alignment, the work shall be stopped and the discrepancy immediately corrected. In addition, a string line shall be used in the bottom of the trench to insure a straight alignment of pipe between manholes, unless curved alignment is shown on the improvement plans.

Pipe shall be laid continuously upgrade with the bell of the pipe uphill. Each length of pipe shall be laid on a firm bed and shall have a true bearing for the entire length between bell holes. No wedging or blocking up of the pipe will be permitted.

Both bell and spigot shall be clean before the joint is made and care shall be taken that nothing but the joint-making material enters the joints.

When for any reason, pipe laying is discontinued for an hour or more, the open end of all pipelines shall be closed with a close-fitting stopper.

The jointing of pipe with this type of joints shall be made by approved methods and recommendations of the manufacturer, care being used to prevent chipping or cracking of either end of the pipe during installation.

Pipe shall be protected during handling against impact shock and free fall. The rubber gasket joints shall be cleaned prior to the seating of the gasket. The gasket shall be wiped clean and shall be fitted snugly in the gasket seat. A thin film of lubricant shall be applied to the inside surface of the gasket which will come in contact with the plain end of the pipe, if necessary apply the same lubricant to the plain end of the pipe. Use only a lubricant recommended by the pipe manufacturer.

Boring or Jacked Casing: The work contemplated under this heading consists of placing cast iron pipe or other pipe of approved material, usually in a conductor pipe, under a paved roadway, street or railroad to a true line and grade as shown on the improvement plans, by means of boring or jacking operations. The equipment and method of operation shall be approved by the General Manager prior to proceeding with the work.

The excavation for the boring operation shall be kept to a minimum but shall be of sufficient dimensions to satisfactorily complete the work. If so required, bracing and shoring shall be provided to adequately protect the workmen and the roadway or railroad.

The conductor pipe shall be placed closely behind and in conjunction with the boring operation. The bored hole shall be not more than 0.1 foot in diameter larger than the conductor pipe. Guide rails shall be accurately set to line and grade so as to achieve close adherence to the line and grade shown on the improvement plans.
The pipe to be placed inside the conductor pipe shall have a non-rigid joint and shall be installed by the use of suitable wood skids. Clean sand shall then be sluiced or blown into the conductor pipe to a depth of not less than half the diameter of the sewer pipe.

Where tunneling is permitted, backfill shall be made with clean damp sand, tamped and compacted to insure a non-yielding, uniform foundation for the entire length of the tunnel.

Trench Backfill Gravity Pipelines: Class 1 Backfill for sanitary sewer pipelines and related appurtenances that are constructed for the District shall have a minimum specific gravity of 2.5.

Backfill around and to at least 1 foot over pipe shall be made with Class 1 Backfill material compacted as placed. A difference in level on either side of the pipe not to exceed 4 inches shall be maintained to hold the pipe firmly in place.

Backfill from a point at least 1 foot over the top of the pipe to finish grade shall be made with Class 2 or Class 3 Backfill. When the sewer trench lies within the right-of-way of a street this backfill shall be Class 2. Class 3 Backfill may be used in areas outside the pavement of streets and highways involved.

In connection with backfill, the following tests shall be made in conformance with the requirements set forth in these Specifications:

Test Method No. California Tests	or ASTM
Relative Compaction	ASTM D1557 & D1556
Sand Equivalent	217
Resistance (R-Value)	301
Sieve Analysis	202

<u>Backfill shall not be placed until the pipe or other facility has been inspected by an authorized District Representative and approved for backfilling.</u> The percentage composition by weight as determined by laboratory sieves shall conform to the following requirements.

Class 1 Backfill

Sieve Sizes	Percentage Passing Sieves
3/8”	100

Sand equivalent not less than 20.
Bulk Specific Gravity of Class 1 Backfill shall be at least 2.5.

Class 2 Backfill

Sieve Sizes	Percentage Passing Sieves
1"	100
3/4"	90-100
No. 4	35-60
No. 30	10-30
No. 200	2-9

Sand equivalent not less than 20.
Bulk Specific Gravity of Class 2 Backfill shall be at least 2.6.

Class 3 Native Backfill

Sieve Sizes	Percentage Passing Sieves
3"	100

Sand equivalent not less than 20.

Class 4 Backfill

Sieve Size	Percentage Passing Sieves
1"	90-100
3/4"	70-100
1/2"	25-60
3/8"	10-40
#4	0-10
#8	0-5

Bulk Specific Gravity shall be at least 2.5

Material for Class 1, Class 2, Class 3, and Class 4 Backfill shall be placed in uniform horizontal layers not exceeding 0.67 foot in thickness before compaction, and shall be brought up uniformly on all sides of the trench. If the contractor can satisfactorily demonstrate to the General Manager an alternative method of placing the backfill so that all requirements, other than the layer thickness, are met, the General Manager will permit the contractor to use the alternative method.

Under no circumstance will the contractor use the alternative method unless the General Manager's approval is obtained in writing.

Each layer of backfill shall be compacted to a relative compaction as indicated in the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169.

The District reserves the right to perform compaction tests, or have compaction tests performed through a licensed geotechnical testing firm, to verify compaction of the backfilled trench section. All tests by the District will be performed in such a manner as will not unnecessarily delay the work. The owner or their agent shall not be required to reimburse the District for the initial tests performed. If subsequent tests are required due to compaction failures, the owner or their agent shall pay for all subsequent compaction tests.

The use of backfill material other than Class 1, Class 2, and Class 3 is not permitted unless approval is granted, in writing, from the General Manager.

Class 4 Backfill material may be substituted for Class 1 Backfill, if approved by the General Manager or their designated representative in writing, under the following conditions:

- When large amounts of groundwater are encountered within the trench section, or;

- When trench depths exceed 12 feet in depth *and* placement of Class 1 Backfill material at the prescribed relative compaction is not possible.

If Class 4 Backfill material is substituted for Class 1 material, 140 NC filter fabric, or equivalent, must be placed on top of the Class 4 Backfill before proceeding with additional approved backfill.

Groundwater may be removed from the trench and placed in the existing sanitary sewer if ***all*** of the following conditions are met:

- The contractor requests, in writing, to place said groundwater into the existing sanitary sewer, ***and*** receives, in writing, from the General Manager permission to do so. This written request by the contractor and subsequent written reply from the General Manager will be only on a case-by-case basis.

- The volume of groundwater placed into the existing sanitary sewer shall not exceed a predetermined amount (in gallons per minute) as designated in writing by the General Manager.

- All pump/hose inlets shall be screened to prevent rocks or gravel from entering the existing sanitary sewer system. If high concentrations of silts are suspended in the groundwater, settling basins may be required before the water may be placed into the existing District sanitary sewer system.

Initial backfill shall be to 0.7 of the vertical outside diameter of the pipe in 8 inch maximum lifts.

Backfill material shall be "shovel sliced" on both sides of the pipe, with care to assure that the spaces under the pipe haunches have been filled.

Field repairs to P.V.C. are not acceptable unless the General Manager has given his/her prior approval for each repair.

Mechanical compactors shall not be used directly over the pipe with less than 1 foot of cover.

Paving over trenches shall not be placed until the backfill has been inspected by an authorized District representative. Trench surfacing and trench restoration in Nevada/Placer County, or State of California right-of-way shall conform to the requirements of the agency having jurisdiction.

Backfill around manholes and the pit excavated for boring operations shall be made in the same manner as above specified for trenches, except as otherwise provided under Manholes.

If at any time during the period of responsibility there shall be any settlement of the trenches, cracking of the newly applied pavement, or separation of the newly applied pavement from the existing pavement requiring repairs to be made in any street highway, or easement, or should any other defect appear in the system due to the contractor's operations, the owner or their agent shall promptly repair all defects in accordance with the requirements of the responsible agency.

Trench Backfill Force Mains: Class 1 Backfill for sanitary sewer force main pipelines and related appurtenances which are constructed for the District shall have a minimum specific gravity of 2.5. Trench backfill methods and materials for force mains, shall be as specified for sewer pipelines with the following exceptions:

- The height of backfill over the pipe before testing shall not be less than 12 inches.

- All thrust blocks shall be in place before the pipeline is hydrostatically tested.

- All joints, bends, angles, or fittings shall be left exposed until testing has been completed.

Every precaution shall be taken against floating the pipe. In case of such floating, the contractor shall replace the pipe to its proper location at his/her own expense, and replace any damaged pipe which may have resulted.

Trench Section, Paved Areas: Pipeline shall be bedded on 6 inches of Class 1 Backfill compacted to 95 percent relative compaction. Class 1 Backfill shall also extend a minimum 12 inches above top of pipe, compacted to 95 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Paved Areas), Figure 14, page 165. In the event that heavy groundwater is encountered in the excavated trench, Class 4 Backfill may be substituted for Class 1 Backfill as outlined above.

Class 2 Backfill shall be placed from 12 inches above top of pipe to 1 inch below bottom of existing asphalt pavement. All Class 2 Backfill shall be compacted to 95 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Paved Areas), Figure 14, page 165.

Trench Section, Roadway Shoulders adjacent to Paved Areas: Pipeline shall be bedded on 6 inches of Class 1 Backfill compacted to 95 percent relative compaction. Class 1 Backfill shall also extend a minimum 12 inches above top of pipe, compacted to 95 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Off Shoulder), Figure 15, page 167. In the event that heavy groundwater is encountered in the excavated trench, Class 4 Backfill may be substituted for Class 1 Backfill as outlined above.

Class 2 Backfill shall be placed from 12 inches above top of pipe to finished grade. Class 2 Backfill placed from 12 inches above top of pipe to 12 inches below finished grade shall be compacted to 90 percent relative compaction, with Class 2 Backfill placed from 12 inches below finished grade to finished grade compacted to 95 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Off Shoulder), Figure 15, page 167.

Class 3 Backfill may be substituted for Class 2 Backfill up to one foot below finished grade. Class 3 Backfill shall be compacted to 90 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Off Shoulder), Figure 15, page 167.

Trench Section, Unpaved Areas: Pipeline shall be bedded on 6 inches of Class 1 Backfill compacted to 95 percent relative compaction. Class 1 material shall also extend a minimum 12 inches above top of pipe, compacted to 95 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Non Traffic Areas), Figure 16, page 169. In the event that heavy groundwater is encountered in the excavated trench, Class 4 Backfill may be substituted for Class 1 Backfill as outlined above.

Class 2 or Class 3 Native Backfill shall be placed from 12 inches above top of pipe to finished grade. Class 2 or Class 3 Native Backfill shall be compacted to 90 percent relative compaction as specified in the Standard Drawings, Typical Sewer Trench (Non Traffic Areas), Figure 16, page 169.

Manhole Installation: Manholes shall be watertight structures constructed in accordance with the details shown on the improvement plans as specified herein and as directed by the General Manager. Pre-cast manholes shall be constructed of pre-cast reinforced pipe sections, tapered reinforced concrete sections, adjustment rings, with cast-in-place bases in accordance with the Standard Specifications and ASTM Specification C478-64T. Portland cement shall be Type II, conforming to the requirements of ASTM Designation C-150.

Pre-cast manhole bases shall be used in lieu of cast in place manhole bases whenever possible.

The ends of pipe (barrel) sections, tapered sections, adjustment rings shall be of such design and construction that when properly laid they shall have a smooth and uniform surface. Each joint shall be sealed with Kent Seal, or Ram-Nek sealant and primer to prevent infiltration or exfiltration. Ram-Nek shall be neatly trimmed after manhole assembly. No pipe shall project more than 0.17 foot into a manhole and in no case shall the bell of a pipe be built into the wall of a manhole or structure. All work shall be cured for a period of 10 days after being placed and shall be protected from injury.

Manholes in paved areas shall have at least one, 2-inch grade ring installed on top of the cone section. The manhole frame and cover shall be placed on top of the grade ring as prescribed herein. The throat of the manholes shall be made of pre-cast concrete grade rings of the proper inside diameter and height. If fine adjustments are needed a concrete mixture fortified with "Xypex Xycrylic Admix" or equal may be used. The maximum depth permitted shall be 12 inches between the cone and frame. Adjustment using concrete mix shall not exceed 2 inches.

When adjusting an existing manhole to grade and the total depth of the throat from the top of the frame to the bottom of the throat exceeds 18 inches, the upper portion of the manhole shall be removed and the manhole shall then be reconstructed so that the final adjusted height of the throat is not greater than 12 inches. The manhole shall then be tested in accordance with Appendix A-6.10, Testing of Sanitary Sewer Facilities, page 106.

Before any work is started on adjusting or repairing a manhole, the channels in the base shall be covered. This cover shall be kept in place during all work. Upon completion of the work, the cover shall be removed from the manhole allowing no debris to fall or remain in the manhole.

The inside base of manholes shall be shaped to provide channels conforming to the size and shape of the crown of the inlets and outlets. The exact configuration of transition from branch size to mainline sizes shall be as directed by the General Manager. Cast-in-place concrete for manholes or portions of manholes shall conform to the Standard Specifications and ASTM Specification C478-64T. Portland cement shall be Type II, conforming to the requirements of ASTM Designation C-150.

The top of manhole elevations shown on the improvement plans are approximate only. In general, the finished grade of the manhole shall be set a maximum of 0.1 foot below the existing ground. Finished grade in paved areas should meet the appropriate Nevada/Placer County or State of California specifications.

Whenever the excavation for a manhole exceeds the outside diameter of the manhole by 10 inches, measured along a radius line, the backfill shall be placed in layers not to exceed 8 inches uniformly around the structure and mechanically tamped to relative compaction of not less than 95 percent for each layer.

Manhole Frame and Cover: Cast iron frames and covers as specified shall be furnished and installed by the contractor in accordance with the applicable portions of the Standard Specifications, except as herein modified. Cast iron frames and covers shall be matched and marked in pairs before delivery to the work. Manhole covers shall fit into their respective frames without rocking. Manhole frames and covers located within easements shall be the bolted down type, bolts shall be stainless steel with an anti seize compound applied to all male threads. Miscellaneous iron and steel for use in the construction of manholes shall be furnished and installed in accordance with the details shown on the improvement plans.

Internal Chimney Seals: All new construction manholes or replacement of existing manholes requires installation of an internal rubber seal as specified. A rubber seal extension to include any additional heights of chimney not covered by the seal itself shall be used as directed. The internal rubber seal and seal extensions shall be as manufactured by Cretex Specialty Products, or approved equal. The seals and extensions shall have a minimum thickness of 3/16 inches and shall be extruded from a high grade rubber compound conforming to the applicable requirements of ASTM C923. The bands used for compressing the seal and extension against the manhole shall be fabricated from 16 gauge stainless steel conforming to ASTM A240 type 304, any screws, bolts or nuts used on this band shall be stainless steel conforming to ASTM F593, type 304.

External Manhole/Vault Seals: When manholes are located within an area of high groundwater, adjacent to a lake or stream, or within an area of standing water, the exterior manhole joints and surface shall be sealed with an external concrete sealant. Exterior manhole walls shall be sealed with a liquid cold-applied waterproofing membrane system such as Sonneborn ® HLM 5000®, or equivalent. Exterior joints shall be sealed with an elastomeric based external concrete joint wrap such as Henry RUB'R-NEK®, or equivalent.

Manhole Temporary Construction Cover: Temporary covers of 3/8 inch steel plate of sufficient size to adequately cover the opening shall be placed on the cone of a manhole until paving is completed. Suitable locating ribs shall be welded to the underside of the cover to hold it in place during the grading and paving operations.

Connection to Existing Manhole: Connections to existing manhole walls shall be made by core drilling into the wall of the manhole. Pipe penetration through the manhole wall shall be sealed with a watertight seal by one of the following:

- equipping the pipe with a modular mechanical type seal ("Link-Seal", or equivalent), consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and manhole wall opening. Links shall be loosely assembled with stainless steel bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and the manhole wall opening.

- inserting the end of the pipe through the core drilled opening, and packing the opening around the pipe with Kent seal or Ram-Nek and primer, then covering with a stiff mix of cement mortar, thoroughly compacted. The mortar shall be composed of one part Type II Portland cement and three parts clean sand. The mortar shall be troweled smooth and flush with the interior surface of the manhole.

Connection of a pipeline to an existing manhole that has a stub-out shall be accomplished with a rigid repair coupling. No flexible rubber couplings are allowed.

The use of impact hammers to break into a manhole wall is prohibited.

Drop Manholes: When in the opinion of the General Manager the flow line grades are such as to require a drop manhole this shall be accomplished as detailed in the District Standard details. A drop inlet shall not be permitted within 5 feet of the flow line.

Utility Pad Installation: See Standard Drawings, Utility Pad Installation, Figure 11, page 159.

Cleanouts: A cleanout shall be installed in each building lateral at the property line of the premises being provided with sewer service and within 5 feet of where the lateral exits the structure foundation. Cleanouts located under the house are not accepted, rather the cleanout must be located *outside* the building foundation. Additional cleanouts shall be installed at intervals not to exceed 75 feet, and at any other point the owner or their agent may select for the purpose of keeping said sewer pipeline clean and free of obstruction. A cleanout shall also be installed on the upstream side of the fitting at all 45 degree or greater bends.

All cleanout risers must be 4 inches below finished grade and boxed to finished grade with an appropriate removable watertight plug in the end of the riser. Cleanout risers and appropriate boxes are required at the property line cleanout and at the cleanout installed nearest the building.

Cleanout boxes shall be constructed of concrete with cast iron lids for vehicular traveled areas (Christy G-5 or equivalent) or reinforced plastic with cast iron lids for non vehicular areas (Carson Industries, Inc., series 608 or 910, or equivalent). Cleanout boxes shall be set to grade and backfilled to prevent accidental displacement or removal. Lids shall have "SEWER" or equivalent imprinted on the lid. Lids with verbiage other than a sewer utility designation (i.e., Storm Drain, Water, Gas, etc.) imprinted on the lid are <u>not</u> permitted.

Service laterals shall be extended to property line and shall be marked with either of the following:

- A 2 x 2 inch redwood stake. The stake shall be buried at the wye and shall extend to finished grade. No stakes shall be driven into the ground or left protruding above finished grade.

- A flexible green marker made of a composite of glass-fiber reinforced polymers (Carsonite®), or equivalent. The marker shall be buried at the wye and extend to finished grade. The marker shall not be left protruding above finished grade.

Every service lateral shall be so marked before final acceptance.

A service lateral stub out to vacant land shall contain a wye (two wyes for double service) with approved removable plugs in the bell ends. The stub out shall be placed at the property line at the appropriate depth to service the parcel. The property line cleanout riser shall be extended to within 4 inches of finished grade and properly boxed per cleanout specifications. An approved marker shall be buried in front of the wye(s) and cut off flush to grade as specified in the Standard Drawings, Service Lateral Detail (Profile View), Figure 8, page 153. Dual swing ties are required for all stub outs and cleanout risers. Permanent objects such as property corners, power poles, water boxes, structures, etc. shall be used for swing ties.

Building Laterals: Building lateral pipelines connecting to the District's sanitary sewer system shall meet the requirements listed below and the criteria listed in Appendix A-5, page 75 and Appendix A-6, page 77.

- **Residential Building Laterals:** The diameter of gravity building laterals shall not be less than the pipeline diameter exiting the structure, or less than 4 inches for a single residence or two residences. Six-inch diameter pipeline or larger shall be used for more than two dwelling units.

- **Commercial Building Laterals:** The minimum pipeline diameter for commercial gravity building laterals shall not be less than 6 inches.

Appropriate fittings shall be used in connecting to the service connection provided by the District. On double sewer services, both wye's shall be uncovered prior to connection to the system for District inspection and the appropriate wye shall be used.

Joints in all building laterals shall be of a collar type as recommended by the manufacturer and shall pass the District's inspection and required tests.

A-6.10 Testing of Sanitary Sewer Facilities

The following tests will be required for all sanitary sewer facilities connected to the District's sanitary sewer system. Testing shall not be permitted until all excavation, backfilling (for other utilities), and grading (for roadway subgrade and structural section) in the immediate area of the sanitary sewer facility has been completed.

Gravity Pipelines: After the sewer pipelines have been properly backfilled to a depth where additional backfilling will not disturb the position of the pipe, all sections shall be tested either *hydrostatically* or with an *air* test. In no case shall the required minimum backfill be less than 30 inches above the top of the pipe before subjecting the pipeline to the test. All necessary materials and equipment to make the test shall be provided by the owner or their agent.

> **Hydrostatic Test**: A section of sewer pipeline shall be prepared for testing by plugging the upper side of the downstream manhole and all openings in the upstream manhole except the downstream opening. Where grades are slight, two or more sections between manholes may be tested at once. Where grades are steep, and excessive test heads would result by testing from one manhole to another, test tees the full size of the sewer main shall be installed at intermediate points so the maximum head on any section under test will not exceed 15 feet.
>
> The allowable leakage in the test section shall not exceed 350 gallons per mile per day per inch diameter of pipe tested at the 5-foot test head.
>
> If it is necessary or desirable to increase the test head above 5 feet, the allowable leakage will be increased at the rate of 80 gallons for each foot of increased in head.

Test sections showing leakage in excess of that allowed shall be repaired or reconstructed as necessary to reduce the leakage to that specified above and the pipeline retested.

Air Test: Air testing may be used in lieu of the hydrostatic testing. Air testing shall be as specified herein unless otherwise directed by the General Manager. Length of pipeline tested shall be limited to the length between adjacent manholes. Air test procedure shall be as follows:
Pressurize the test section to 4.0 pounds per square inch and hold above 3.5 pounds per square inch for not less than 5 minutes. Add air if necessary to keep the pressure above 3.5 pounds per square inch. At the end of this 5 minute saturation period, note the pressure (must be 3.5 pounds per square inch min.) and begin the timed period. If the pressure drops 0.5 pounds per square inch in less than the time given in the following table, the section of pipe shall not have passed the test.

If the time for the pressure to drop 0.5 pounds per square inch is 125 percent or less of the time given in the table, the pipeline shall immediately be re-pressurized to 3.0 pounds per square inch and the test repeated.

For 8 inch and smaller pipe if the pressure drops less than 0.5 pounds per square inch after the initial pressurization and air is not added, the section undergoing test shall have passed.

If the test is not passed, the leak shall be found and repaired to the satisfaction of the General Manager and the pipeline shall be retested.

House waste piping shall be considered part of the building lateral to which it is connected. No adjustment of test time shall be allowed to compensate for the smaller diameter of the house waste piping.

Lateral Size	Minimum Time in Seconds
4	122
6	184
8	245
10	306
12	367
15	460

For larger diameter pipe, use the following formula:

Minimum time in seconds = 370 x pipe diameter in feet

When the prevailing ground water is above the sewer being tested, air pressure shall be increased 0.43 pounds per square inch for each foot the water table is above the flow line of the sewer.

The pressure gauge used shall be supplied by the contractor, shall have minimum divisions of 0.10 pounds per square inch, and shall have an accuracy of 0.04 pounds per square inch. Accuracy and calibration of the gauge shall be certified by a reliable testing firm at 6 month intervals or when requested by the General Manager. In addition, the General Manager may compare the contractor's gauge with a District owned gauge at any time.

Mandrel Testing: Deflection test for Plastic Pipe and Fittings -Installed pipe shall be tested to insure that vertical deflections for plastic pipe do not exceed the maximum allowable deflection. Maximum allowable deflections shall be governed by the mandrel requirements stated herein and shall nominally be:

Nominal Pipe Size	Percentage
Up to and including 12-inch	5.0
Over 12- to and including 30-inch	4.0
Over 30-inch	3.0

The maximum average ID shall be equal to the average OD minus two times the minimum wall thicknesses per applicable ASTM Standards. Manufacturing and other tolerances shall not be considered for determining maximum allowable deflections.

Deflection tests shall be performed not sooner than 30 days after completion of placement and densification of backfill. The pipe shall be cleaned prior to testing.

For all pipes less that 24-inch ID, a mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded. If the mandrel fails to pass, the pipe will be deemed to be over deflected. Prior to use, the mandrel shall be approved by the engineer or by another entity approved by the engineer. Use of an uncertified mandrel or a mandrel altered or modified after certification will invalidate the test.

Any over deflected pipe shall be uncovered and, if not damaged, reinstalled.

Damaged pipe shall not be reinstalled, but shall be removed from the work site. Any pipe subjected to any method or process other than removal, which attempts, even successfully, to reduce or cure any over deflection, shall be uncovered, removed from the work site and replaced with new pipe.

The mandrel shall:

- Have an odd number of legs (nine legs minimum) and be a rigid, nonadjustable mandrel having an effective length not less than its nominal diameter.

- Be fabricated of steel, be fitted with pulling rings at each end, be stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size, and mandrel OD (e.g., PVC D 3034-8 inch - 7.524 inch, ABS Composite D 2680-10 inch

- 9.584 inch); and be furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel. For the pipe IDS nominally 24-inch and larger, deflections shall be determined by a method submitted to and approved by the engineer. If a mandrel is selected, the minimum diameter, length and other requirements shall conform to the dimensions and requirements as stated above.

All costs incurred by the contractor attributable to deflection testing including any delays, shall be borne by the contractor.

Television Tests: Each section of sewer pipeline shall be subject to inspection by use of a television (T.V.) camera. Use of the T.V. inspection shall not relieve the contractor of the responsibility for performing the tests outlined in this section nor shall it be used in lieu thereof.

Pre-inspection Preparation - T.V. inspection will not be scheduled or made until the following operations are complete:

- All sewer pipelines are installed and backfilled to finished grade, or, if pavement will be finished grade, to the final street subgrade, but prior to paving.
- All structures are in place and pipelines are accessible from structures.
- All pipelines have been balled, flushed and tested for deflection.
- All pipelines have been successfully tested.

Arrangements for Inspection - When the contractor determines that the pipeline is ready for inspection, the contractor shall notify the District and request a date for the T.V. inspection. The District shall notify the contractor of the scheduled date. If it is determined by the contractor that the job site will not be ready or accessible for the T.V. inspection on the scheduled date, as notified, the contractor shall notify the District of the necessary cancellation at least 48 hours in advance of the scheduled inspection. Rescheduling shall be accomplished in the same manner as for the initial inspection.

The developer shall bear the cost of the first T.V. inspection made for the purpose of determining acceptance. Subsequent inspections and T.V. camera assistance rendered by the District shall be charged labor, materials, equipment, and travel time.

Grounds for Refusal of Acceptance - All pipelines that have been televised will be evaluated by the District for deficiencies. If no deficiencies are noted, the sewer installation portion of the work will be considered satisfactory.

The following conditions are considered unacceptable for sewer pipelines and will result in refusal of acceptance:

- Visible standing water
- Joint separations greater than recommended by manufacturer
- Cocked joints present in straight runs or on the wrong side of pipe curve
- Chipped pipe
- Cracked pipe
- Infiltration or exfiltration
- Debris or other foreign matter
- Protrusions or excessive roughness in pipe
- Offset joint
- Out of round or diameter deflected pipe
- Improper alignment or curves not conforming to specified line
- Upset in normal hydraulic regime
- Any conditions that prevents the economical, safe or reasonable use of the sewer
- Pipeline sags in excess of 1/2-inch standing water

Video Tape - Televised sewer pipelines will be recorded onto video tape. The contractor may view video tapes within 2 working days at the District Offices by making an appointment. All video tapes produced as a result of the work shall be the sole property of the District and shall remain under its care and custody at all times.

Reinspection - If the sewer pipeline offered for acceptance fails to meet applicable specifications, the District shall have a right to reinspect after correction of defects and to charge a re-televising fee in accordance with current District rates. The T.V. testing process shall be repeated as necessary until all defects have been corrected to the satisfaction of the District.

Force Main Testing:

Pressure Class PVC Pipe - Each section of PVC pipe shall be tested in accordance with the Inspection and Testing methods outlined for pressure PVC pipe in the UniBell Handbook of PVC Pipe with the following conditions. The pipeline shall be subjected to a test pressure of not less than 150 pounds per square inch or the service pressure plus 50 pounds, whichever is greater, without exceeding the pressure rating for the pipe at the lowest end of the pipe. The pressure shall be applied for a minimum of 2 hours. All exposed joints, bends, angles, and fittings shall be closely examined during the test. Any part of the pipeline which proves to be defective shall be replaced and the pipeline retested.

Ductile Iron Pipe - Each section of ductile iron pipe shall be tested in accordance with Hydrostatic Testing methods outlined for ductile iron water mains in the Ductile Iron Pipe Research Association Handbook with the following conditions. The pipeline shall be subjected to a test pressure of not less than 150 pounds per square inch or the service pressure plus 50 pounds, whichever is greater, without exceeding the pressure rating for the pipe at the lowest end of the pipe. The pressure shall be applied for a minimum of 2 hours. All exposed joints, bends, angles, and fittings shall be closely examined during the test. Any part of the pipeline which proves to be defective shall be replaced and the pipeline retested.

Manhole Testing: If deemed necessary by the District, any or all manholes shall be tested for leakage by one of the following procedures:

Water Test - All inlet and outlet pipes shall be plugged and the manhole filled with water to the top of the manhole frame. The water should be introduced into the test section at least 4 hours in advance of the official test period to allow the manhole and joint material to become saturated. The manhole shall then be refilled to the original water level. At the beginning of the test, the elevation of the water in the upper manhole shall be carefully measured from a point on the manhole rim. After a period of 4 hours, the water elevation shall be measured from the same point on the manhole rim and the loss of water during the test period calculated. If this calculation is difficult, enough water shall be measured into the upper manhole to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage. For manholes, the allowable leakage shall not exceed 0.13 gallons per hour. Manholes showing leakage in excess of that allowed shall be repaired or reconstructed as necessary to reduce the leakage to that specified above and the manhole retested.

Vacuum Test - Vacuum test equipment shall be used per the manufacturer's specifications. A vacuum of 10 inch Hg should be drawn on the manhole, and the time for the vacuum to drop to 9 inch Hg shall be measured. For simplification in the field, a "rule of thumb" for this drop in vacuum shall be conservatively established at 60 seconds for a 48-inch diameter manhole; 75 seconds for a 60-inch diameter manhole; and 90 seconds for a 72-inch diameter manhole.

A-6.11 Pavement Restoration

Asphalt Concrete Pavement Restoration: The contractor shall perform asphalt concrete patching and pavement restoration work in accordance with State of California Department of Transportation Standard Specifications, Section 39, and Contract Drawings and documents.

This work shall consist of furnishing and mixing aggregate and asphalt binder at a central mixing plant, spreading and compacting the mixture as specified herein in all areas affected by trenching and construction activities under this contract.

Asphalt concrete is designated as Type B and shall meet the requirements Section 39 of the State of California Department of Transportation Standard Specifications (July 1992) Type B Asphalt Concrete.

Asphalt concrete shall be produced in a batch mixing plant, a continuous pugmill mixing plant or a dryer-drum mixing plant. Proportioning shall be either by hot-feed control or cold-feed control.

Asphalts: Asphalt binder to be mixed with aggregate shall be Grade AR4000. The amount of asphalt binder to be mixed with the aggregate will be specified in the special provisions.

Liquid asphalt for prime coat shall conform to the provisions in "Liquid Asphalts", and shall be SC-250.

Aggregates: All aggregates shall be clean and free from decomposed materials, organic material and other deleterious substances.

Coarse aggregate is material retained on the No.4 sieve; fine aggregate is material passing the No.4 sieve; and supplemental fine aggregate is added fine material passing the No. 30 sieve, including dust from dust collectors.

Unless otherwise specified in the special provisions, the aggregate grading to the various types of asphalt concrete shall conform to the following:

Type	Grading
B, AR-4000	1/2" maximum

The combined aggregate, prior to the addition of asphalt binder, shall conform to the requirements of this section. Conformance with the grading requirements will be determined by California Test 202, modified by California Test 105 when there is a difference in specific gravity of 0.2 or more between the coarse and fine portions of the aggregate or between blends of different aggregates.

In the tables below, the symbol "X" is the gradation which the contractor proposes to furnish for the specific sieve. The proposed gradation shall meet the gradation shown in the table under "Limits of Proposed Gradation". Changes from one mix design to another shall not be made during the progress of the work unless permitted by the District Engineer. However, changes in proportions to conform to the approved mix design shall not be considered changes in mix design.

AGGREGATE GRADING REQUIREMENTS
Type B Asphalt Concrete
Percentage Passing

1/2" Maximum, Medium

Sieve Range	Limits of Compliance	Operating	Contract	Sizes	Gradation
3/4"		100	100		
1/2"		95-100	89-100		
3/8"		80-95	75-100		
No.4	59-66	X±5	X±8		
No.8	43-49	X±5	X±8		
No.30	22-27	X±5	X±8		
No.200		3-8	0-11		

Subgrade: Immediately prior to applying prime coat or paint binder, or immediately prior to placing the asphalt concrete when a prime coat or paint binder is not required, the subgrade to receive asphalt concrete shall conform to the compaction requirement and elevation tolerances specified for the material involved and shall be free of loose or extraneous material. If the asphalt concrete is to be placed on an existing base or pavement which was not constructed as part of the contract, the contractor shall clean the surface by sweeping, flushing or other means to remove all loose particles of paving, all dirt and all other extraneous material immediately before applying the prime coat or paint binder.

Prime Coat and Binder: Edges of existing pavement being joined and surface being overlaid shall receive a tack coat of SS1H bituminous binder or equivalent.

Prime coat shall be applied at the approximate total rate of 0.25 gallons per square yard of surface covered.

Prime coat shall be applied at a temperature conforming to the range of temperatures provided in the State of California Department of Transportation Standard Specifications, Section 93-1.03, "Mixing and Applying," for distributor application of the grade of liquid asphalt being used.

A paint binder shall be furnished and applied to all vertical surfaces of existing pavement, curbs, gutters when additional material is to placed to a pavement to be surfaced, and to other surfaces designated by the District Engineer.

Paint binder shall be applied in one application at a rate of from 0.02 to 0.10 gallon per square yard of surface covered.

Spreading Equipment: Asphalt pavers shall be self-propelled mechanical spreading and finishing equipment, provided with a screed or strike-off assembly capable of distributing the material to not less than the full width of a traffic lane if necessary.

Compacting Equipment: A minimum of one steel-tired, two-axle tandem roller weighing not less than 8 tons or more than 10 tons shall be used for each asphalt paver to compact Open Graded asphalt concrete.

Temporary Paving: The owner or their agent shall comply with all general temporary paving requirements and special requirements of the Placer County, and the State of California Department of Transportation. Temporary paving (cold patch) shall be placed to grade over all backfilled trenches located within primary roadways until permanent paving is installed.

Temperature Requirements: Type B asphalt concrete shall be placed only when the atmospheric temperature is above 50 degrees Fahrenheit.

Asphalt concrete and asphalt concrete base shall not be placed when the underlying layer or surface is frozen, or when, in the opinion of the District Engineer, weather conditions will prevent the proper handling, finishing, or compaction of the mixtures.

Spreading: When directed by the District Engineer, paint binder shall be applied to any layer in advance of spreading the next layer.

Before placing the top layer adjacent to cold transverse construction joints, such joints shall be trimmed to a vertical face and to a neat line. Transverse joints shall be tested with a 12-foot straightedge and shall be cut back as required to conform to the requirements as specified in Pavement Restoration, Appendix A-6.11, Compacting, page 111. Connections to existing surfacing shall be feathered to conform to the requirements for smoothness. Longitudinal joints shall be trimmed to a vertical face and to a neat line if the edges of the previously laid surfacing are, in the opinion of the District Engineer, in such condition that the quality of the completed joint will be affected.

All layers shall be spread with an asphalt paver. Asphalt pavers shall be operated in such a manner as to insure continuous and uniform movement of the paver and shall lay a mat which will provide a lift of 2.5 inches in the compacted state and not less than 1.5 inches in the compacted state.

Compacting: A pass shall be one movement of a roller in either direction. A coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage, made to insure compaction without displacement of material in accordance with good rolling practice, shall be considered to be part of the coverage being made and not part of subsequent coverage. Each coverage shall be completed before subsequent coverages are started.

Rolling shall commence at the lower edge and shall progress toward the highest portion, and shall be performed so that cracking, shoving or displacement will be avoided.

The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the asphalt concrete by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the asphalt concrete shall be discontinued, and acceptable equipment shall be furnished by the contractor.

When a straightedge 12 feet long is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01 foot from the lower edge of the straightedge. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.02 foot are present when tested with a straightedge 12-feet long laid in a direction transverse to the center line and extending from edge to edge of a 12-foot traffic lane. Contractor shall furnish the 12-foot straight edge.

Manhole Adjustments: When manholes are adjusted to pavement grade, they shall be 1/2 to 3/4 inch below adjacent pavement surface. Asphalt concrete shall be neatly *tapered* from the final pavement grade to the manhole frame and cover. If the manhole is located within 2 feet of the edge of the pavement, in earth shoulders or earth flow-line areas, asphalt concrete shall be placed to a minimum 2 feet around the manhole and paved out at 45 degrees to the edge of existing pavement.

A-6.12 Clean Up

During the progress of the work, the owner or their agent shall keep the entire job site in a clean and orderly condition. Excess or unsuitable backfill material, broken pipe or other waste material shall be removed from the job site. Spillage resulting from hauling operations along or across existing streets or roads shall be removed immediately by the contractor. All gutters and roadside ditches shall be kept clean and free from obstructions. Any deviation from this practice shall have prior approval from the General Manager.

Before final acceptance of the work, the owner or their agent shall carefully clean up the work and premises, remove all temporary structures built for the work, and remove all surplus construction materials and rubbish of all kinds from the grounds which he has occupied and leave them in a neat condition.

A-6.13 Environmental Considerations

Water Pollution: The owner or their agent shall exercise every reasonable precaution to protect ditch conduits, streams, lakes and reservoirs from pollution with fuels, oils bitumens, chemicals, concrete and other harmful materials and shall conduct and schedule his/her operations so as to avoid or minimize muddying and silting of said conduits, streams, lakes and reservoirs.

Nothing in these Standards shall relieve the owner or their agent of the responsibility for compliance with Sections 5650 and 12015, California Fish and Game Code, or other applicable statutes relating to prevention or abatement of water pollution.

Erosion control features shall be constructed concurrently with other work and at the earliest practicable time. Care shall be exercised to preserve vegetation beyond the limits of construction.

When borrow material is obtained from other than commercially operated sources, erosion of the borrow site during and after completion of the work shall not result in water pollution. The material source shall be constructed, where practicable, so that water will not collect or stand therein.

The requirements of this section shall apply to all work performed within the District and to all noncommercial operated borrow or disposal sites used for work within the District. The word "stream" as hereinafter used shall be construed to mean ditch, conduit, stream, river, lake or reservoir.

The owner or their agent shall be completely responsible for compliance with all local, town, county, state, and federal regulations pertaining to water pollution and soil erosion including the payment of any fines or penalties imposed by any governmental agency as a result of work performed by or for the owner or their agent.

Stream Zones: Where working areas encroach on live streams, barriers adequate to prevent the flow of muddy water into streams shall be constructed and maintained between working areas and streams, and during the construction of such barriers, the muddying of streams shall be held to a minimum.

Prior to the removal of material from an area beneath a flowing stream, a bypass channel shall be constructed in a location which will carry the stream free from mud or silt around the material removal operation.

Should the operations of the owner or their agent require transportation of materials across live streams, such operations shall be conducted without muddying the stream. Mechanized equipment shall not be operated in the channels of such live streams except as may be necessary to construct crossings or barriers and fills at channel alterations.

When operations are completed, the flow of streams shall be returned as nearly as possible to the original meandering thread without creating the possibility of future bank erosion.

Material derived from the work shall not be deposited in a live stream channel where it could be washed away by high stream flows.

Erosion Control: This work shall consist of incorporating straw and/or mulch, fertilizing, and seeding all water pipeline excavation and backfill areas; all easements which are disturbed by pipelines, ditches or access roads shall also be seeded. Areas designated as waste or borrow areas shall be seeded after final cleanup of said areas is finished.

> **Seeding:** Seed shall be uniformly distributed over the seedbed area. The seed mixture chosen shall be one which is suitable for dry soils at an elevation of 5,000 to 6,000 feet and meets the specifications for purity and viability as given in Chapter XI-C of the Tahoe Regional Planning Agency's Handbook of Best Management Practices.
>
> The seeding operation shall be accomplished promptly after the cleanup of an area is

completed, in no case shall the seeding operation of an exposed or disturbed area be allowed to stand fallow through winter until the following construction season.

Fertilizer: Fertilizer shall be applied at a rate so as to provide 80 pounds of available nitrogen per acre and 100 pounds of available phosphoric acid (p2o5) per acre.

Mulch: Wood fiber mulch shall be applied to all areas at the rate of 1,500 pounds per acre. The mulch shall be applied in a slurry with the seed and fertilizer. Straw mulch shall be a cereal grain straw, not rotted and free of noxious weeds. Straw mulch shall be applied on areas as specified in the following paragraphs at the rate of 2 tons per acre. Mulching shall follow immediately after seeding.

Erosion control shall be used on all trench excavation outside of the paved Placer County, or State of California right-of-ways.

In addition, should the cross slope grade parallel with the trench be greater than 15 percent, Douglas Fir or Cedar 1 x 8 inch boards shall be placed normal to the pipe trench on 10 foot centers with 2 inches exposed above grade and extended 6 inches into original ground on each size before seeding.

A-6.14 Structural Concrete

Provide and install all cast-in-place concrete, as shown and as specified, including but not limited to the following:

- Accessories to be embedded in cast-in-place concrete, anchor bolts, etc.;
- Cutting, patching, finishing and curing of cast-in-place concrete;
- Coordination with all trades with regard to requirements for special bases, sleeves, chases, inserts, finishes, or provisions of any nature;
- Treatment of finished concrete surface.

Quality Assurance: Qualification of Workmen: All concrete work shall be completed by experienced and skilled concrete workmen working under the supervision of an experienced concrete contractor.

Reference Standards: The following references and standards are hereby made a part of this section. Nothing contained herein shall be construed as permitting work that is contrary to code requirements or governing rules and regulations.

ACI - American Concrete Institute.

- ACI 301 - "Specification for Structural Concrete for Buildings."
- ACI 304 - "Recommended practice for Measuring, Mixing and Placing Concrete."

- ACI 305 - "Recommended Practice for Hot Weather Concreting."
- ACI 306 - "Recommended Practice for Cold Weather Concreting."
- ACI 309 - "Recommendation Practice for Consolidation of Concrete."
- ACS 318 - "Building Code Requirements for Reinforced Concrete."
- ASTM - American Society for Testing and Materials.
- C 31 - "Making and Curing Concrete Test Specimens in the Field."
- C 33 - "Standard Specification for Concrete Aggregates."
- C 39 - "Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens."
- C 88 - "Standard Specification for Method of Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate."
- C 94 - "Standard Specification for Ready-Mixed Concrete."
- C 143 - "Standard Method of Test for Slump of Portland Cement Concrete."
- C 150 - "Standard Specification of Portland Cement."
- C 157 - "Standard Method of Test for Length Change of Hardened Mortar and Concrete."
- C 171 - "Standard Specification for Sheet Materials for Curing Concrete."
- C 172 - "Sampling Fresh Concrete."
- C 233 - "Testing Air-Entraining Admixtures for Concrete."
- C 260 - "Standard Specifications for Air-Entraining Admixtures for Concrete."
- C 309 - "Standard Specification for Liquid Membrane - Forming Compounds for Curing Concrete."
- C 494 - "Standard Specifications for Chemical Admixtures for Concrete."
- C 2419 - "Standard Specification for Method of Test for Sand - Equivalent Value of Soil and Fine Aggregate."
- E 329 - "Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction."

UBC - Uniform Building Code, Standards.

Testing Agency: Any testing Agency utilized during the course of the project should conform to the following: All reports and certificates prepared by the Testing Agency shall be signed by a Professional Engineer registered to practice as a Civil Engineer in the State of California. Test methods shall comply with the codes and standards listed.

Source Quality Control: The Testing Agency shall perform tests and/or assemble the necessary data indicating conformance with specifications as follows:

- Mix Designs **-** Furnish a list of proportions for each proposed mix.

- Strength **-** For each mix, submit data showing that the proposed mix will attain the required strength in accordance with the requirements of these specifications.

- Aggregate **-** For each aggregate used, submit data showing that it complies with ASTM C33. Include gradation, deleterious materials, specific gravity and soundness. For coarse aggregates in mixes for site work, include abrasion.

- Cement **-** Furnish mill tests for all cement used. Submit this data to the District for review prior to delivering any concrete materials to the site. Mix designs, test, etc., required by this specification need not be made specifically for this job, provided that data submitted is current within the last 12 months and that in the judgement of the Testing laboratory the test data correctly describes the materials proposed for use.

- Provide all necessary controls during batching, mixing, and placement of concrete.

The owner will perform and report on the following:

- Review mix designs, certificates of compliance, and samples of materials proposed for use;

- Test and inspect materials, as necessary, in accordance with ACI 318, for compliance with requirements;

- Take samples as required from sources designated by contractor;

- Inspect batch plant prior to any Work to verify following:

    1) Plant is equipped with approved metering devices for determining moisture content of fine aggregate.

    2) Other plant quality controls are adequate.

- Compression Tests: During progress of Work, take not less than five identical test specimens for standard cylinder tests at job site for each 100 cubic yards or less of class "A" and "B" concrete placed per day (except 50 cubic yards or less at underpinning), in accordance with requirements of ASTM C 31 and C 172. Make standard 7 and 28 days after casting. Keep fifth cylinder as a check cylinder for further tests if required.

- Slump Tests: Make slump tests per ATM C 143 at time of making each set of cylinder specimens and for each truckload.

- Air Entrainment Tests: Make air entrainment test for each truckload.

Submittals: Submit mix designs for approval by owner prior to placement of any concrete.

Submit improvement plans and schedule concrete placement operations before commencing Work. Show all construction, contraction and expansion joints.

Product Delivery, Storage and Handling: Protect cement from moisture and rotate stock to insure fresh materials.

Protect cement from moisture and rotate stock to insure fresh materials.

Alternative Procedures: Concrete may be placed by pumping provided that pumping equipment is suitable for proposed use and provided that specific "pump mixes" are submitted with data showing that they comply with the requirements of these specifications and subject to approval of Testing Laboratory.

Concrete Mix: Class "A" **-** Stone aggregate concrete for use in foundations: 3/4 inch maximum size aggregate, specified minimum 28 day strength of 4,000-pounds per square inch, slump 3-inches, +/=1-inch, 4-8 percent air entrainment, maximum water/cement ratio of 0.43.

Concrete mixes shall comply with ASTM C94. Proportioning shall comply with Alternative 3, mixing and transporting shall comply with requirements for Truck-Mixed Concrete.

Materials: Portland Cement: Type II, ASTM C 150, with use of at lease 2 years with proposed aggregates without detrimental reaction. Cement shall not exceed 150 degrees Fahrenheit at time of use. Use one brand of cement throughout the Work.

Standard Weight Aggregates: ASTM C 33 from approved pits. The Maximum size used in a particular location shall be consistent with the form and dimensions of the section being placed, with the location and spacing of the reinforcing steel and with the method of vibration. The aggregate sizes shall be such as will produce dense, uniform concrete, free of rock pockets, honeycombs, or other irregularities. Aggregates for stone concrete shall conform to UBC Standard No., 26-2, except as modified by this section. Any suitable individual grading of coarse aggregates may be used, provided a workable and durably sound mix is obtained. <u>Fine and coarse aggregate for stone concrete</u> shall be clean, hard, fine grained, ground crushed rock or washed gravel or a combination of both, free from oil, organic matter, or other deleterious substances containing not more than 2 percent by weight of shale or cherty material.

Water: Clean and free of deleterious materials such as acids, alkalis, salts, oils, or organic substances.

Admixtures: Only if acceptable by Northstar Community Services District.

- Water Reducing Admixtures: ASTM C 494, Type A; Grace Construction Materials "WRDA"; Master Builders' "Pozzolith"; Sonneborn-Contech's "Trimix" or equal.

- Air Entraining Admixtures: ASTM C 260; Protec (Autolene Lubricant Company), MB-

VR (The Master Builders' Company), or Plastiment (Sika Chemical Corp.).

Epoxy Materials:

- Epoxy Adhesive: Ceilcote No. 348, Concresive LPL 1001, or equal.

- Epoxy Grout: Ceilcote No. 648, Grace Vibro-Foil Grout Master Builder's Masterflow No. 713 Grout, or equal.

Grout for Base Plates: Master Builder's "Embeco 636 Grout"; Conrad Sovig's "Perma Grout"; Master Builders' "Masterflow 713", or equal.

Vapor Barrier: St. Regis Paper Company's Sisal Kraft Division "Moistop", or equal, in sheets as wide as possible to avoid joints. Provide manufacturer's recommended tape for all seams, joints, and repairs.

Hardeners: Clear, Dust-on Type: Base price on application of 50 pounds per 100 square feet. Same as Conrad Sovig's "K-Natural"; Upco Company's "Hydromat"; Lambert Corp.'s "Colorhard"; or equal.

Drypack Mortar for Form Tie-Holes and Patching: Composed of one part Portland Cement and two parts of fine aggregate and water.

Cement Mortar for Sacking: 5-1/2 parts sand, 2-1/2 parts Portland Cement, 1-1/2 parts lime hydrate by volume, plus water.

Concrete Curing Requirements:

- Seven-day full water cure.

- Manufactured curing compounds may be used in addition to the 7-day full water cure upon written approval of the General Manager.

Pre-molded Joint Filler: ASTM D 1751.

Polyvinyl Waterstop: Neoprene, center bulb type, or equal.

Inspection: Prior to placement of concrete, contractor shall be responsible for the examination and acceptance of all conditions affecting the proper installation of his/her work and shall not proceed until all unsatisfactory conditions have been corrected including the following:

- Approval of compaction tests of fill and backfill.

- Completion of the placement of drainage fills or slab base.

- Completion of form work.

- Placement of reinforcement.

- Placement of embedded items.

- Completion of review of form work and reinforcing.

Slab on Grade and Footing: Vapor Barrier: Place completely over capillary break material subgrade. Lap joints 6 inches minimum, and continuously tape. Fit tightly to penetrations, and continuously tape. Install continuous tape at all edge conditions.

Sand Cushion: Place a 2-inch sand cushion on top of membrane immediately after placing membrane.

Clean and roughen all construction joint surfaces by removing latence and exposing sound aggregate. Thoroughly clean and moisten contact surfaces before placing fresh concrete.

Cleaning and wetting forms and subgrade: Remove foreign matter accumulated in forms, rigidly close ports and openings left in the form work immediately prior to starting concrete placing. Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce suction and maintain workability of the concrete mix. Thoroughly clean tools used in transporting, placing, and consolidating concrete immediately after each use. Wet subgrade surfaces, immediately prior to placing slabs on grade.

Placing Concrete: Transport concrete from batching plant to place of final deposit as rapidly as practicable. Place concrete before initial set has occurred and in no event after it has contained water for more than 90 minutes and 45 minutes when concrete temperature exceeds 85 degrees Fahrenheit. Convey concrete from mixer to forms as rapidly as possible and deposit as nearly as practicable in its final position by methods which will prevent segregation or loss of ingredients. Thoroughly vibrate and tamp concrete so that all parts of forms are filled and so that no voids remain in mass or on surface. Take special care to work concrete through and around reinforcing steel.

Deposit concrete in horizontal layers not over 8-inches deep. Use spouts, elephant trunks or other approved means as necessary to avoid segregation when dropping concrete. Free fall shall not exceed 5 feet unless approved by the District prior to placement.

Use as many vibrators and tampers as necessary to secure desired results for different parts of structure. Make extra vibrators available during placing of concrete, ready for service in case any vibrator in use fails.

For vibrating of concrete, use a mechanical internal vibrator having a frequency of not less than 4,000 impulses per minute. Place vibrating element directly in concrete and not attached to either inside or outside of forms or to reinforcing steel. Do not over vibrate concrete.

Provide runways for buggies or other approved means of conveying concrete into place to prevent displacement of forms or reinforcement. Do not run buggies directly over reinforcing steel or on planks supported directly by reinforcing steel. Take care not to displace reinforcement, anchor bolts or other materials that are to be embedded in concrete. Where placing of concrete has been stopped for a sufficient period of time so that shrinkage or warp has separated forms and concrete, draw forms into firm contact with concrete before placing additional concrete. Prevent any shoulder or ledge being formed at a cold joint.

Bring surfaces to be finished to proper grade, strike off, finish in a workmanlike manner. Ensure smooth level surfaces.

Add no water when placing concrete.

Finishing Concrete: Sidewalks, Exterior Slabs on Grade and Curbs:

- Compact, screed, level, and tamp with a grid tamper to raise a thin mortar bed to the surface. Steel trowel and medium broom after concrete has hardened sufficiently to prevent the drawing of moisture to the surface. Do not dust with dry materials. Avoid excessive tamping and surface mortar.

- Tool mark slabs where shown. Round all edges to a 1/2-inch radius.

Curing Concrete: During initial 7 days of curing, concrete and form work shall be kept continuously moist so that a film of water remains on the concrete or form work surface. This may be accomplished through continuously fogging or spraying with water or with moisture retaining fabric coverings. Any covering must be free of any substance that would be harmful to the concrete or the curing process. New fabric coverings should be thoroughly rinsed in water prior to use.

Weather Protection:

Cold Weather Requirements:

- Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather in accordance with ACI 306. Use no frozen materials or materials containing snow or ice.

- All reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be free from snow or ice. Whenever the temperature of the surrounding air is below 40 degrees Fahrenheit, all concrete placed in the forms shall have a temperature of 45 degrees Fahrenheit or higher after placement. Provide adequate means for maintaining this temperature for 4 days. Provide any additional time necessary to ensure proper curing of the concrete as directed. The housing, covering, or other protection used in connection with curing shall remain in place and intact at least 24 hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

Hot-Weather Requirements:

- In hot weather, take suitable precautions to avoid drying of concrete prior to finishing operations. Provide windbreaks, sun shades, fog sprays, or other devices as directed and as required.

- Concrete deposited in hot weather shall no have a placing temperature that will cause difficulty from loss of slump, flash set, or cold joints. Concrete temperature shall be less than 90 degrees Fahrenheit, unless higher temperatures are permitted by the Architect.

Defective Work: Any concrete work not formed as shown or not true to the intended alignment or not plumb or level where so intended, or not true to the intended grades and levels or that has voids or rack pockets that have not been filled, or that has any sawdust, wood, or debris embedded in it, or does not fully conform to the Specifications will be deemed to be defective. Concrete finish which is not properly surfaced as specified, or which varies more than 1/4 inch from the required finish grade (except floors having drains), or which has any roughened top surfaces, or which does not connect properly to the adjoining work will be deemed to be defective. Defective work shall be removed and be replaced with workmanship and materials complying with the requirements of the Contract Documents at no increase in Contract Price and with no time extension allowed.

Patching and Grinding: Formed Surfaces: Patch tie holes and defective areas immediately after form removal. Bonding grout approximately one part Portland Cement to one part fine sand passing a #30 sieve, mixed to creamy consistency. Patching mortar shall be made of the same material and approximately the same proportions as used for concrete, except that coarse aggregate shall be omitted and mortar shall consist of not more than one part Portland Cement to 2-1/2 parts damp loose sand by volume. Combine white and gray Portland Cement as necessary to match color of surrounding concrete. Use no more mixing water than necessary for handling and placing. Mix patching mortar in advance and allow to stand with frequent mixing with trowel without adding water until it has reached the stiffest consistency that will permit placing. Remove honeycombed and other defective concrete down to sound concrete. Dampen area to be patched and at least 6 inches surrounding the area. After water has evaporated from surface, a coat of bonding grout shall be well brushed into the surface. When the bonding grout begins to lose water sheen, apply patching mortar, thoroughly consolidate and strike off slightly higher than surrounding surface. All patching mortar shall set undisturbed for at least 1 hour before final finishing. Do not finish patches for 7 days. Tie holes shall be cleaned, dampened, and solidly filled with patching mortar. All areas to be repaired or grouted are to be inspected by the owner and architect prior to repair.

Slabs on Grade: After entire slab is finished, shrinkage cracks may appear which shall be patched as follows:

- Where the slab is not exposed or where appearance is not important, fill cracks larger than 1/32 inch wide with cement grout and strike off level with surface.

- Where slab is exposed and appearance is important, repair all unsightly cracks in a manner satisfactory in appearance to the Architect. If this cannot be accomplished, then the concrete shall be considered defective.

Wall Finishes:

- Sack all exposed exterior wall surfaces to fill only superficial air voids and irregularities which are larger than 1/4 inch in diameter with a cement mortar grout, remove all excess grout by sacking without use of water. Take care in application of grout and in sacking excess grout from surface in order that all voids are filled without a thickness of grout being built up on adjacent concrete surface. The resultant finish and texture of concrete shall match existing finish and texture.

Clean Up: Wash and mop clean all interior finish surfaces and sweep and hose clean exterior surfaces after removal of protective covering. Leave all finish surfaces clean and free from oil, paint, plaster, stain and foreign substances and in approved condition.

Reinforcement: Bar reinforcement shall be deformed, and shall be intermediate grade conforming to the "Billett-Steel Bars for Concrete Reinforcement" (ASTM Designation A15), and be of the shape and dimensions shown on the improvement plans. Before any reinforcing steel is delivered to the job site, two sets of prints of the shop drawings shall be submitted to the General Manager for his/her approval, showing the number, length, and a dimensioned bending diagram of all steel bars and rods. Such approval is intended only as an additional precaution against errors and the responsibility for furnishing and placing steel in accordance with the details shown on the improvement plans and as specified shall still remain with the contractor.

A-6.15 Pump Station Structures

Doors: All man doors shall be hollow metal with all steel door frame. Minimum size 3068. Doors shall be of adequate size to move interior equipment in and out for maintenance.

Clearance Requirements: Where works are to be constructed within vaults, houses, or other enclosing structures, the desired minimum horizontal clearance around, outside of, and between the extreme dimensions of appurtenances such as pipes, valves, fittings, flanges, pumps, tanks, and auxiliary equipment shall be 24 inches; the desired minimum horizontal clearance between said extreme dimensions and the vertical walls or enclosing surfaces of said structures shall be 24 inches; and the desired minimum vertical clearance under and between said extreme dimensions and the horizontal floors or bottom surfaces shall be 18 inches. Electrical equipment clearances shall be per the current National Electrical Code.

Floor Drains: The floor or bottom areas of the above mentioned structures shall be drained by means of sloping floors, catch basins with grates, and drain lines constructed to terminate at an approved location, and will not recirculate into the enclosing structure. The catch basin grates shall have a free flowing area of not less than 50 square inches, and the minimum drain line shall be 4 inch size. Where gravity discharge through a drain line is not feasible, a power driven sump pump or line pump, automatically activated by a liquid level sensing device, shall be installed. Gravity drains shall be equipped with a trap and drain to the wet well.

The enclosing structures shall be designed so that precipitation, surface water, and ground water cannot enter said structure. Floors shall be at least 6 inches above outside ground level. The Outside ground level shall have adequate storm drainage facilities not connected to the sanitary sewer system.

Materials and Workmanship: All materials used or incorporated in any works to be accepted by the District shall be new and the best market quality. All work shall be completed in the best, most thorough, substantial and workmanlike manner.

All material, labor and finished work shall be subject to the approval of the General Manager as to its quality and fitness, and shall be immediately removed if it does not meet with his/her approval.

Improvement Plans: The owner or their agent shall submit to the General Manager two prints of all structure plans for his/her review. These improvement plans shall be on 24 x 36 inch sheets.

All structures above ground shall be compatible architecturally with existing or future conditions and shall be approved as to appearance prior to final structure design.

Insulation: Insulation shall be placed if required. The owner or their agent shall submit to the General Manager insulation calculations based upon a low temperature of minus 28 degrees Fahrenheit.

Surface Treatment: The structures surface treatments shall be approved by the General Manager.

Loads: The minimum vertical snow load applicable to the design of roofs and similar surfaces including water tanks shall conform to the following schedule.

Elevation of Structure	Normal Snow Load
5500 and greater, but less than 6000	220 PSF
6000 and greater, but less than 6500	260 PSF
6500 and greater, but less than 7000	300 PSF

Wind loads shall conform to the uniform building code.

Two sets of calculations shall be sent to the General Manager.

Concrete: All concrete used in District structures shall conform to Structural Concrete, Appendix A-6.14, page 117, of this specification.

Excavation and Backfill: Excavation and backfill for buildings and structures shall be approved by the General Manager.

The owner or their agent shall, at no expense to the District, take compaction tests one for each 100 cubic yards of structure backfill by an approved commercial testing laboratory with two copies of the results sent to the General Manager.

The moisture density test shall be ASTM D1557, Method A.

The in place density shall be determined by ASTM D1556.

Access Roads and Site Work: Access roads to District sanitary sewer facilities shall be of an all weather type with a minimum width of 12 feet of traveled way. This width may be increased if length or location become a consideration to the District.

The road grades shall be a maximum of 8 percent. The structural section for access roads and parking areas shall be a minimum of 6 inches of aggregate base Class 2, and 4 inches of asphalt concrete.

There shall be adequate consideration given to roadway and site drainage.

Tops of all excavation slopes and toe of embankment slopes shall have "V" type ditches draining the runoff away from the site area.

All structure sites shall allow for a minimum of one pickup truck parking and adequate room to turn around where necessary.

The District will require free title to all structure sites and a recorded access easement on the road extending a minimum of 5 feet beyond any construction limits.

Welding: All welding shall conform to the welding handbook of the American Welding Society, and as modified herein.

Welder Qualification: All welders working on any portion of work to be incorporated in the District sanitary sewer system shall be certified as specified below and as may be required by the General Manager.

Fabrication and testing of test specimens for qualification of welding procedures and qualification of welding operators shall be completed at no cost to the District.

Test reports shall be submitted to the General Manager in triplicate and approved by him in writing prior to start of fabrication. Test reports shall become the property of the District.

The General Manager may require tested specimens to be furnished to him for review after testing. In the event that test specimens are not satisfactory, the welder will be disqualified.

The contractor shall advise the General Manager in advance of testing weld specimens and shall provide access to the test area so that testing may be witnessed by the General Manager, and bear all costs of such inspection.

Welder qualification tests will be evaluated in accordance with requirements of the AWS except that radiographic examinations will not be used in lieu of the guided bend tests. Radiographic examinations may be used as a supplement to other tests and should they indicate that a test weld is unsound, the General Manager may disqualify the welder.

In lieu of the AWS requirements, qualification tests for tack welding will be the same as the qualification tests required for butt welding material up to and including 3/4 inch thick.

All certification tests shall be performed at the owner or their agent's expense by a commercial testing laboratory approved by the General Manager.

Welding Testing: If in the opinion of the General Manager, the workmanship or the welds are of such a type or nature as to require testing, the owner or their agent shall have the necessary tests performed by a commercial testing laboratory at the owner or their agent's expense with the results delivered to the General Manager.

Pipelines and Fittings: All piping and appurtenances shall be installed in the position and to accurate lines, elevations, and grades as shown on the improvement plans or specified herein. All pipelines shall be rigidly supported and braced by approved hangers, brackets, or other devices. When temporary supports are used, they shall be sufficiently rigid to prevent any shifting or distortion of the piping or related work.

Pipe shall be cleaned of dirt and scale prior to installation and all joints swabbed clean before jointing. All fittings necessary for the satisfactory alignment and arrangement of piping and all necessary unions and cleanouts shall be adequately supported throughout and the weight thereof shall be carried independently of the pump casings or the equipment. All pipe work shall be mounted in a truly workmanlike manner with pipe work parallel with vertical and horizontal axis of reference. All sections of pipe shall be rigidly bolted or joined together after being cut accurately to length in such a manner as to relieve any and all parts of equipment of undue strain resulting from closure of flanged or other joints or connections. Equipment shall be so positioned and aligned that no strain shall be induced within the equipment during or subsequent to the installation of pipe work.

Threaded joints shall be made up with the best quality pure lead paste or approved equal, carefully and smoothly placed on the male threads only. All screwed joints shall be made tight with tongs and wrenches; caulking of any kind will not be permitted.

Use of thread cement or caulking to make joints tight is prohibited. All cut ends shall be reamed to full bore before assembly.

Flanged joints shall be made up square, with even pressure on the gaskets, and shall be watertight. Gaskets shall be heat quality rubber packing not less than 1/16 inch thick and compatible with wastewater applications. All gaskets shall be the full width of the flanges to which they are applied.

All piping within structure shall have bolted flanged joints except as authorized by the General Manager.

The owner or their agent shall, if requested by the District, demonstrate the disassembly and reassembly of the station piping.

Bolts and nuts for flanged joints shall be made of the best quality of defined iron or mild steel and shall have sound, well fitting threads. Bolts shall be provided with hexagonal chamfered heads and nuts. The underside of all bolt heads and nuts shall have true surfaces at right angles to the axis of the bolts. The lengths of the bolts shall be such that after joints are made up, the bolts shall protrude through the nuts, but in no case shall they protrude more than 1/2 inch. All bolts shall have an anti seize compound applied to all male threads.

Dehumidifiers, Heating, Ventilation, and Air Conditioning: Where necessary these types of equipment shall be installed such that the control of the environment within wastewater lift stations and/or other District structures may be controlled.

Heaters shall be required in structures where cold sensitive equipment is located. Cabinets containing cold sensitive equipment shall be equipped with heat strips or heat ventilation. Piping located above ground or in such a manner that exposure to extreme cold would be evident if the heating system failed shall be avoided.

Dehumidifiers where required shall conform to the following. The moisture removing capability of the dehumidifier shall vary with the temperature and relative humidity. The minimum capacity rating at 80 degrees Fahrenheit shall be 15.5 pints per day at 60 percent relative humidity. The maximum capacity at 80 degrees Fahrenheit shall be 25 pints per day at 90 percent humidity. The dehumidifier shall be controlled automatically by an adjustable humidistat and low air temperature cut out with contacts of adequate capacity for the dehumidifier motor.

Ventilation shall be accomplished by using a ventilating blower with sufficient capacity in cubic feet per minute to ventilate the enclosing structure. Minimum guidelines for air changes per hour shall be taken from the current publication of NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities.* A gas detection system shall be installed to check for levels of oxygen, hydrogen sulfide, and explosive gases. The indicators on the gas detection system shall be located such that personnel entering the building will receive notification of hazards. Telemetry equipment shall be connected to the gas detection system to remotely notify District personnel in the event there is a detection of dangerous levels of explosive gases.

Air conditioning shall be installed if the horsepower requirements of the pump motors are such that overheating will be a consideration. Air-conditioning type and size shall be approved by the General Manager.

Calculations for environmental conditions within the lift station shall be submitted with lift station improvement plans.

A-6.16 Pump Station Electrical Work

These Standards cover in general the Districts requirements. The developer shall have his/her engineers specify in additional detail all necessary items of electrical work not mentioned herein.

Materials: All materials shall be new, of the quality herein specified, free from defects and approved by the Underwriters' Laboratories for the purpose for which they are used. Materials shall be of uniform type and make throughout.

Equipment Identification: All panelboards, remote control switches, push buttons, terminal boxes, etc., shall be properly identified with a descriptive nameplate. Nameplate shall be made of 1/16-inch laminated plastic with black background and white letters. Size of letters shall be 1/8 inch high for equipment in device box or boxes and 1/4 inch high for panelboard, terminal can, or larger items. Letters shall be machine engraved. Punched strip tape type nameplates and cardholders in any form are not acceptable.

Working Space: Provide adequate working space around electrical equipment in compliance with the National Electrical Code. In general, provide 6-1/2 foot of headroom and 42-inch minimum clear work space in front of panelboards and controls.

Wire: Installed in conduit and control panels shall be stranded copper with 600 volt type "THHN" or "THWN" insulation. Direct burial cable shall not be allowed.

All other wires shall be stranded type copper wire of not less than 98 percent conductivity. Wires shall bear the Underwriters' label, be color coded and be marked with gauge, type, and manufacturer's name on 24 inch centers.

Wire splices and joints are allowed only in readily accessible junction boxes. #10 AWG or smaller shall be twisted together electrically and mechanically secured and insulated with approved type insulated electrical spring connectors Scotchlok or Ideal. Threaded type wire nut, porcelain or bakelite are not acceptable. Joints and connections for #8 AWG, or larger, shall be made with Burndy, T & B or approved equal, solderless tool applied pressure lugs and connectors. Un-insulated lugs and wire ends shall be insulated with layers of plastic tape equal to insulation of wire and all irregular surfaces properly padded with "Scotchfill" putty prior to application of tape. Tape shall be equal to Scotch #33, General Electric #AW-1 or H.K. Porter #107.

Lace or wire tie conductors together in a neat and workmanlike manner in panelboards, wireways, raceways pull boxes, and similar locations. Plastic wiring ducts are preferred as an alternate to lace or wire ties.

#12 AWG wire shall be the minimum size wire used for lighting and power circuits. Wires run in conduit shall conform to code regulations as to number of wires and conduit size. All wire ends shall be identified with Thomas & Betts WM-A-Z and/or WM-0-45 or approved equal. Identification shall be as shown on the electrical drawings.

Outlet Boxes: Shall be galvanized or sherardized, one-piece pressed steel type. Boxes for fixtures shall be not less than 4 inches and be equipped with fixture stud. Boxes shall be at least 1-1/2 inches deep. Boxes must be accurately placed for finish, independently and securely supported by adequate wood backing or by manufactured adjustable channel type heavy duty box hangers. Boxes in unfinished areas, installed exposed, shall be cast type "condulet" for switches and convenience outlets. Exposed boxes mounted below 6 feet from finished floor shall be cast type.

Codes, Rules, Regulations: All work shall be in full accordance with the latest edition of the National Electrical Code, California Electrical Code, and all state, federal, local, and other laws including the requirements of the serving utility company. However, when these specifications call for materials or construction of a better quality or larger sizes than required by the above mentioned rules and regulations, the provisions of the specifications shall take precedence.

Pilot Lights: Shall be of the oil-tight type and shall have push-to-test feature. Color of lens shall be red unless noted otherwise on drawings.

Switchboard Motor Controls: Shall generally consist of the following components: main circuit breaker; combination drawout circuit breakers and full voltage or soft-start motor starters; dry transformers; 120-volt panelboards; and all appurtenances.

The switchboard/motor controls shall consist of vertical sections to accommodate the circuit breakers, motor starters and control devices. The control structures shall be free-standing, designed and tested in accordance with the latest NEMA ICS 1970 standards, and shall be metal enclosed indoor type, completely interwired in accordance with steel with NEMA Class I Type B standards. Fabrication shall be of code gauge steel with 1-1/2 x 1-1/2 inch welded structural steel angles at the top and bottom of the frames. Control cabinets shall be designed for multiple alignment with continuous main horizontal bus and multiple sections riveted together.

Doors and blank cover plates shall be code gauge steel with gaskets around each door except panelboard. Doors shall use semi-concealed piano type hinges and be secured with slotted head, one-quarter turn captive speed fasteners or approved equal.

All bus bars shall be rectangular and formed of alcan tin-plated copper supported on fiberglass insulators and be properly braced to withstand mechanical stresses of not less than 22,000 amperes. Each combination starting unit shall be mounted on a chassis, having a height as required by the particular size of the combination starter and circuit breaker unit. The chassis shall be so housed and constructed as to isolate the components from adjoining circuits. All motor starters shall be of the magnetic type for across-the-line starting with ambient compensated thermal and adjustable overload protection in each phase. Overload heaters shall be sized for the load they are protecting. Motor starters and circuit breakers shall be I.T.E., Square D, or approved equal. Each combination starter shall be protected by a molded case circuit breaker having an interrupting capacity of not less than 14,000 amperes (symmetrical) and/or as called for on the drawings. Adjustable time delay relays shall be provided, where shown on drawings, to start motors in sequence to limit starting demand on commercial power. Ammeters shall be used as necessary.

Time delay relays, control power transformers and auxiliary relays as necessary shall be provided in each cubicle and each internal and external component shall be clearly identified.

Components shall be mounted on removable back panels, drilled and tapped from the front. They shall not protrude into or restrict wireways. Push buttons, selector switches, meters and pilot lights shall be visible and operable externally, through gasketed, die-cut openings in the unit door. Thermal overload protective devices in combination starters and branch circuit protective devices shall have an external operating device. The circuit breaker shall be interlocked with the door so that the circuit must be de-energized before the door can be opened. A semi-concealed interlock "defeater" arrangement shall be provided. Provisions shall be made for padlocking the breakers with a minimum of three padlocks in the "on or off" position.

All plug-in equipment not mounted horizontally shall have readily removable physical restraining devices to prevent their vibrating loose and falling out.

A wiring diagram specifically detailed for each cubicle shall be furnished and installed inside each cubicle in a door mounted holder.

A continuous ground bus shall extend through all motor control centers. Provide space heaters and thermostats with a calibrated dial adjustment in each section.

All motor control centers and switchboards shall be mounted on 1-1/2 inch concrete slab raised above normal floor level. Grouting will not be accepted. Provide anchor bolts. At locations shown on improvement plans, maintain a minimum of 2 inch air space between rear of switchboards and concrete or metal walls. The 1-1/2 inch concrete pads shall be provided under this section of the specifications to fit the exact size and shape of the switchboards.

Identification of electrical interior controls shall be of a plastic coated material, or other permanent type of marking, as approved by the General Manager. Dymo tape is not accepted. The permanently attached marking shall be attached to each of the following, but not necessarily limited to such: relays, timers, terminal blocks, starters, control transformers, etc. Identification of each item shall correspond to wiring diagram of final shop drawings.

A qualified representative of each manufactured item shall make final adjustments of equipment.

Lighting Fixtures and Lamps: Shall be as shown in the Fixture Schedule complete with lamps listed therein, and shall be U.L. approved, listed and labeled for use as installed. All fixtures of a kind shall be of identical manufacture, appearance and finish. Fixtures shall be located where shown on improvement plans. Where structural conditions require slight deviations, resulting layout shall be symmetrical and as approved by the General Manager.

Bussing: All bussing shall be of copper with sizes based on current code requirements or a current carrying capacity of not over 1,000 amperes per square inch of cross-section. Bars shall be 1/4 inch thickness minimum. All contact surfaces shall be cleaned bright and silver-plated by submergence in an electrolytic bath. Busses shall be rigidly supported and thoroughly braced to match short circuit values of the main circuit breaker.

Circuit Breakers: The main and distribution circuit breakers shall be molded case type with trip ratings as called for in the schedule on the drawing.

Each circuit breaker shall be identified with an engraved laminated phenolic plate showing the load served or the function of the breaker. The nameplate shall be attached with oval head machine screws tapped into the front of the board, or some other equally effective means.

Grounding: Ground fittings shall be of approved manufactured type, installed and connected to conform with Code requirements. The neutral conductors and noncurrent-carrying parts of equipment at each installation shall be grounded in accordance with the applicable Code. Ground conductor shall be copper having a current capacity per N.E.C., but not smaller than No. 6 AWG. Exercise every precaution to obtain good contact at all panelboards, outlets, etc. Where it is not possible to obtain good contact, the conduits shall be bonded around the boxes with an insulated conductor, No. 6 AWG or larger, connected to the conduits by means of approved clamps.

All equipment cases, motor frames, etc., shall be completely grounded to satisfy the requirements of the N.E.C. and the Electrical Safety Orders.

Conduits: Rigid Steel Conduit shall be standard weight, mild steel pipe, zinc coated on the outside by a hot dipping, sherardizing, or metalizing process. The inside and outside of the conduit shall be finished with a protective coating.

Fittings, such as couplings, elbows, bends, etc., shall be subject to the same requirements as for rigid steel conduit. All couplings and unions shall be the threaded type assembled with red leaded joints made absolutely tight to exclude water. Unions shall be Crouse Hinds UNY or UNF or approved equal.

Electrical Metallic Tubing (E.M.T.) shall be cold rolled steel tubing with zinc coating on the outside and a protective enamel coating on the inside.

Fittings shall meet the same requirements for finish and material as E.M.T. They shall be the watertight compression type requiring the tightening of a nut. Indenters will not be allowed.

A flexible conduit shall be liquid tight except where used with a recessed light fixture. Conduit shall be galvanized with extruded polyvinyl covering and with watertight connectors. Minimum size shall be 1/2 inch except where supplied as part of approved manufactured assemblies.

All conduits shall be rigid, except that E.M.T. may be used at the following locations:

- In dry locations in furred spaces.
- In partitions other than concrete or solid masonry.
- For exposed work indoor above 6 feet.

Conduits installed in contact with the ground, in sand or gravel-fill shall be rigid steel with two protective coverings of Koppers' Bitumastic #50 or equal, applied after couplings and fittings are in place, each coat not less than 1/32 inch thick when dry. Conduit shall be run concealed in areas having finished ceilings and in furred walls. Conduit may be run exposed where so permitted by the General Manager. Exposed conduit below 6 feet shall be rigid type. Conduit run exposed shall be neatly installed parallel and at right angles to the structural members.

Conduit shall be fastened to the structure with pipe clamps. Conduits up to and including 1-1/2 inch trade size shall be supported at 5 foot intervals or less.

Cap conduit during construction by means of manufactured seals; swab out conduits before wires are pulled in.

Make water-tight conduits projecting through roof by proper flashing.

Wet Well Electrical Equipment: The electrical equipment used in the wet well must meet the National Electrical Code (NEC) requirements for Class I, Division I, groups C and D hazardous atmospheres. The electrical control cabinet shall also be isolated from the wet well to meet the above hazardous atmospheres. If sensors or other electrical equipment is used that does not meet the NEC requirements for hazardous atmospheres, they shall be electrically isolated with approved intrinsically safe barriers.

Telemetry: Will be required where wet wells, pump stations and other types of mechanical facilities are to be incorporated into the District sanitary sewer system. The owner or their agent shall include a complete telemetry system which shall conform with the existing District telemetry plans and system. The proposed system shall be approved by the General Manager.

Tests: Upon completion of construction and adjustment of all equipment, all systems shall be tested under the direction of the General Manager to demonstrate that all equipment furnished and installed and/or connected under the provisions of these standards shall function electrically in the manner required.

All systems shall test free from short circuits and grounds, shall be free from mechanical and electrical defects, and shall show an insulation resistance between phase conductors and between phase conductors and ground not less than the requirements of the National Electrical Code. All circuits shall be tested for proper neutral connections.

As Built Drawings and Operating Manuals: Shall be furnished in three bound sets, covering the following items:

- "As Built" drawings of contract electrical documents showing clearly exact locations of all underground conduits as installed. All deviations from contract drawings shall be shown. This information shall be presented by the contractor on revised transparent ozalid prints of original tracings. As built drawings shall be presented at completion of project and before final payment is due.

- "As Built" drawings of all switchboards, panelboards, wiring diagrams and control equipment.

- Detailed control wiring diagrams, both schematic and construction wiring for all switchboards, motor starters, transformers. Included herein shall be copies of individual cubicle wiring diagrams posted inside motor starter cubicles as noted under switchboard specifications. All wires, connections, terminals, etc. shall have an individual identification code.

- Complete instruction, maintenance and overhaul manuals, clearly showing and explaining operation and overhaul of all starters, circuit breakers, controls and all electrical equipment.

- Renewal parts lists for all equipment requiring maintenance, adjustment or repairs.

- Complete step-by-step sequential explanation of relay contact and device operation for all controls. The written explanation shall be clearly coordinated to device symbols and numbers on the elementary wiring diagrams.

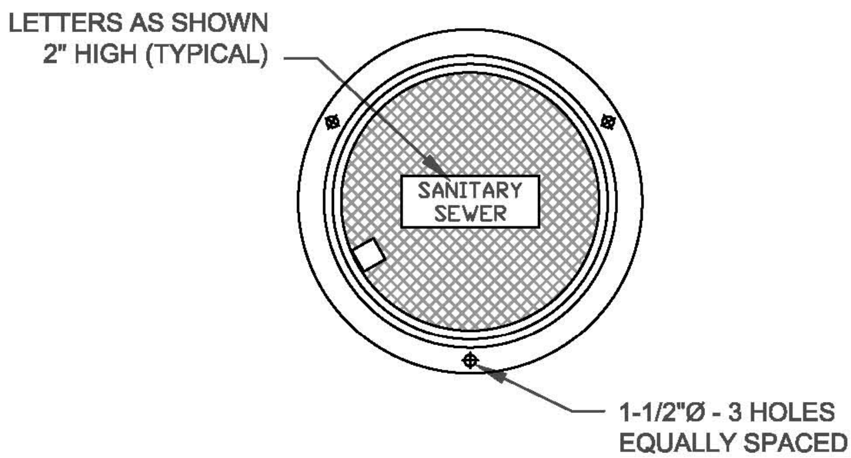
- Complete step-by-step sequential instructions and precautions for system start-up as well as system shut down.

- All material called for in c. to f. above shall be bound and indexed in stiff back, loose leaf, plastic covered binder.

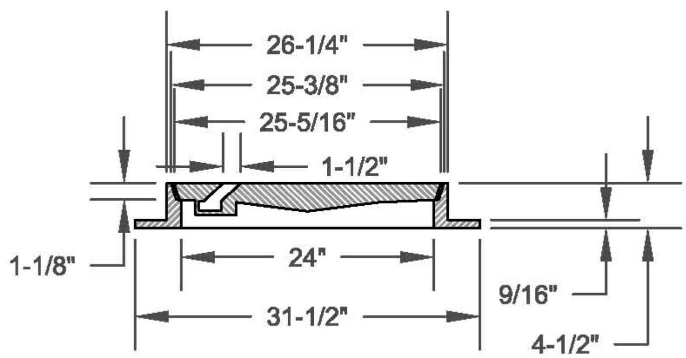
Guarantee: The owner or their agent shall leave the entire electrical system in proper working order and shall, at their own expense, replace any work, material, or equipment furnished by him which develops defects within 1 year from the date of acceptance.

STANDARD DRAWINGS

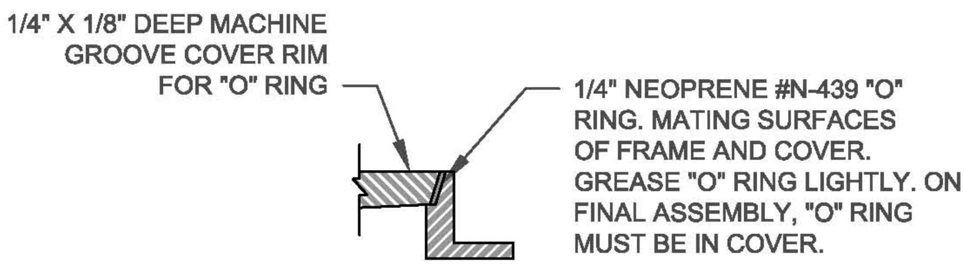
PLAN VIEW



SECTION VIEW

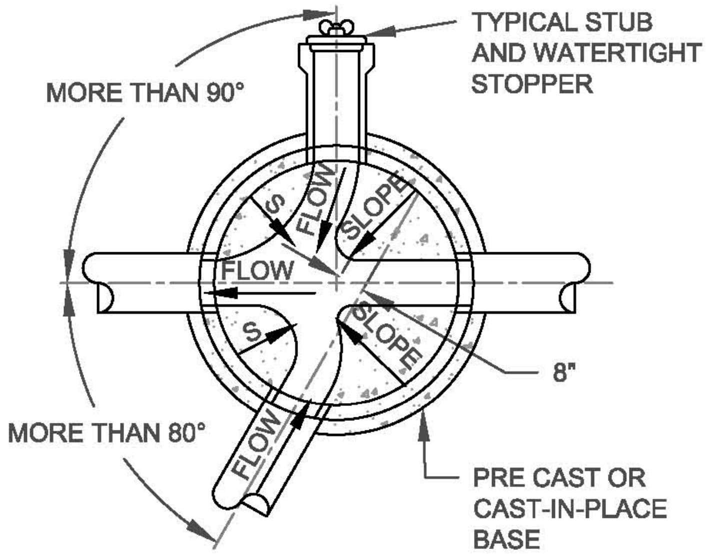


TAPERED FRAME AND COVER DETAIL



NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
MANHOLE FRAME AND COVER DETAIL	DRAWN: JW	DWG. FILE: SO-1
	APPROVED: MS	FIGURE: 1
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

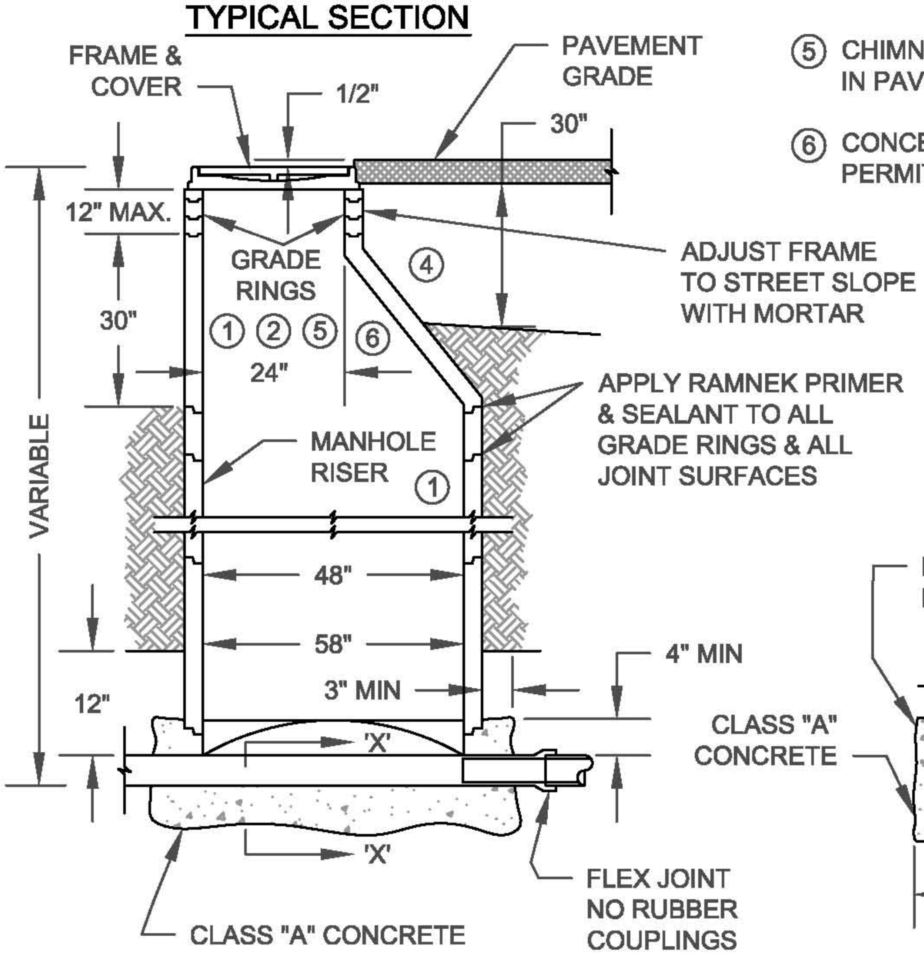
FLOOR PLAN



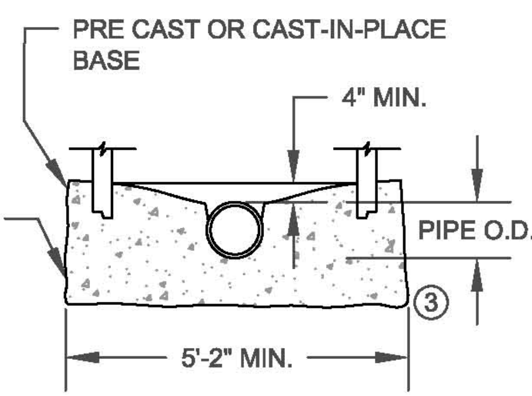
NOTES:

1. REINFORCED CONCRETE GRADE RINGS, CONES, PIPE RISERS OR APPROVED PRE CAST MANHOLE SECTIONS SHALL CONFORM TO CURRENT A.S.T.M. SPEC. NO. C-478.
2. MANHOLES IN PAVED AREAS SHALL HAVE AT LEAST ONE 2-INCH GRADE RING INSTALLED ON TOP OF THE CONE.
3. FOR CAST-IN-PLACE BASES, CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.
4. CLASS 2 BACK FILL AT 95% R.C. IN ALL STREETS, CLASS 3 AT 90% R.C. IN OTHER AREAS.
5. CHIMNEY SEAL REQUIRED ON MANHOLES IN PAVED AREAS.
6. CONCENTRIC OR ECCENTRIC CONES PERMITTED.

TYPICAL SECTION

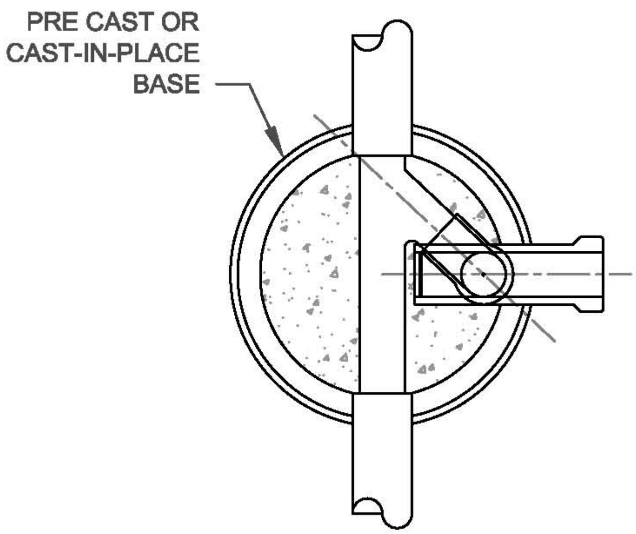


SECTION 'X - X'



NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
TYPE "A" MANHOLE	DRAWN: JW	DWG. FILE: SO-2
	APPROVED: MS	FIGURE: 2
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

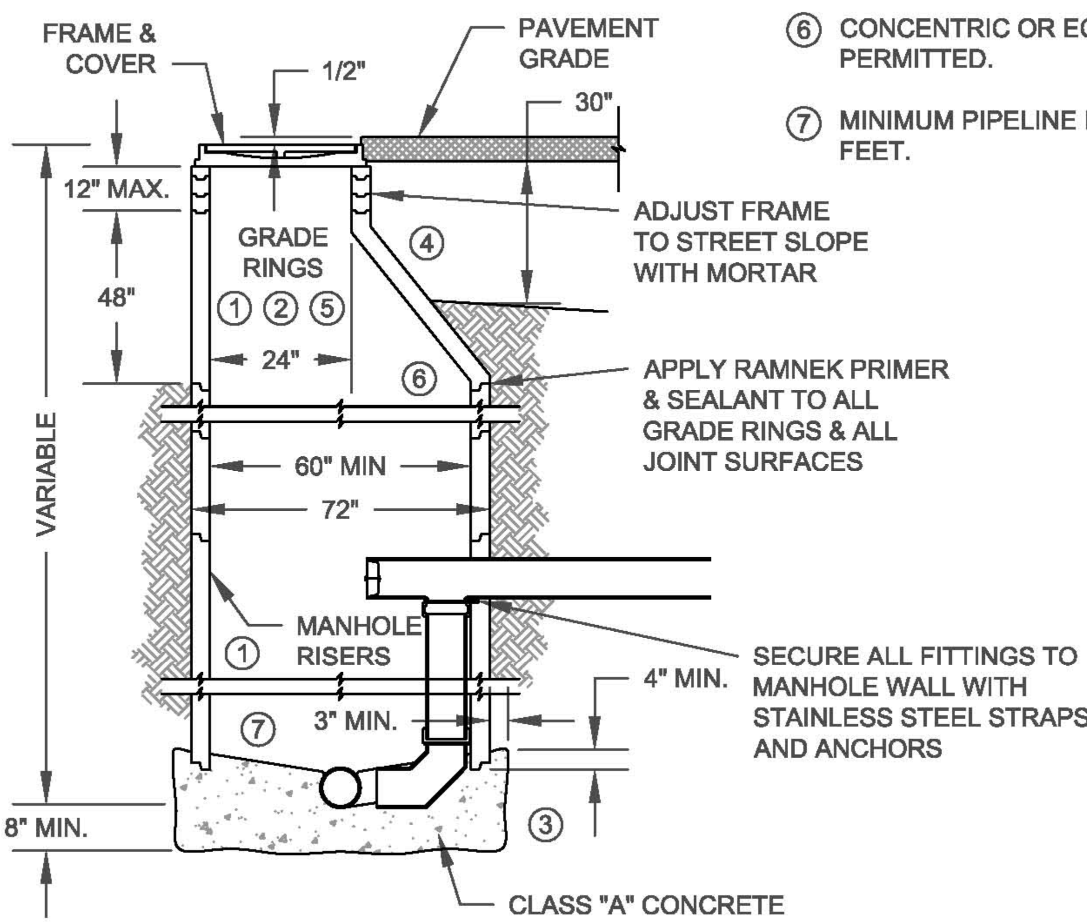
FLOOR PLAN



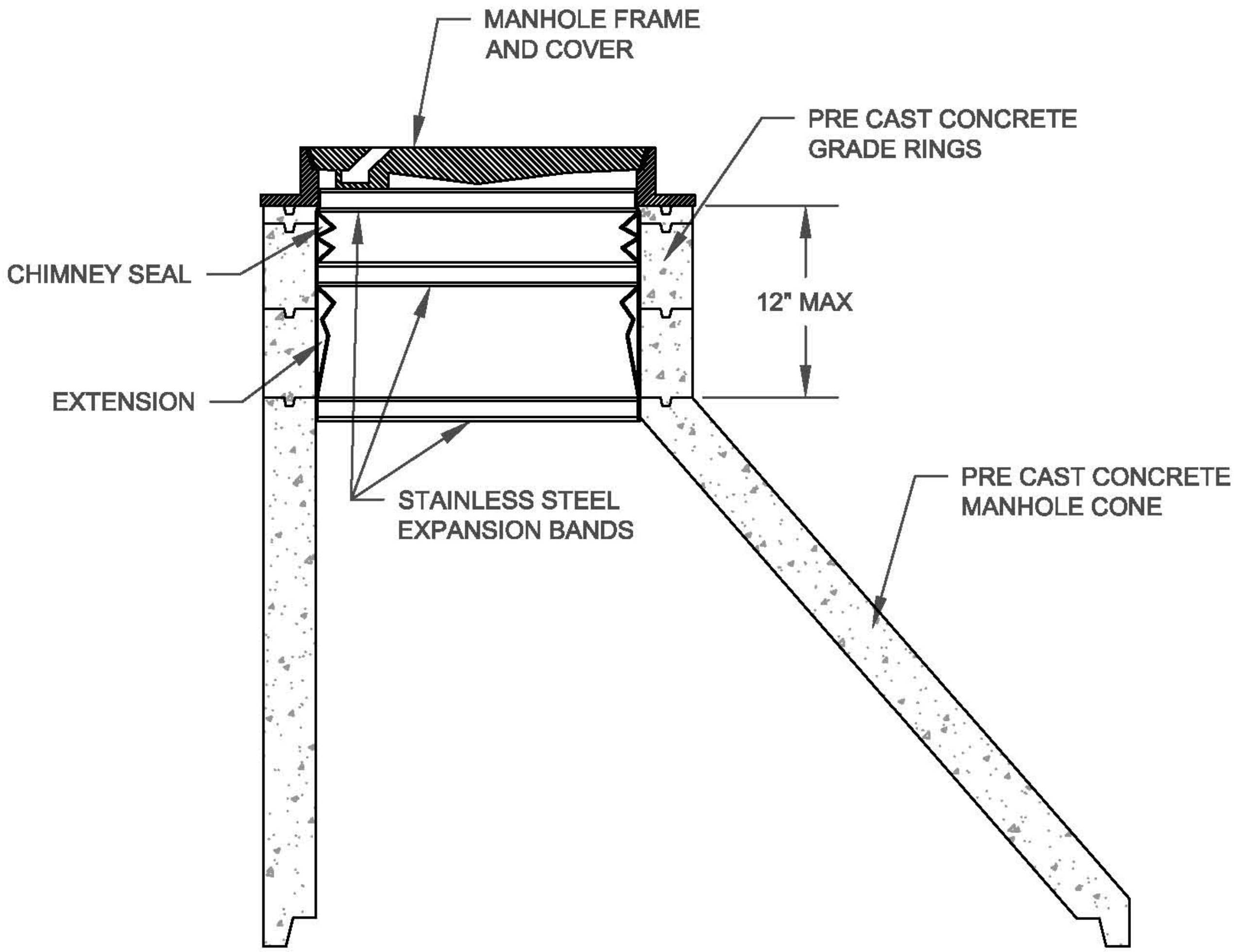
NOTES:

1. REINFORCED CONCRETE GRADE RINGS, CONES, PIPE RISERS OR APPROVED PRE CAST MANHOLE SECTIONS SHALL CONFORM TO CURRENT A.S.T.M. SPEC. NO. C-478.
2. MANHOLES IN PAVED AREAS SHALL HAVE AT LEAST ONE 2-INCH GRADE RING INSTALLED ON TOP OF THE CONE.
3. FOR CAST-IN-PLACE BASES, CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.
4. CLASS 2 BACK FILL AT 95% R.C. IN ALL STREETS, CLASS 3 AT 90% R.C. IN OTHER AREAS.
5. CHIMNEY SEAL REQUIRED ON MANHOLES IN PAVED AREAS.
6. CONCENTRIC OR ECCENTRIC CONES PERMITTED.
7. MINIMUM PIPELINE DROP 5 VERTICAL FEET.

TYPICAL SECTION



NORTHSTAR C.S.D.	DATE:	AUG. 2004	DIR.:	SEWER
DROP CONNECTION MANHOLE	DRAWN:	JW	DWG. FILE:	SO-3
	APPROVED:	MS	FIGURE:	3
908 NORTHSTAR DR. TRUCKEE, CA	SCALE:	NONE		

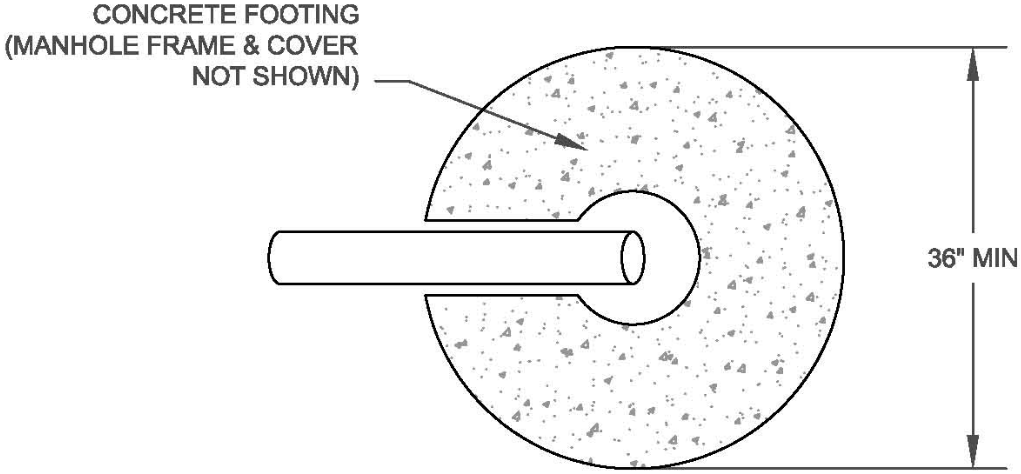


CHIMNEY HEIGHT	SEAL
0 THROUGH 4-1/2"	CHIMNEY SEAL ONLY
4-1/2" THROUGH 10"	SEAL + 7" EXTENSION
10" THROUGH 12"	SEAL + 10" EXTENSION

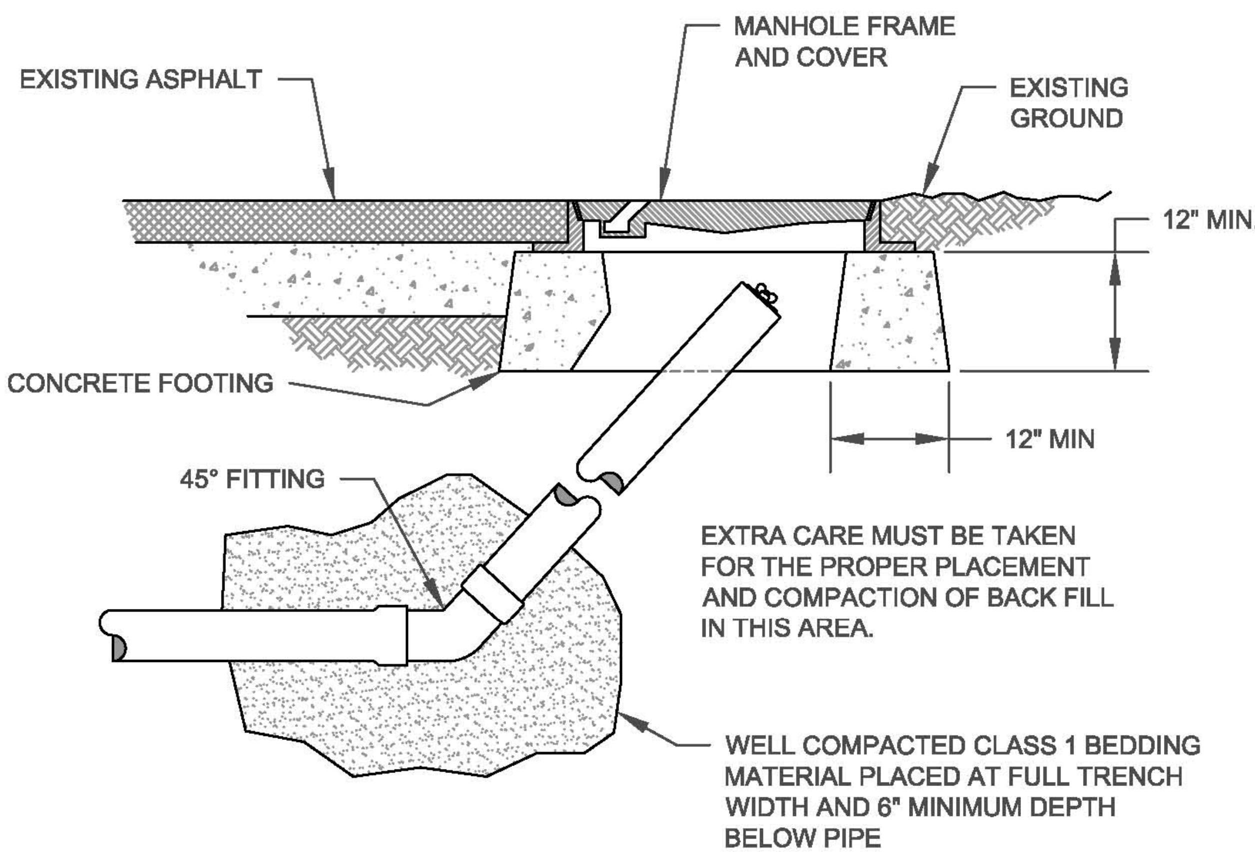
NOTE: FRAME OFFSETS AND DIAMETER DIFFERENTIALS WILL REDUCE SEAL/EXTENSION SPAN HEIGHT.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER	
INTERNAL MANHOLE CHIMNEY SEAL	DRAWN: JW	DWG. FILE: SO-4	
	APPROVED: MS	FIGURE: 4	
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE		

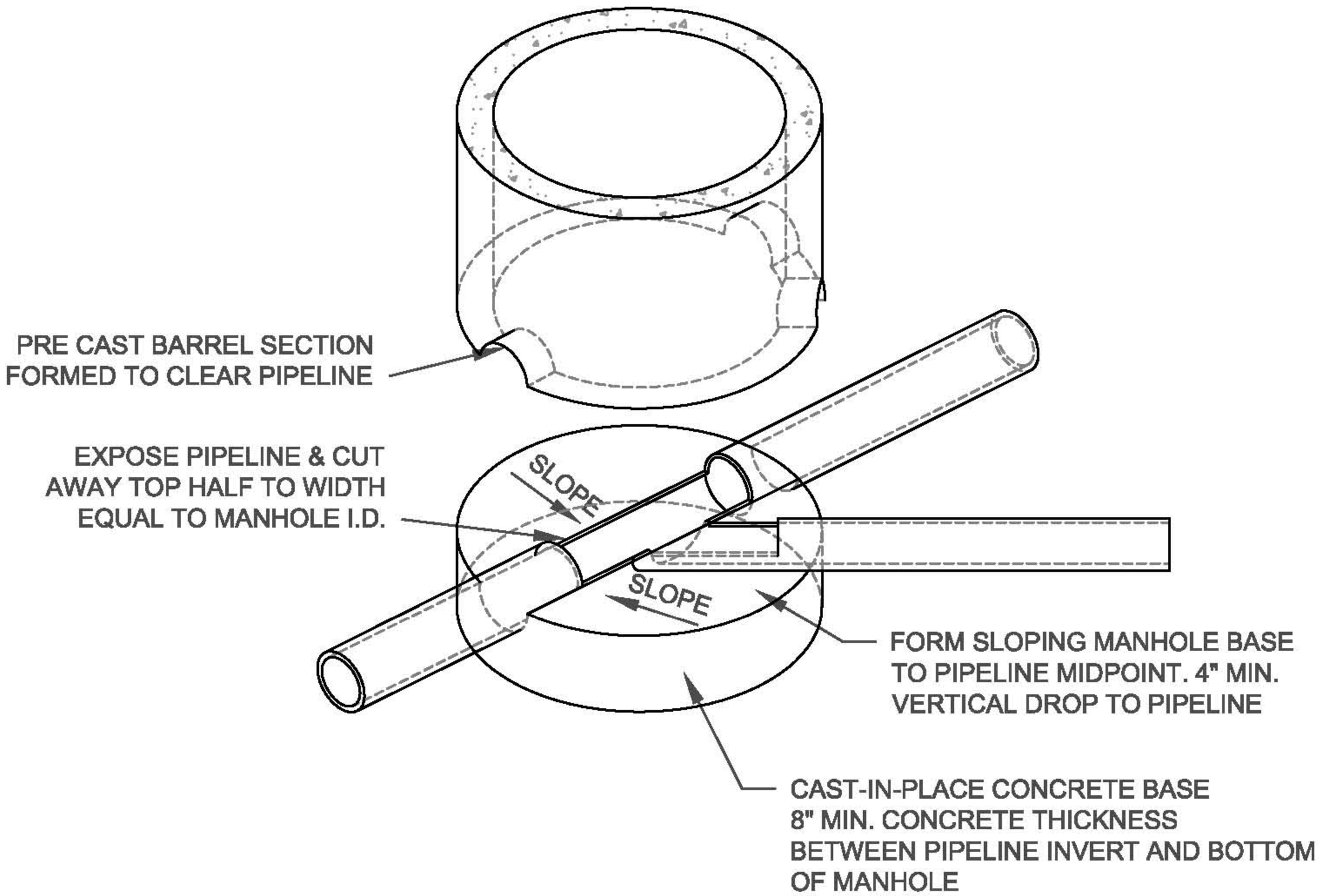
PLAN VIEW



PROFILE VIEW

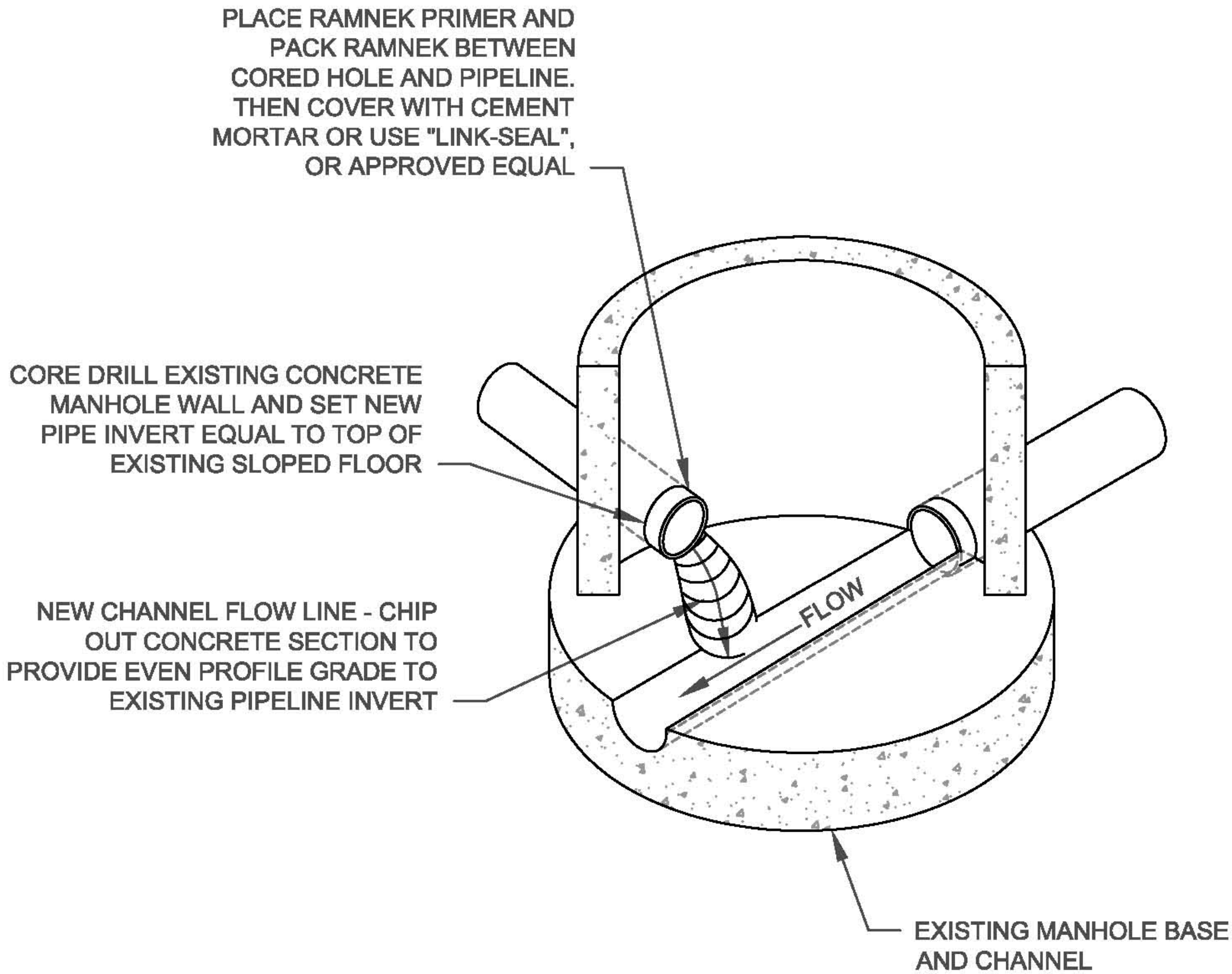


NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
END OF LINE CLEAN OUT ASSEMBLY	DRAWN: JW	DWG. FILE: SO-5
	APPROVED: MS	FIGURE: 5
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

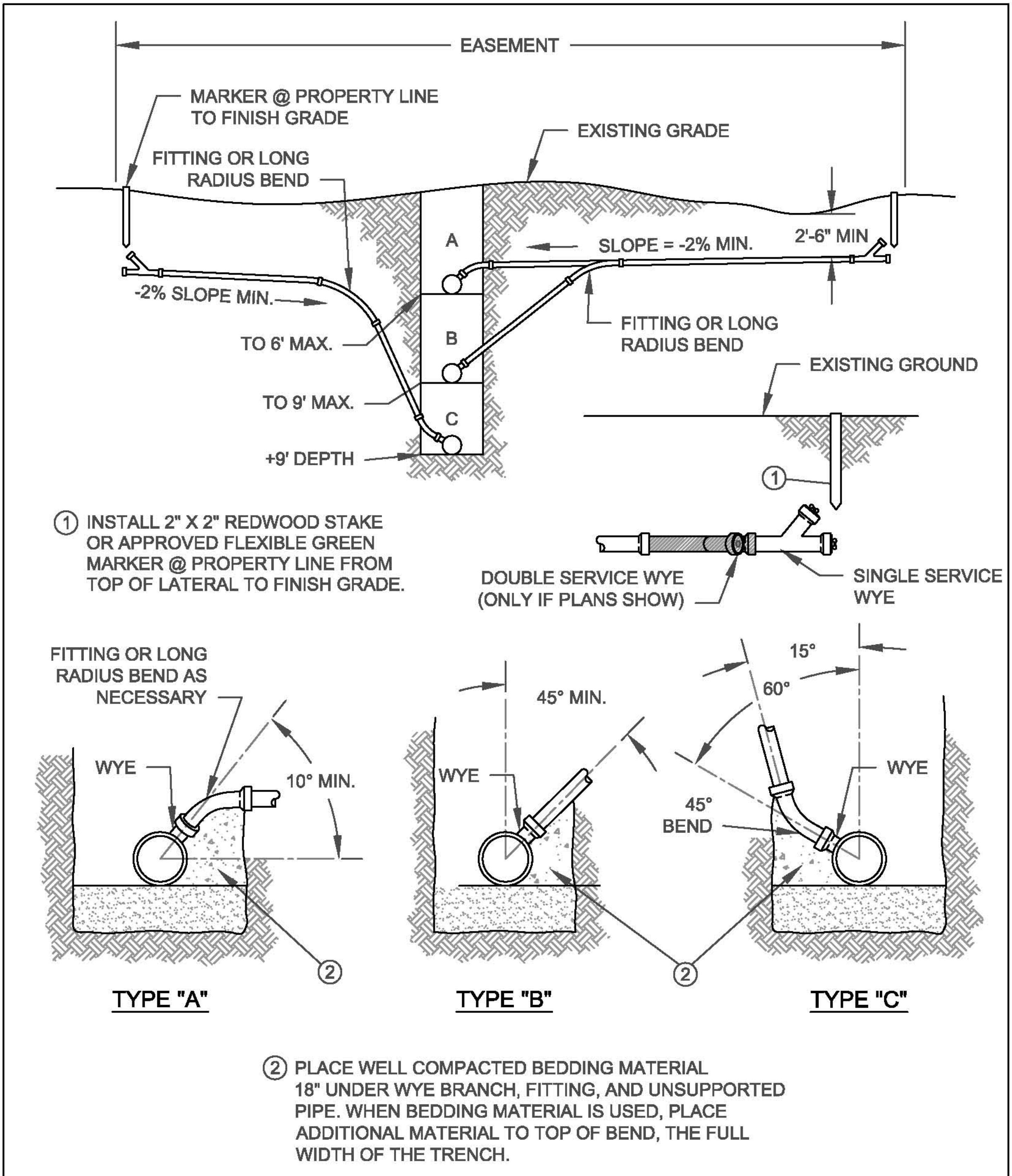


NOTE:
CAST IN PLACE MANHOLE BASE, BARREL SECTION(S), ECCENTRIC CONE, FRAME AND COVER, AND RELATED APPURTENANCES SHALL MEET THE REQUIREMENTS OF FIGURES 1 & 2, STANDARD DRAWINGS.

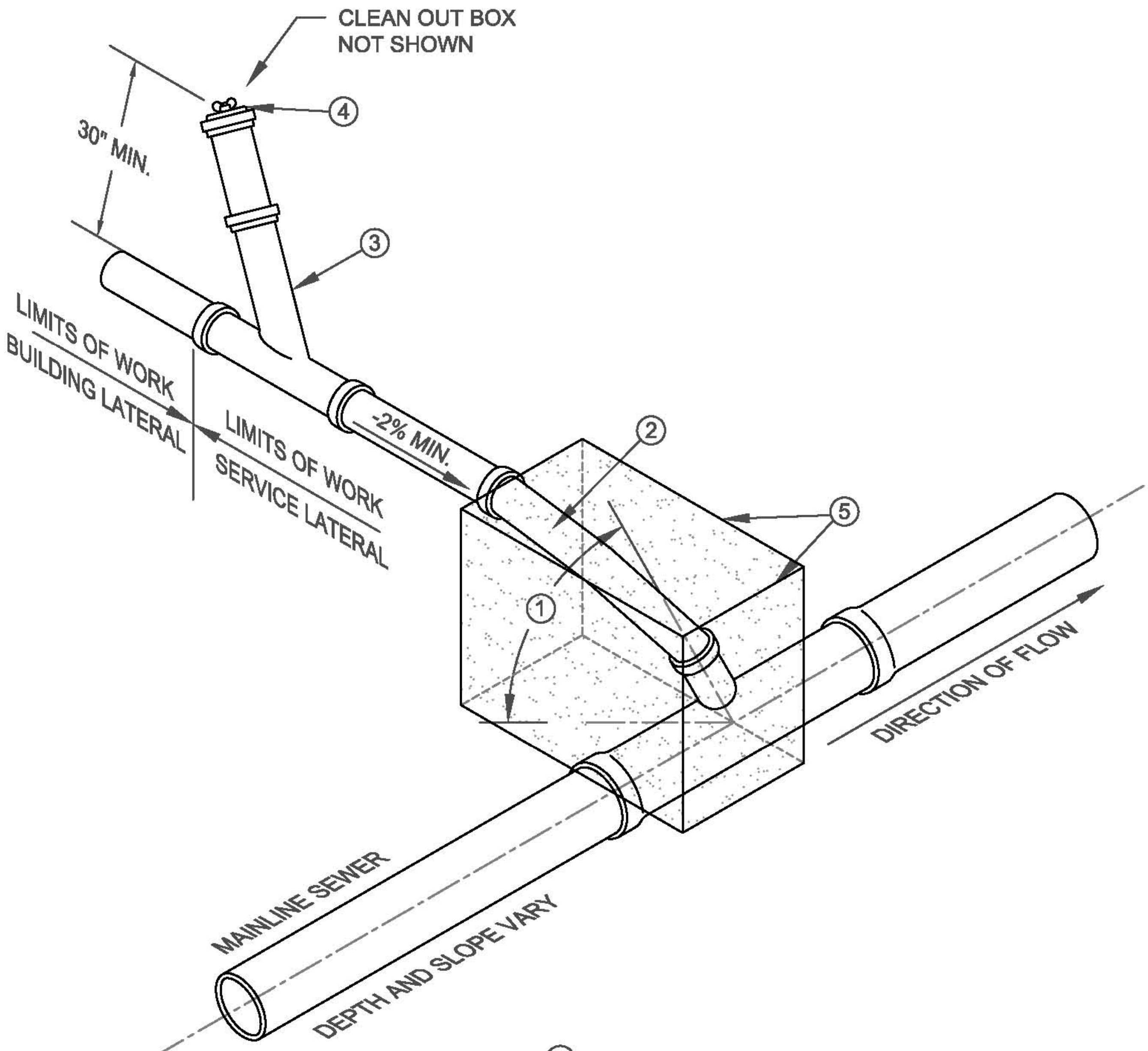
NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
MANHOLE CONSTRUCTION OVER	DRAWN: JW	DWG. FILE: SO-6
EXISTING SEWER LINE	APPROVED: MS	FIGURE: 6
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	



NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
PIPE CONNECTION TO EXISTING MANHOLE	DRAWN: JW	DWG. FILE: SO-7
	APPROVED: MS	FIGURE: 7
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	



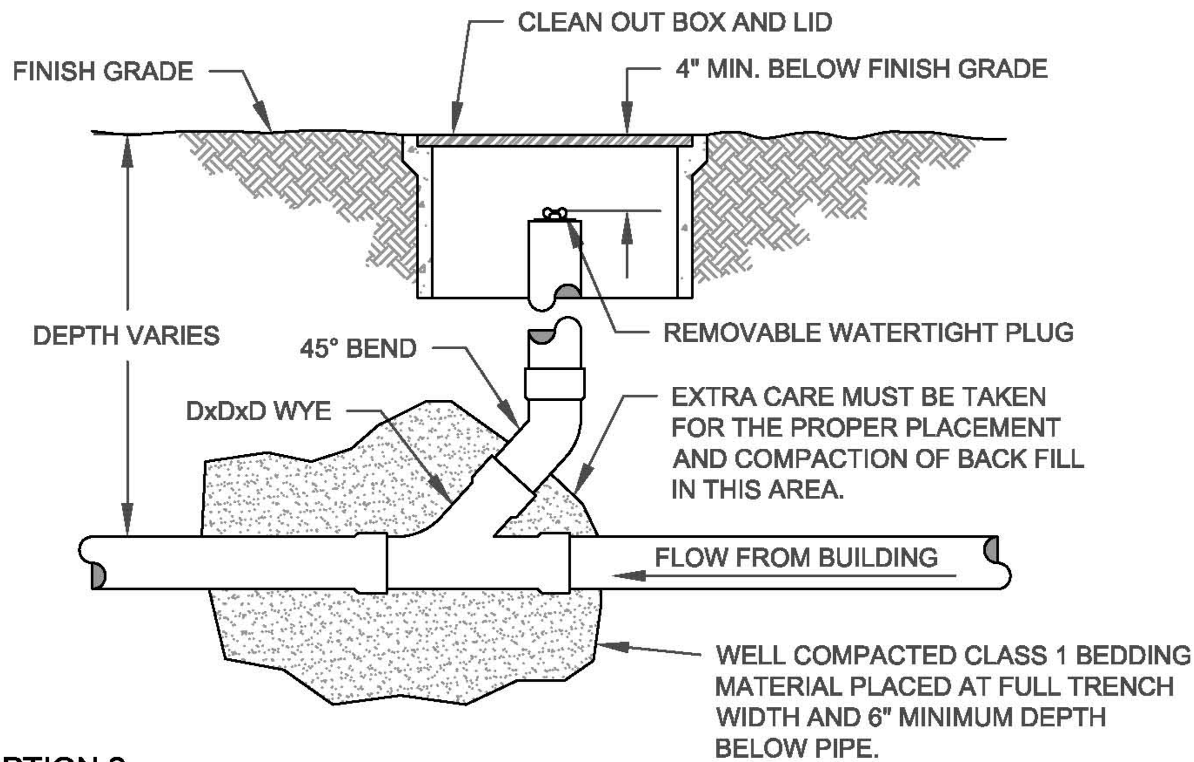
NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
SERVICE LATERAL DETAIL	DRAWN: JW	DWG. FILE: SO-8
(PROFILE VIEW)	APPROVED: MS	FIGURE: 8
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	



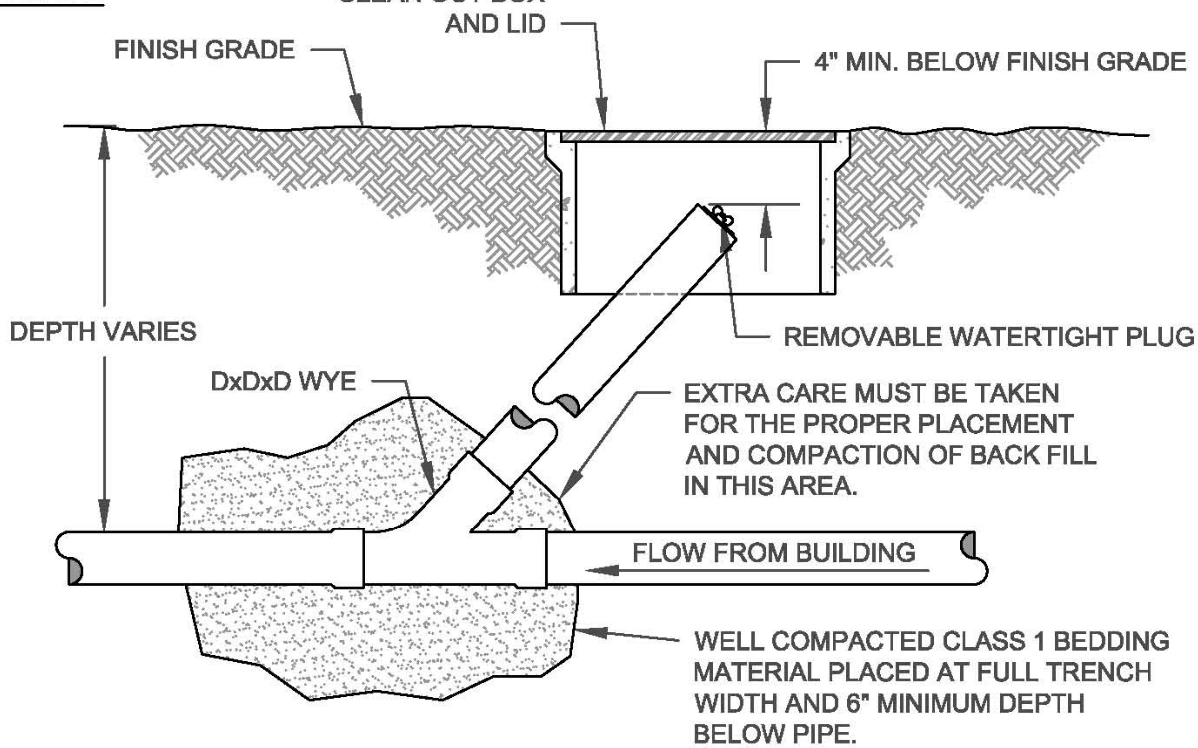
1. 10° MIN. FOR WYE LATERAL CONNECTION.
2. FITTING OR LONG RADIUS BEND.
3. SERVICE WYE WITH PIPE EXTENSION TO GRADE.
4. WATERTIGHT END PLUG (EASILY REMOVABLE).
5. PLACE WELL COMPACTED BEDDING MATERIAL 18" UNDER WYE BRANCH, FITTING, AND UNSUPPORTED PIPE. WHEN BEDDING MATERIAL IS USED, PLACE ADDITIONAL MATERIAL TO TOP OF BEND, THE FULL WIDTH OF TRENCH.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
SERVICE LATERAL DETAIL	DRAWN: JW	DWG. FILE: SO-9
(ISOMETRIC VIEW)	APPROVED: MS	FIGURE: 9
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

OPTION 1 NOT RECOMMENDED IN AREAS WHERE HEAVY EQUIPMENT IS OPERATED.

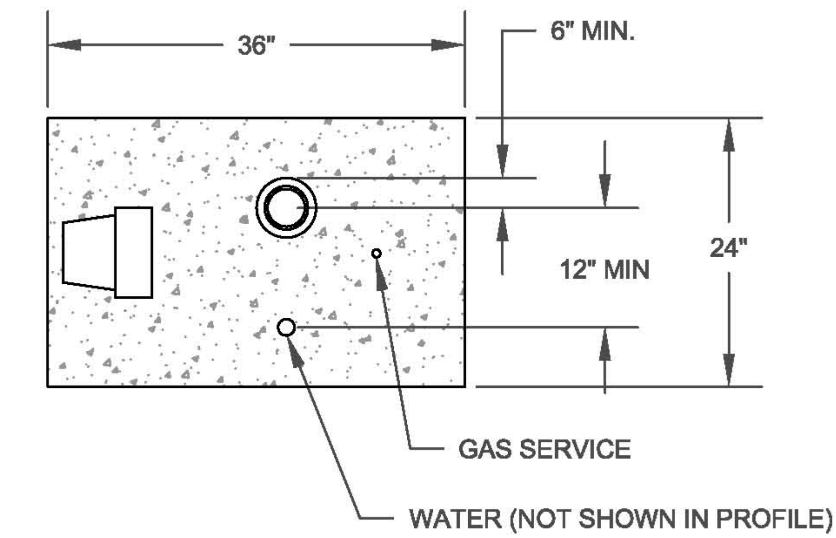


OPTION 2

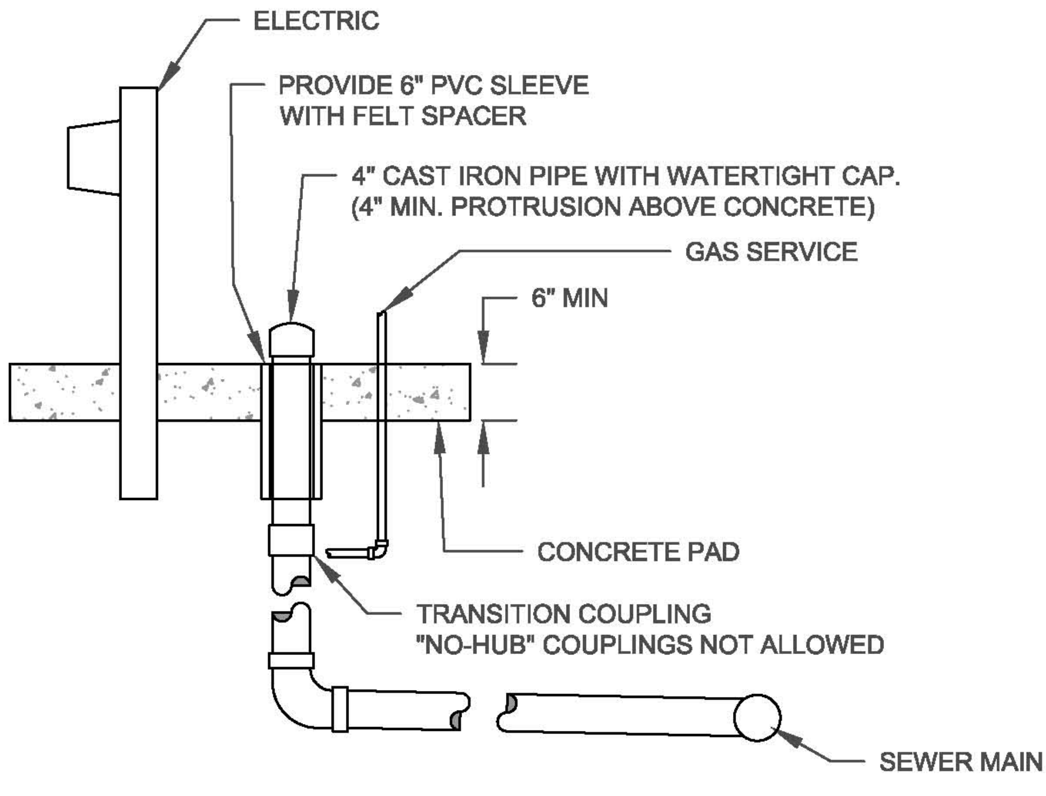


NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
LATERAL CLEAN OUT ASSEMBLY	DRAWN: JW	DWG. FILE: SO-10
	APPROVED: MS	FIGURE: 10
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

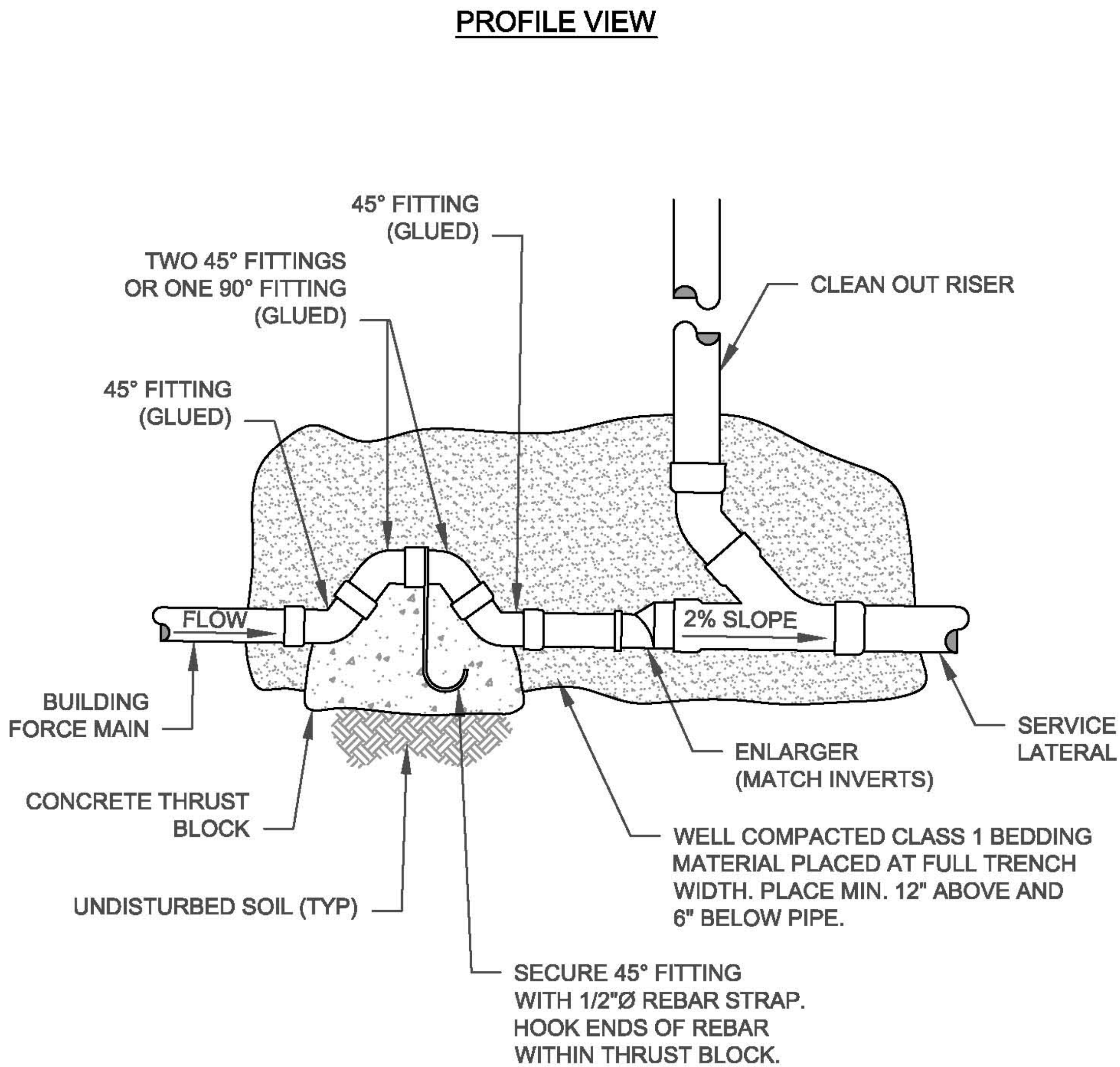
PLAN VIEW



PROFILE VIEW

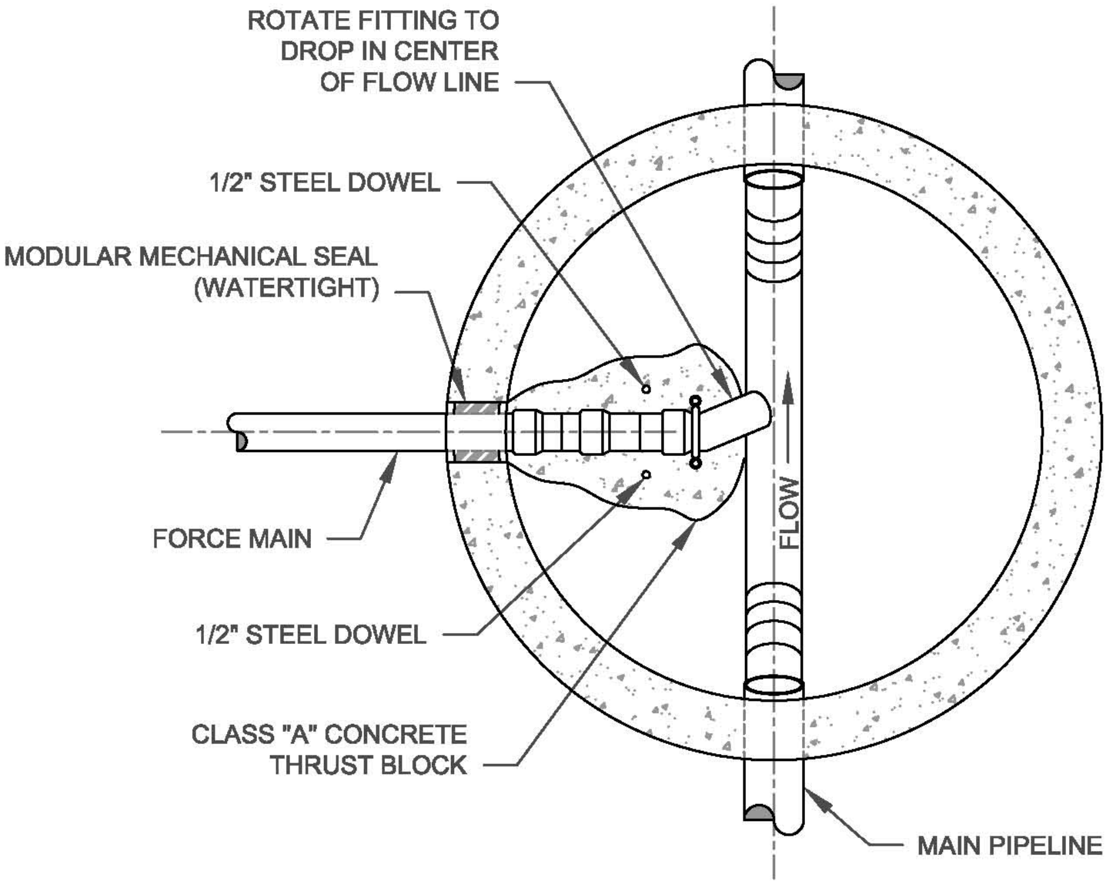


NORTHSTAR C.S.D.	DATE:	AUG. 2004	DIR.:	SEWER
UTILITY PAD INSTALLATION	DRAWN:	JW	DWG. FILE:	SO-11
	APPROVED:	MS	FIGURE:	11
908 NORTHSTAR DR. TRUCKEE, CA	SCALE:	NONE		

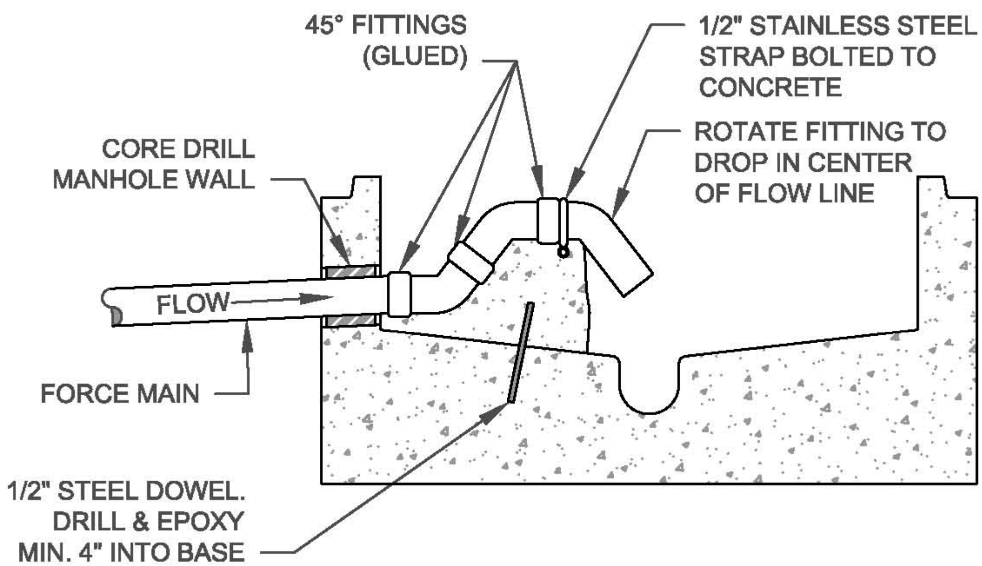


NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
FORCE MAIN DETAIL	DRAWN: JW	DWG. FILE: SO-12
(SIPHON BREAK AT PROPERTY LINE)	APPROVED: MS	FIGURE: 12
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

PROFILE VIEW

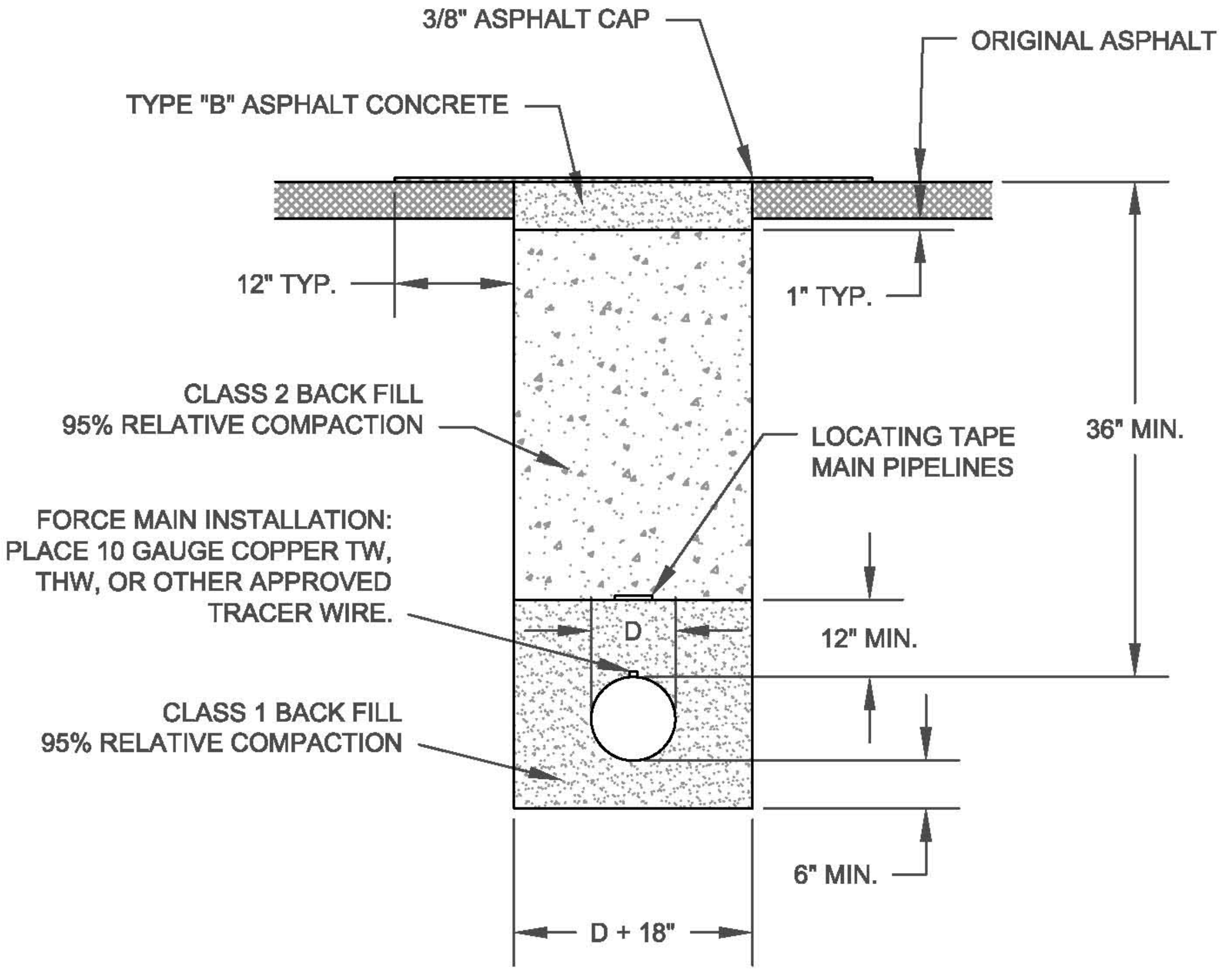


PLAN VIEW



NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
FORCE MAIN DETAIL	DRAWN: JW	DWG. FILE: SO-13
(SIPHON BREAK AT MANHOLE)	APPROVED: MS	FIGURE: 13
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

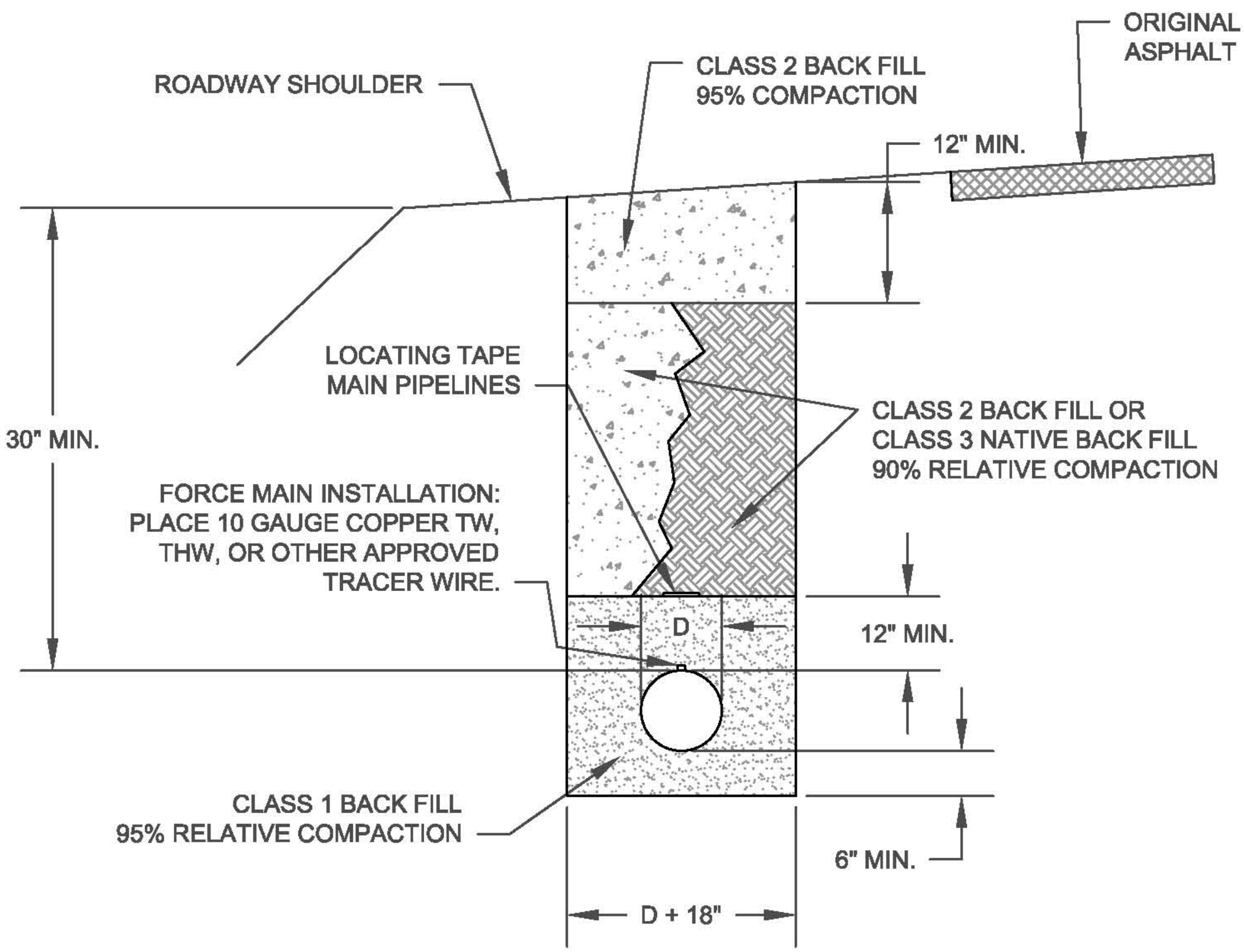
PROFILE VIEW



NOTES:
1. ALL SEWERAGE WORKS TO MEET OR EXCEED NORTHSTAR C.S.D. CODE REQUIREMENTS.
2. D = PIPE DIAMETER.
3. TRENCH BRACING OR SHORING AS REQUIRED BY THE "CONSTRUCTION SAFETY ORDERS", STATE OF CALIFORNIA, DEPARTMENT OF INDUSTRIAL RELATIONS.
5. A MINIMUM OF 30 INCHES COMPACTED EARTH FILL SHALL COVER ALL GRAVITY AND FORCE BUILDING AND SERVICE LATERALS. COVER LESS THAN 48 INCHES IN VEHICULAR TRAVELED WAYS REQUIRES HEAVIER WALLED PIPE AS LISTED IN APPENDIX A-5.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
TYPICAL SEWER TRENCH FOR PAVED AND TRAFFIC AREAS	DRAWN: JW	DWG. FILE: SO-14
	APPROVED: MS	FIGURE: 14
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

PROFILE VIEW

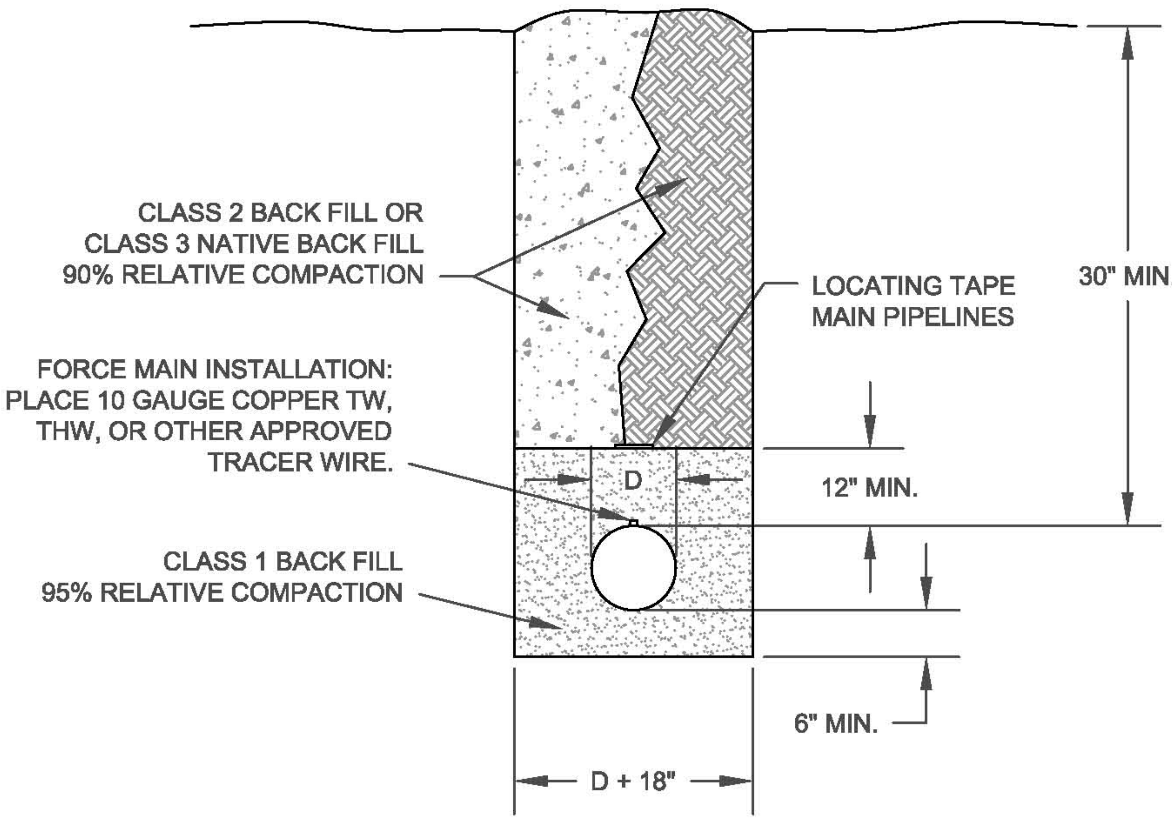


NOTES:

1. ALL SEWERAGE WORKS TO MEET OR EXCEED NORTHSTAR C.S.D. CODE REQUIREMENTS.
2. D = PIPE DIAMETER.
3. TRENCH BRACING OR SHORING AS REQUIRED BY THE "CONSTRUCTION SAFETY ORDERS", STATE OF CALIFORNIA, DEPARTMENT OF INDUSTRIAL RELATIONS.
4. ROADWAY SHOULDERS SHALL BE CONSIDERED VEHICLE AREA AND ARE SUBJECT TO PIPELINE REQUIREMENTS OF APPENDIX A-5.
5. A MINIMUM OF 30 INCHES COMPACTED EARTH FILL SHALL COVER ALL GRAVITY AND FORCE BUILDING AND SERVICE LATERALS. COVER LESS THAN 48 INCHES IN VEHICULAR TRAVELED WAYS REQUIRES HEAVIER WALLED PIPE AS LISTED IN APPENDIX A-5.

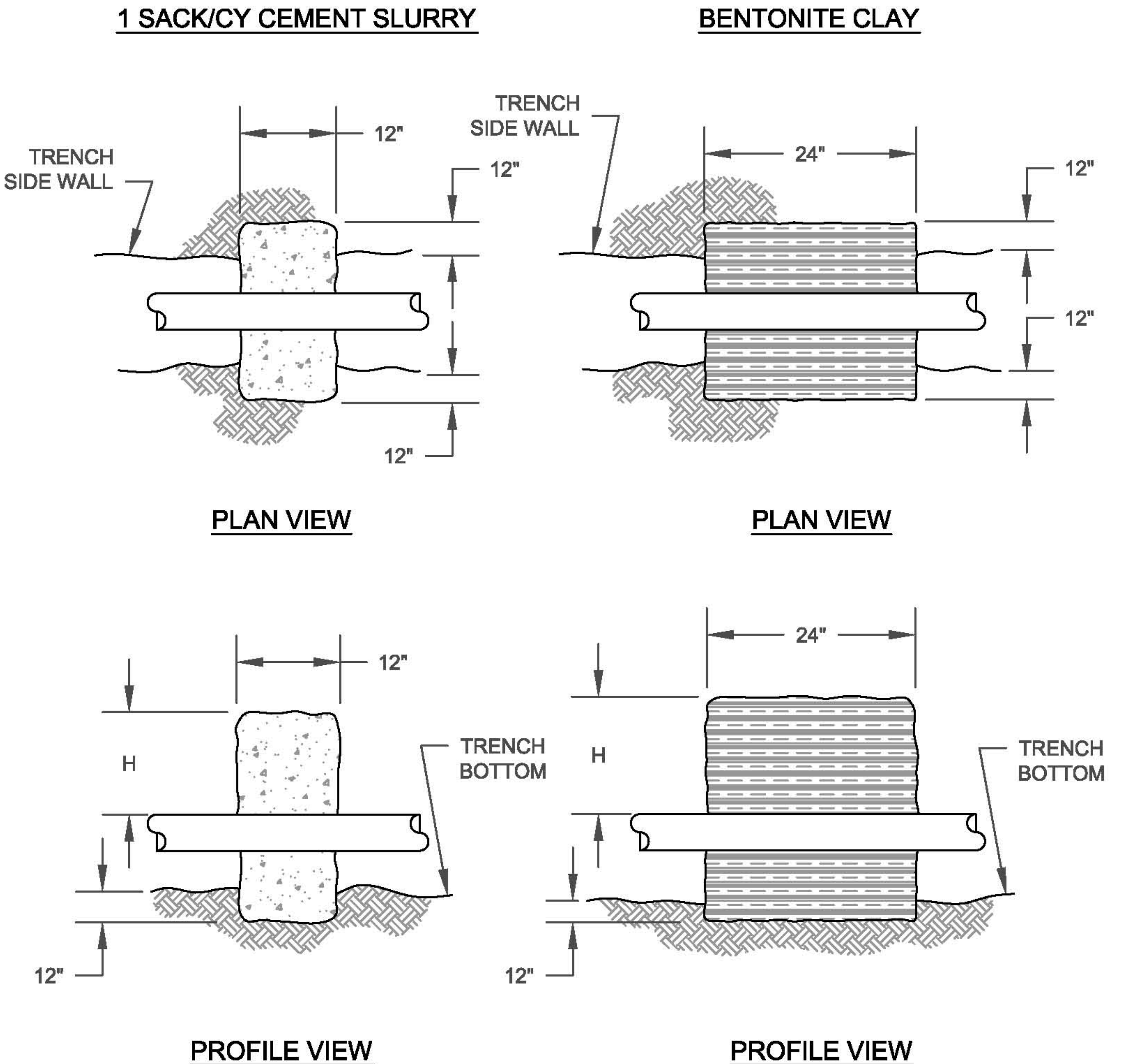
NORTHSTAR C.S.D.	DATE: AUG. 2004		DIR.: SEWER
TYPICAL SEWER TRENCH	DRAWN: JW		DWG. FILE: SO-15
(OFF SHOULDER)	APPROVED: MS		FIGURE: 15
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE		

PROFILE VIEW



NOTES:
1. ALL SEWERAGE WORKS TO MEET OR EXCEED NORTHSTAR C.S.D. CODE REQUIREMENTS.
2. D = PIPE DIAMETER.
3. TRENCH BRACING OR SHORING AS REQUIRED BY THE "CONSTRUCTION SAFETY ORDERS", STATE OF CALIFORNIA, DEPARTMENT OF INDUSTRIAL RELATIONS.
5. A MINIMUM OF 30 INCHES COMPACTED EARTH FILL SHALL COVER ALL GRAVITY AND FORCE BUILDING AND SERVICE LATERALS. COVER LESS THAN 48 INCHES IN VEHICULAR TRAVELED WAYS REQUIRES HEAVIER WALLED PIPE AS LISTED IN APPENDIX A-5.

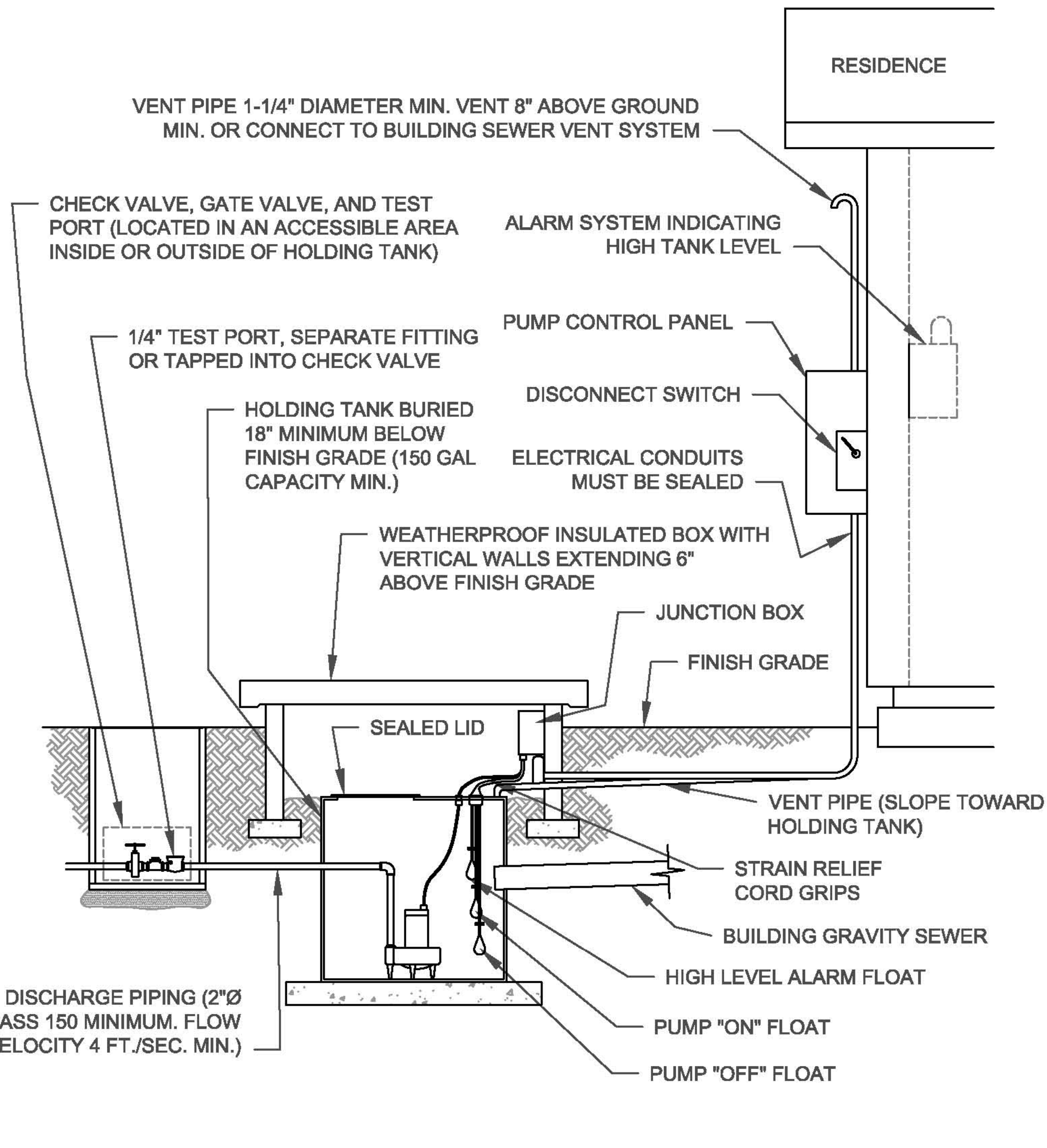
NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
TYPICAL SEWER TRENCH	DRAWN: JW	DWG. FILE: SO-16
(NON-TRAFFIC AREAS)	APPROVED: MS	FIGURE: 16
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	



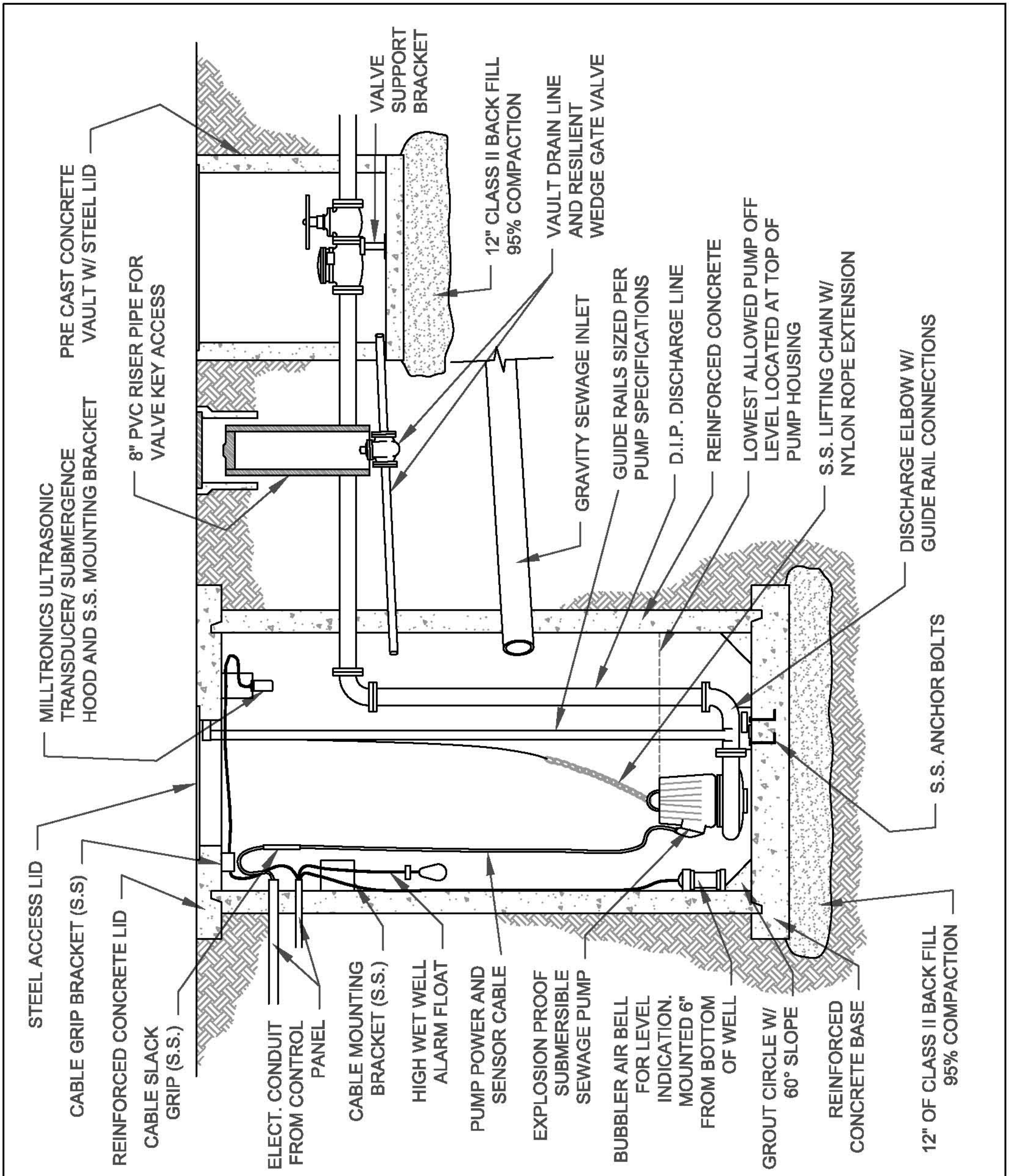
H = 12" ABOVE SEASONAL HIGH
GROUNDWATER TABLE (36" MIN.)

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
TRENCH CUT-OFF BLOCK	DRAWN: JW	DWG. FILE: SO-17
	APPROVED: MS	FIGURE: 17
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

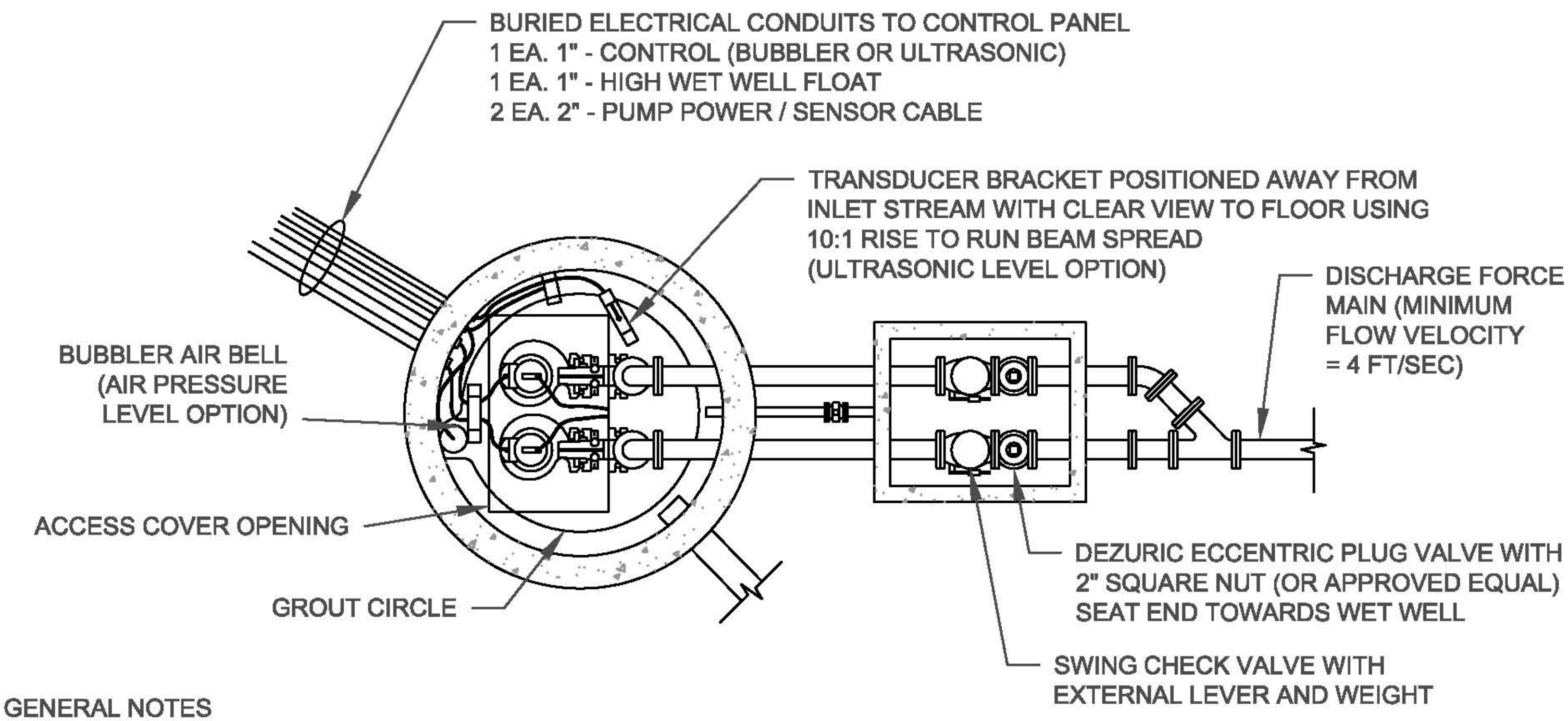
PROFILE VIEW



NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
RESIDENTIAL PUMP STATION	DRAWN: JW	DWG. FILE: SO-18
	APPROVED: MS	FIGURE: 18
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	



N.C.S.D. UTILITIES	NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
	SUBMERSIBLE PUMP STATION	DRAWN: JW	DWG. FILE: SO-19
	(SECTION VIEW)	APPROVED: MS	FIGURE: 19
	908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

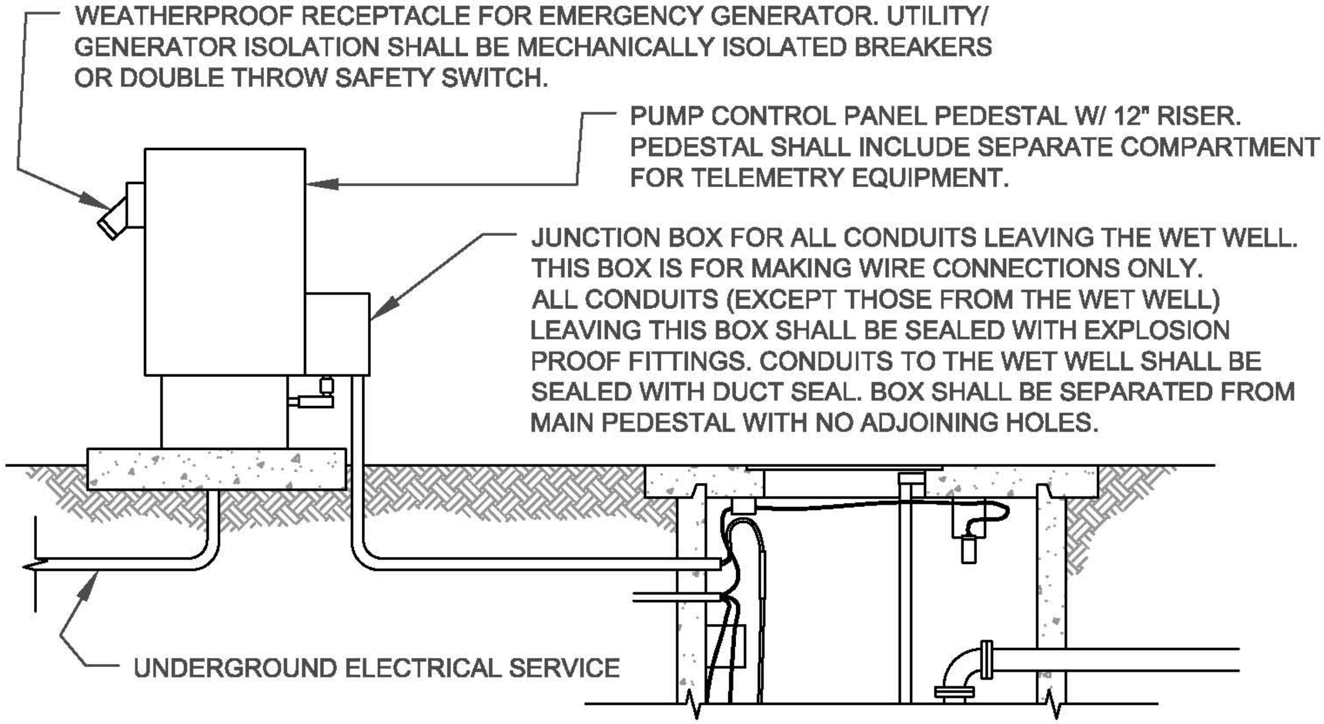


GENERAL NOTES

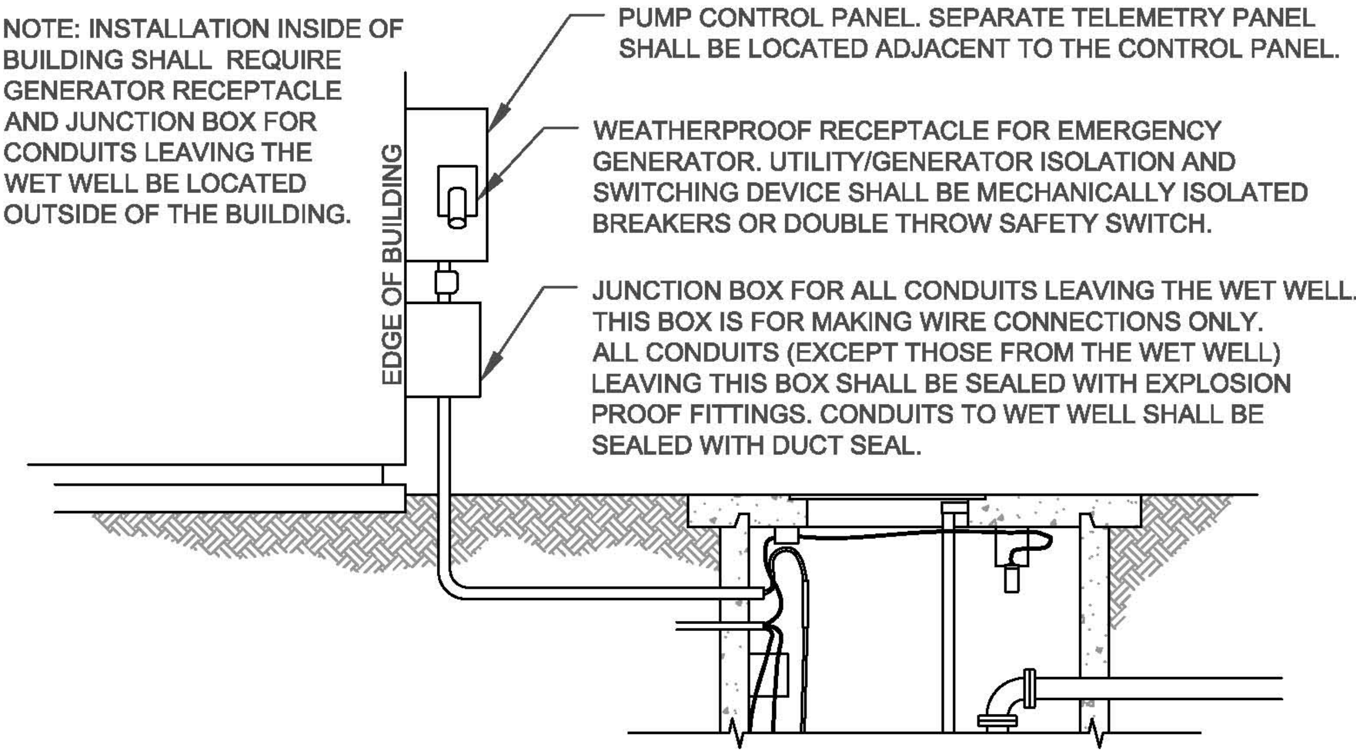
1) WET WELL SHALL BE CLASSIFIED AS A CLASS 1 DIVISION 1 GROUPS C & D HAZARDOUS LOCATION. ALL EQUIPMENT INSIDE THE WET WELL AND ALL CONDUITS CONNECTED TO THE WET WELL SHALL BE APPROVED AND INSTALLED FOR FOR THIS HAZARDOUS CLASSIFICATION.
2) ALL HARDWARE AND MOUNTING BRACKETS IN THE WETWELL SHALL BE STAINLESS STEEL.
3) ALL CONCRETE WET WELL PIECES SHALL BE REBAR REINFORCED AND DESIGNED FOR H2O LOADING. ALL CONCRETE JOINTS SHALL BE CLEANED, AND THEN SEALED WITH RAMNEK PRIMER AND RAMNEK OR AN APPROVED EQUAL. THE WET WELL INTERIOR SHALL BE COATED WITH AT LEAST TWO COATS OF XYPEX CONCRETE SEAL OR APPROVED EQUAL. IN AREAS WITH HIGH GROUND WATER THE WET WELL EXTERIOR SHALL BE COATED IN ACCORDANCE WITH EXTERNAL MANHOLE/VAULT SEALS SPECIFICATIONS IN SECTION A-6.
4) BUBBLER CONTROLS MAY BE SUBSTITUTED WITH ULTRASONIC CONTROLS UPON APPROVAL.
5) ALL PIPE OR CONDUIT PENETRATIONS THROUGH WET WELL OR VAULT SHALL BE SEALED WATERTIGHT WITH MECHANICAL TYPE SEALS (LINK SEAL OR EQUIVALENT) OR RAMNEK AND PRIMER, THEN GROUTED WITH NON-SHRINK GROUT.
6) THRUST BLOCKS SHALL BE PLACED AT EACH FORCE MAIN BEND OR FITTING THAT CHANGES THE FLOW DIRECTION OR VELOCITY.
7) DISCHARGE PIPING IN WET WELL AND THROUGHOUT THE VALVES SHALL BE FLANGED DUCTILE IRON. WHEN SPOOLS CONSIST OF FIELD FLANGES, CONSIDERATION SHALL BE MADE FOR UNSUPPORTED FITTINGS AND SPOOLS BY USING RESTRAINED FLANGE ADAPTERS.
8) DISCHARGE PIPING SHALL HAVE A TRACER WIRE ATTACHED TO THE TOP OF THE PIPE. TRACER WIRE SHALL BE SECURED TO THE PIPE AT APPROPRIATE INTERVALS AND SHALL BE CONTINUOUS BETWEEN VAULTS AND OTHER ACCESS POINTS.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER	
SUBMERSIBLE PUMP STATION (PLAN VIEW)	DRAWN: JW	DWG. FILE: SO-20	
	APPROVED: MS	FIGURE: 20	
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE		

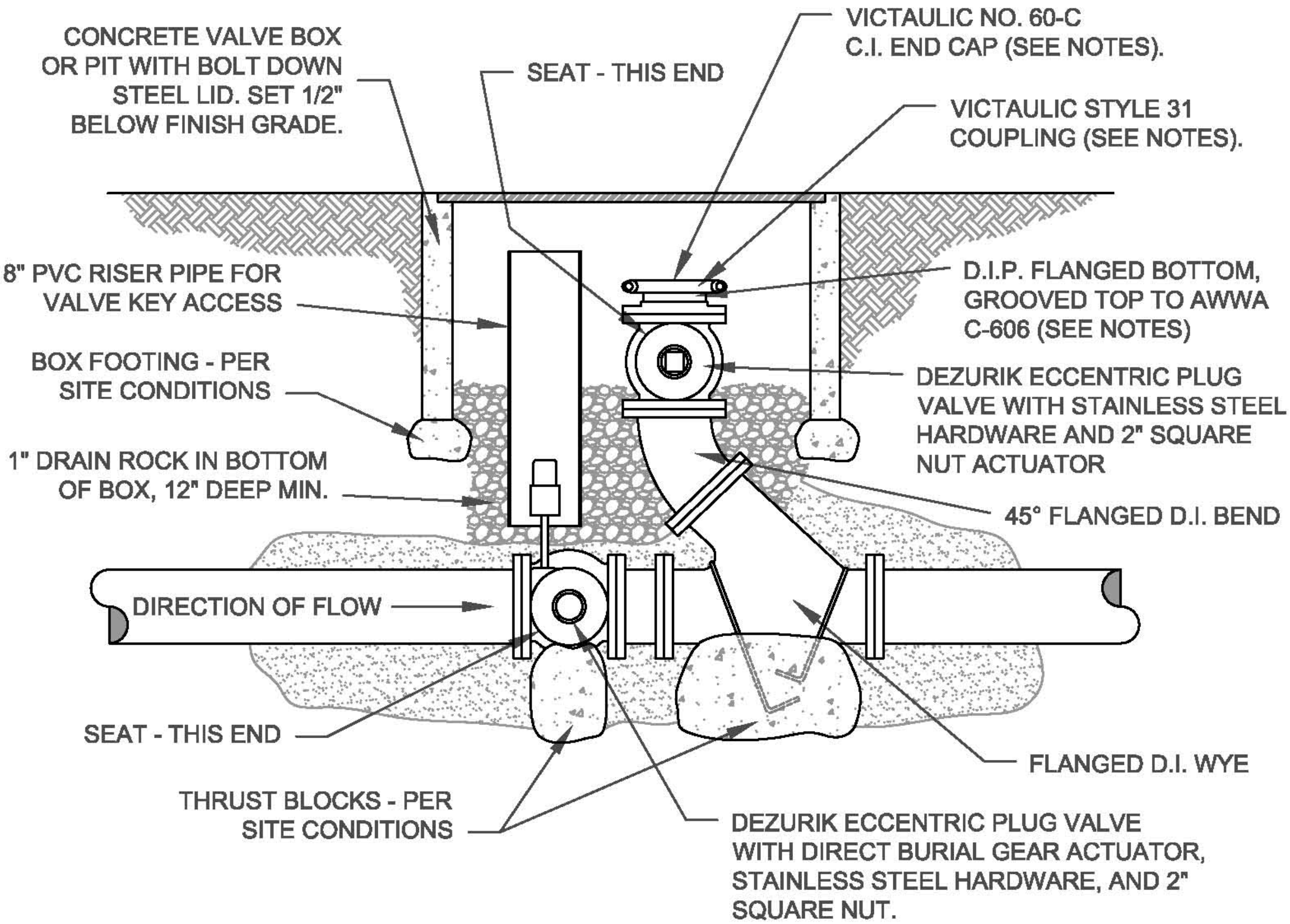
TYPICAL INSTALLATION WITH SERVICE/CONTROL PEDESTAL



TYPICAL INSTALLATION ON BUILDING EXTERIOR OR SERVICE POLE

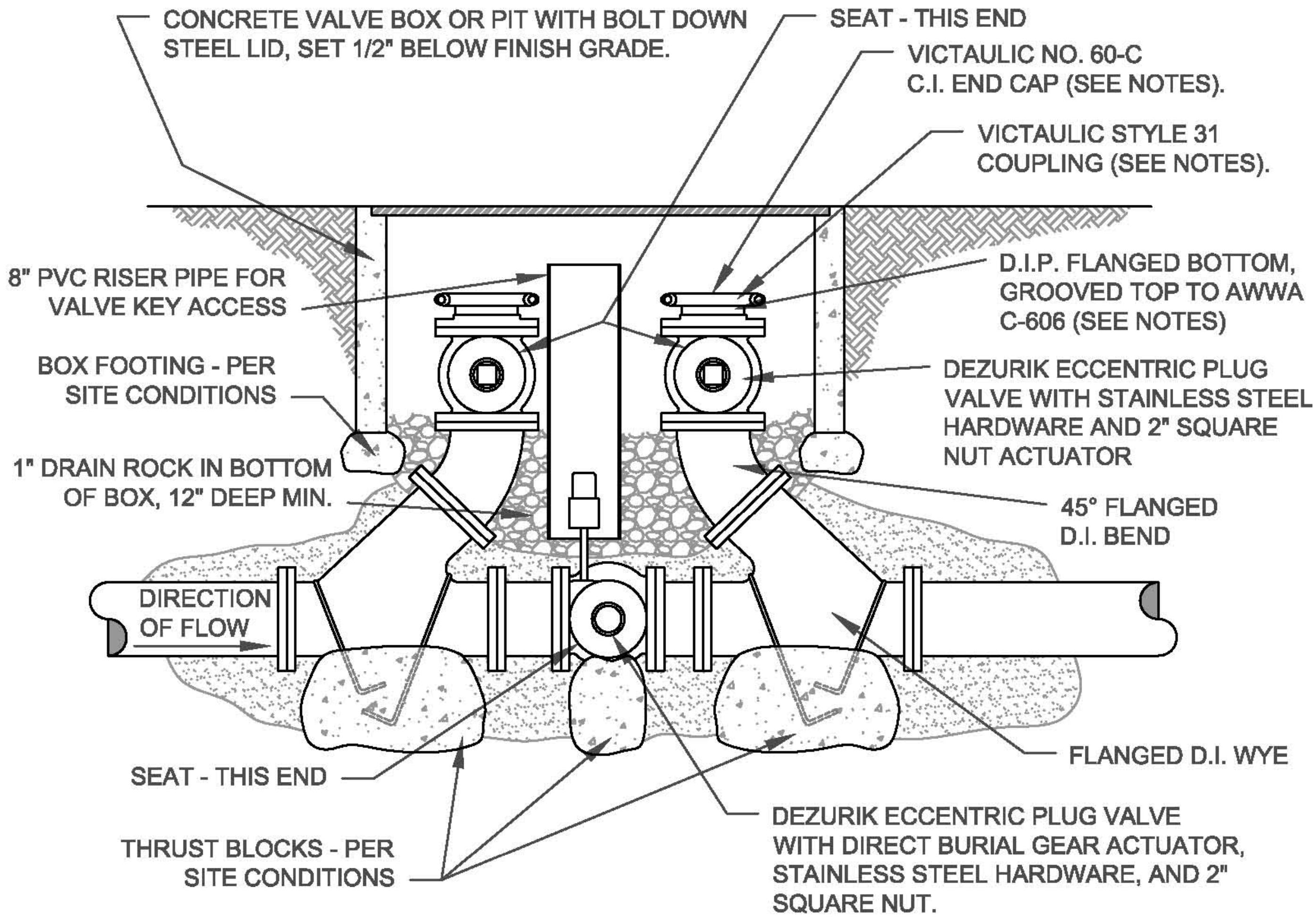


NORTHSTAR C.S.D.	DATE:	AUG. 2004	DIR.:	SEWER
SUBMERSIBLE PUMP STATION	DRAWN:	JW	DWG. FILE:	SO-21
(ELECTRICAL)	APPROVED:	MS	FIGURE:	21
908 NORTHSTAR DR. TRUCKEE, CA	SCALE:	NONE		



NOTES:
1). BOX FOOTING REQUIRED PER SOIL CONDITIONS. TRAFFIC AREAS REQUIRE FOOTINGS TO SUPPORT H-20 RATED BOX.
2). VALVES AND FITTINGS TO BE SIZED EQUAL TO FORCE MAIN SIZE FOR FORCE MAINS LESS THAN OR EQUAL TO 8" DIAMETER.
3). GROOVED TOP RISER, GROOVED CAP, AND VICTAULIC COUPLING SHALL BE AWWA C.I./D.I. DIMENSIONS FOR 8" PORTS OR LARGER. SMALLER PORT SIZES SHALL HAVE STANDARD I.P.S. DIMENSIONS ON GROOVED RISER, CAP, AND COUPLING.
4). GEAR ACTUATOR MAY BE SUBSTITUTED WITH STANDARD 2" SQUARE NUT ON BURIED PLUG VALVE FOR 4" BYPASS PORTS ONLY.
5). ALL FLANGES TO BE RATED FOR APPROPRIATE PRESSURE CLASS AS DICTATED BY FORCE MAIN DESIGN PRESSURES. CLASS 125 MINIMUM.
6). ALL HARDWARE, INCLUDING VALVE HARDWARE, SHALL BE STAINLESS STEEL.
7). BOX SHALL BE SIZED AS TO ALLOW SUFFICIENT WORKING ACCESS TO ACTUATORS AND COUPLINGS. SIZE SHALL BE DETERMINED PER SITE CONDITIONS AND APPROVED BY THE DISTRICT.
8). PORT HEIGHT SHALL BE DETERMINED PER SITE CONDITIONS AND APPROVED BY THE DISTRICT.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER	
SINGLE BYPASS PORT	DRAWN: JW	DWG. FILE: SO-22	
	APPROVED: MS	FIGURE: 22	
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE		

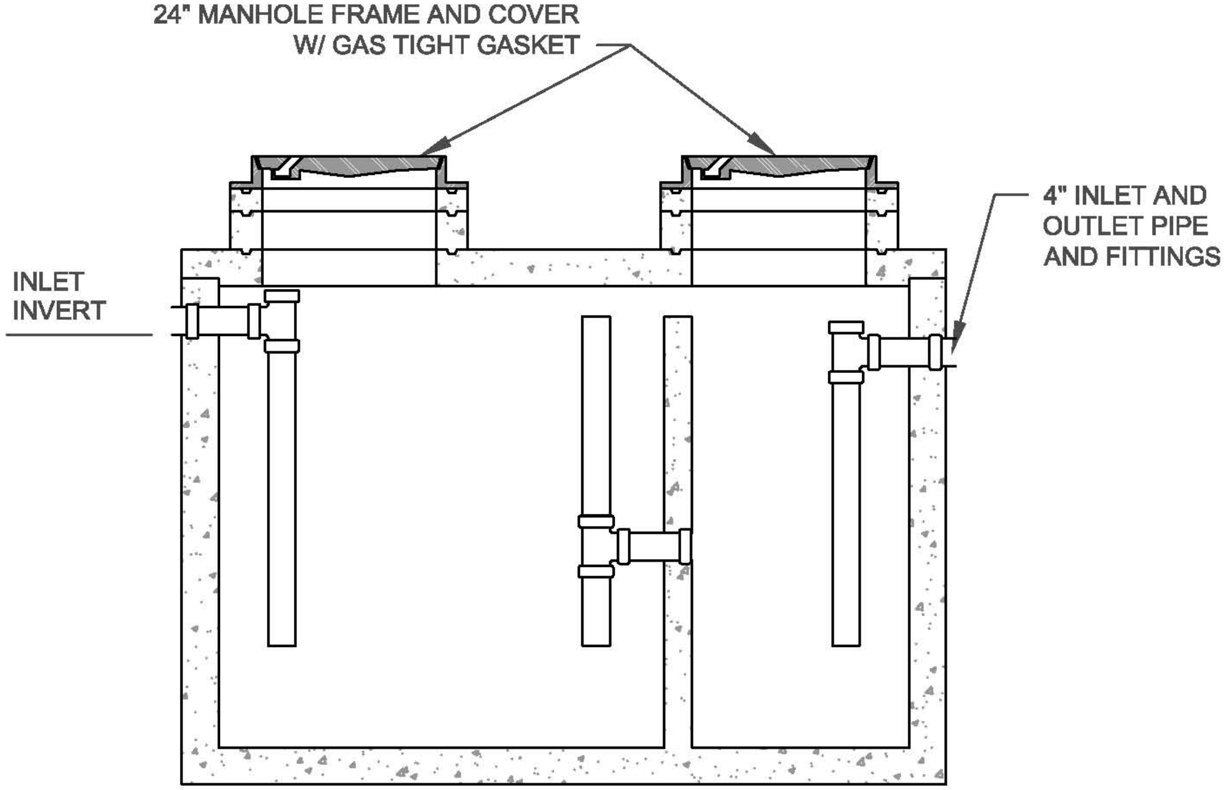


NOTES:

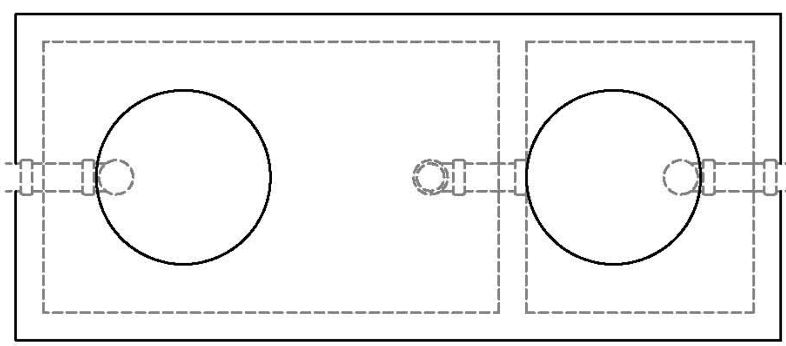
1). BOX FOOTING REQUIRED PER SOIL CONDITIONS. TRAFFIC AREAS REQUIRE FOOTINGS TO SUPPORT H-20 RATED BOX.
2). VALVES AND FITTINGS TO BE SIZED EQUAL TO FORCE MAIN SIZE FOR FORCE MAINS LESS THAN OR EQUAL TO 8" DIAMETER.
3). GROOVED TOP RISER, GROOVED CAP, AND VICTAULIC COUPLING SHALL BE AWWA C.I./D.I. DIMENSIONS FOR 8" PORTS OR LARGER. SMALLER PORT SIZES SHALL HAVE STANDARD I.P.S. DIMENSIONS ON GROOVED RISER, CAP, AND COUPLING.
4). GEAR ACTUATOR MAY BE SUBSTITUTED WITH STANDARD 2" SQUARE NUT ON BURIED PLUG VALVE FOR 4" BYPASS PORTS ONLY.
5). ALL FLANGES TO BE RATED FOR APPROPRIATE PRESSURE CLASS AS DICTATED BY FORCE MAIN DESIGN PRESSURES. CLASS 125 MINIMUM.
6). ALL HARDWARE, INCLUDING VALVE HARDWARE, SHALL BE STAINLESS STEEL.
7). BOX SHALL BE SIZED AS TO ALLOW SUFFICIENT WORKING ACCESS TO ACTUATORS AND COUPLINGS. SIZE SHALL BE DETERMINED PER SITE CONDITIONS AND APPROVED BY THE DISTRICT.
8). PORT HEIGHT SHALL BE DETERMINED PER SITE CONDITIONS AND APPROVED BY THE DISTRICT.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
DOUBLE BYPASS PORT	DRAWN: JW	DWG. FILE: SO-23
	APPROVED: MS	FIGURE: 23
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

PROFILE VIEW



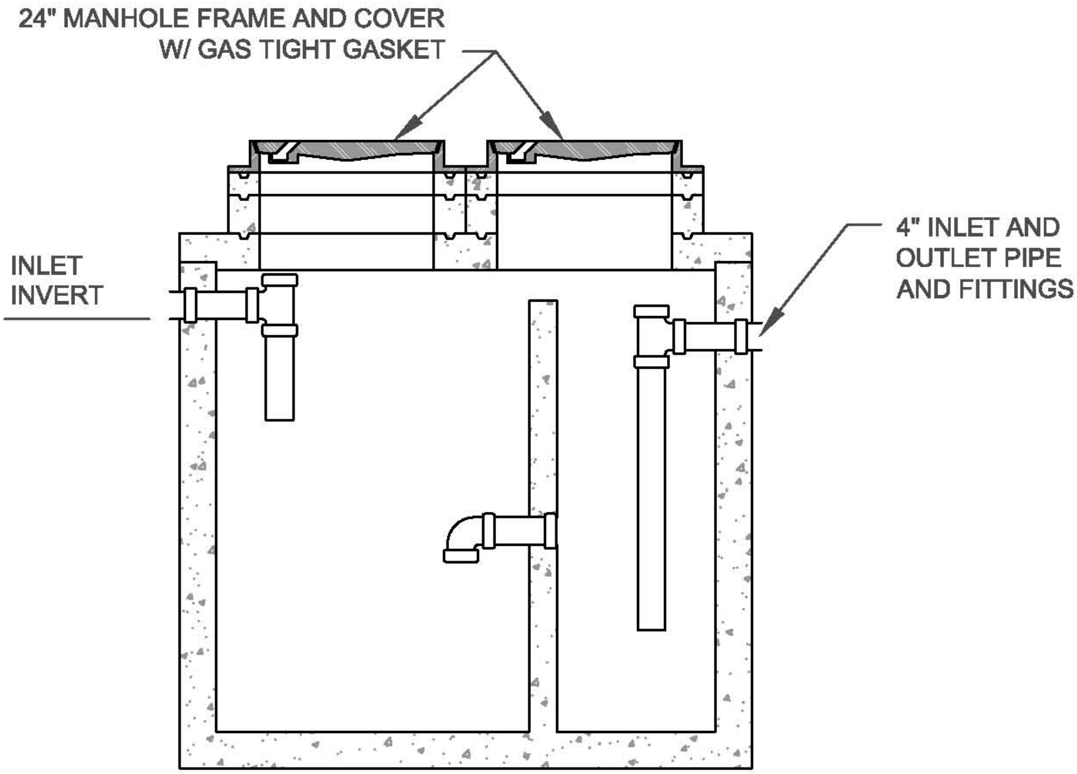
PLAN VIEW
(COVERS AND RISERS REMOVED)



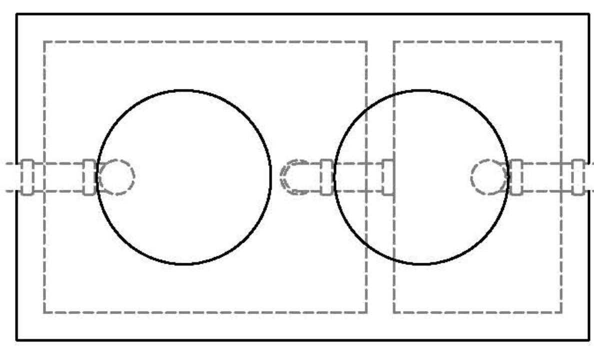
1). LIQUID CAPACITY: MINIMUM 750 GALLONS
2). VAULT DESIGN LOAD: H - 20 TRAFFIC LOADING
3). MINIMUM 3" VERTICAL DIFFERENTIAL BETWEEN INLET AND OUTLET.
4). APPLY RAMNEK PRIMER AND SEALANT TO BOTH SURFACES AT ALL JOINTS.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
GREASE INTERCEPTOR	DRAWN: JW	DWG. FILE: SO-24
	APPROVED: MS	FIGURE: 24
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

PROFILE VIEW



PLAN VIEW
(COVERS AND RISERS REMOVED)



1). LIQUID CAPACITY: MINIMUM 500 GALLONS
2). VAULT DESIGN LOAD: H - 20 TRAFFIC LOADING
3). MINIMUM 3" VERTICAL DIFFERENTIAL BETWEEN INLET AND OUTLET.
4). APPLY RAMNEK PRIMER AND SEALANT TO BOTH SURFACES AT ALL JOINTS.

NORTHSTAR C.S.D.	DATE: AUG. 2004	DIR.: SEWER
SAND/OIL INTERCEPTOR	DRAWN: JW	DWG. FILE: SO-25
	APPROVED: MS	FIGURE: 25
908 NORTHSTAR DR. TRUCKEE, CA	SCALE: NONE	

DEFINITIONS AND ABBREVIATIONS

Definitions

The following definitions shall apply to all District work:

AGENCY: Any political subdivision of the State of California acting as a body in accordance with the appropriate enabling legislation.

AGENT: Any individual, corporation, partnership or other legal entity representing the interests of the owner.

APPLICANT: An individual, agent, owner or agency making application for permission to connect and to make use of the District's sanitary sewer facilities.

BANQUET FACILITIES: A designated area which is occasionally used by commercial establishments for restaurant seating for groups of customers in addition to the regularly used restaurant seating. The District factor rating for banquet facilities is based upon the maximum number of seats used on the property at any one time. These banquet seats are charged 36 percent of a restaurant seat. Banquet seating shall not be used in the day to day operation of a restaurant; or for more than 50 percent of the time; or for non-banquet purposes. Seats which do not meet the criteria for banquet seats shall be rated as restaurant seats.

BAR SINK: A single square or rectangular sink which does not exceed 15 inches in length or width, and 7 inches in depth; or a round sink which does not exceed 15 inches in diameter. It shall not be the primary sink in a residential unit. If a bar sink is installed in a room which is not made available for rental purposes and does not have a kitchen, kitchenette, or any cooking facilities, and which is located within a residential unit which already contains a kitchen sink, there will be no connection charges or service charges assessed for the room.

BARBER SHOP: An establishment whose primary purpose is washing, cutting, and styling hair, and where color tints or dyes are not used and permanent waves are not usually given.

BEAUTY SHOP: An establishment whose primary purpose is washing, cutting, and styling hair, and where color tints or dyes are used and/or permanent waves may be given.

BENCH SEATING: In an establishment which is rated according to the number of seats, 20 inches of benching will be considered as one seat. Each bench will be counted in increments of 20 inches. Fractional seats will not be charged.

BOOTH SEATING: In an establishment which is rated according to the number of seats, 24 inches of booth seating will be considered as one seat. The booth seat will be counted in increments of 24 inches. Fractional seats will not be charged.

BOARD: The Board of Directors of the Northstar Community Services District.

BUILDING: Any structure used for human habitation, employment or place of business, recreation or other purpose, containing sanitary facilities.

BUILDING LATERAL: The sanitary sewer waste pipeline extending from the outside of the building foundation to the service lateral connection point (usually located at the property line). The cleanout at the service lateral connection point (usually the property line cleanout) is part of the building lateral.

CLEANOUT: A sealed aperture permitting access to a sanitary sewer pipeline for cleaning purposes.

COMMERCIAL ESTABLISHMENT: Any building use other than a residential unit as defined in the District Code, or a building used for manufacturing.

CONFERENCE FACILITIES: Facilities which are only used for conducting conferences intermittently throughout the year by groups of people which may vary significantly in number. The factor rating for these facilities is based upon the number of plumbing fixture units in the area used exclusively by the fore-mentioned groups and are generally rated at the public rate.

CONNECTION CHARGE: An amount of money charged for connection to the District sanitary sewer system pursuant to the District Code. This includes connection fees charged for any increase in factor rating as listed in Appendix A-3, page 71. Fixture Unit Equivalents may be amended from time to time, as a result of remodeling, additional building on property, change in usage of the property, or other change in appearance or operations.

CONTRACTOR: The person, firm, partnership, association, corporation or organization, either singular or plural, which is constructing any work authorized to be performed by improvement plans and specifications and approved by the District. The aforementioned entities may act either directly, or through properly authorized agents acting within the scope of the particular duties delegated to them.

COUNTY: The Counties of Nevada or Placer in the State of California, represented by the Director of Public Works acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

CUSTOMER: Any person described herein who receives wastewater service from or discharges wastewater into the District sanitary sewer system.

DEVELOPER: The person, firm, partnership, association, corporation or organization, either singular or plural, which is having constructed any work which is authorized to be performed by improvement plans and specifications and approved by the District. The aforementioned entities may act, either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

DISTRICT: The Northstar Community Services District.

DISTRICT DEVELOPMENT GUIDELINES: There are specific administrative requirements for developments and projects which involve the installation of sewer facilities. The District has produced a "Development Guidelines" packet to assist you. A "Development Guidelines" packet may be picked up at the District office.

DISTRICT ENGINEER: Engineer retained by the District, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

DISTRICT SANITARY SEWER FACILITIES: The system of pipelines, manholes, cleanouts, pump stations, interceptors, and/or related appurtenances, under the jurisdiction of the District, that carry liquid and waterborne waste from residential, commercial, or industrial facilities to the Tahoe-Truckee Sanitation Agency (T-TSA) for final treatment and disposal.

DWELLING UNIT: A living unit with kitchen facilities, including those in multiple dwellings, apartments, motels, hotels, mobile homes, trailers, condominiums or townhouses.

DWELLING UNIT EQUIVALENT: (DUE) A single family residential unit. Based on the occupancy of 2.3 persons per single family residence, producing 100 gallons of wastewater per person per day. One DUE is equal to 230 gallons of wastewater per day.

EFFLUENT: Treated waste waters flowing from a processing plant, or related facility.

ENGINEER: The person, firm, partnership, association, corporation or organization, either singular or plural, specifically appointed to prepare improvement plans and specifications, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

FACTOR RATING: The number of plumbing fixtures in a commercial establishment related to plumbing fixture unit equivalents in Appendix A-3, page 71, and correlated to the District Fee Structure, Appendix A-2, page 69.

FIXTURE UNITS: Plumbing fixture unit equivalent load values for drainage piping and plumbing, as specified in the District Code, the applicable Uniform Plumbing Code or the California State plumbing laws and administrative rules.

FORCE MAIN: A pressure pipe joining the pump discharge at a water or wastewater pumping station with a point of gravity flow.

GARBAGE: All animal and vegetable wastes from the preparation, cooking and dispensing of food, or the commercial and industrial processing thereof.

GENERAL MANAGER: The General Manager of the Northstar Community Services District

GREASE INTERCEPTOR/TRAP: A device, or structure and storage reservoir, acceptable to the District, which provides for the separation and storage of waste water with a specific gravity of less than 1.0 and prevents said light waste water from entering the sanitary sewer system.

GUEST HOUSE: A space to be used by members of the family occupying the main dwelling and their non-paying guest, without a kitchen or cooking facilities and containing less than 500 square feet of floor area. All utilities serving the guest house, such as water, sewer, electricity and gas shall be common to, dependent on and associated with the main dwelling. Allowable plumbing shall be limited to that required for a single bathroom. There shall be a limit of one guest house per parcel. The guest house must be further covered with a deed restriction or appropriate covenant approved by the District prohibiting the separate sale of the unit and/or independent rental of the unit.

INDUSTRIAL WASTE: Any liquid, gaseous, radioactive or solid waste substance or a combination thereof, resulting from any process of industry or manufacturing, or from the development or recovery of any natural resources.

INSPECTION: The act of reviewing any/or all sewer construction work for the purpose of determining compliance with the District Code.

INSPECTOR: A District representative, acting within the scope of their designated authority, who shall inspect commercial establishments in order to count the fixture units to determine the factor rating to be charged to the property. Also review any or all construction work for the purposes of determining compliance with the District Code.

KITCHEN FACILITIES: Any kitchen sink(s), kitchen sink with garbage disposal, kitchenette, or cooking facilities.

LABORATORY: Any testing agency or testing firm which has been approved by the Board of Directors of the Northstar Community Services District.

LICENSED CONTRACTOR: A contractor having a valid license issued pursuant to Chapter 9, Division 3, of the Business and Professions Code, State of California, which license includes the activities applied for and permitted.

LIVING UNIT: A structure or portion of a structure used for human habitation that contains sanitary facilities; shall be equivalent to a Dwelling.

LOT: Any piece or parcel of land bounded, defined, or shown upon a map or deed, recorded or filed in the office of the County Recorder.

MOTEL UNIT/HOTEL UNIT: (Also includes Bed & Breakfast establishments) Shall mean each guest room in a motel or hotel which is made available for use, rental or hire for the purpose of furnishing transient living accommodations on a day-to-day basis.

MULTIPLE USES: When restrooms are shared by both restaurant patrons and other business patrons (as they are in some major ski areas, for example), and where restrooms are not located in the restaurant and are not provided solely for the use of restaurant patrons, the formula detailed on Appendix A-4, page 73, will be applied as a credit against the total of plumbing fixture units which are provided for the use of both restaurant and other business patrons.

NOTICE OF NONCOMPLIANCE: A written notice issued by the District to the owner or their agent informing of defective materials, workmanship or procedures which do not conform to District requirements and which must be removed, replaced or remedied.

ORDINANCE: A statute or regulation of the Northstar Community Services District Board of Directors.

OUTFALL SEWER: A major sewer pipeline which collects wastewater from various sewer main pipelines and conveys it to an interceptor pipeline or pump station.

OWNER: The person, corporation, partnership, or other legal entity which is shown as the owner of a particular lot on the property tax rolls that are maintained by the Counties of Nevada or Placer.

pH: The negative reciprocal of the logarithm of the weight of hydrogen in grams per liter of solution.

PERMIT: Formal authorization required pursuant to this District Code for connection to the sanitary sewer system of the Northstar Community Services District.

PERMITTEE: The person to whom a permit has been issued pursuant to the provisions of the District Code.

PERSON: The State of California, any individual, public or private corporation, political subdivision, governmental agency, municipality, industry, co-partnership, association, firm, trust, estate or any other legal entity whatsoever.

PLUMBING FIXTURE: Any sink, toilet, shower, tub, floor drain, urinal, drinking fountain, etc., or appliance that collects and/or produces waste flow and introduces it into the sanitary sewer system.

PREMISES: Any lot, or any piece or parcel of land comprising of two or more lots of record in one ownership, or any building or other structure or any part of any building or structure used or useful for human habitation or gathering or for carrying on a business or occupation or any commercial or industrial activity.

PRIVATE SANITARY SEWER FACILITIES: The system of pipelines, manholes, cleanouts, pump stations, interceptors, and/or related appurtenances, ***not operated or maintained by the District***, that carry liquid and waterborne waste from residential, commercial, or industrial facilities to the District's sanitary sewer system.

PRIVATE FIXTURES: Are those which are intended for the use of an individual, or which are limited to the use of the employees of a business or tenants of a commercial building; provided that the number of employees in that business or tenants in that commercial building at any one time does not exceed the ratio of 5 employees or tenants per toilet per restroom.

PUBLIC ENTITY: A city or county, municipal water district, public utility district, sanitary district, sanitation district, county water district, or California water district, organized under the laws of the State of California, or any other public corporation or agency of the State having power to acquire, construct and operate facilities for the collection, treatment and disposal of wastewater, industrial waste and storm water of such entity and its inhabitants.

PUBLIC FIXTURES: Are those which are intended for the use of the employees of a business or tenants of a commercial building when the ratio of employees or tenants per toilet per restroom exceed 5 to 1; or those fixtures in a business which are for unrestricted use by clients or customers of the business, or members of the public; or those which are located in places to which the public is invited, or places which are frequented by the public without special permission, or other installations where fixtures are installed so that their use is similarly unrestrictive.

PUBLIC SEWER: A sanitary sewer pipeline which is controlled by or under the jurisdiction of a public entity.

RESIDENTIAL UNIT: A living unit with a kitchen sink, kitchenette, or any cooking facilities such as: (a) single family dwelling, (b) multiple dwelling, (c) apartment, (d) timeshare unit, (e) mobile home, (f) trailer, (g) condominium, or (h) townhouse. Includes all living units in which the owner is renting or leasing the premises, or any portion of the premises.

SANITARY SEWER: A sewer pipeline that carries water-borne wastes from residences, commercial buildings, and industrial plants.

SANITARY SEWER SYSTEM: The system of interceptor pipelines, outfall sewer pipelines, main pipelines, laterals, and pumping stations of the District that carry liquid and waterborne waste from residences, commercial buildings, and industrial plants.

SEASONAL SEATING: When an establishment which is rated and charged according to the number of seats has seating which is located outside, those seats which are located outside shall be charged 50 percent of the normal service charges charged for seats and 50 percent of the regular connection charge which is charged for seats.

SECTION: A subdivision of the District Code unless a specific citation is given to some other enabling legislation. Also, a term used to describe a specified segment of pipeline.

SEPTIC TANK: A watertight receptacle which receives the discharge from a building lateral and is designed and constructed to retain solids, digest organic matter through a period of detention, and is intended to allow the liquids to discharge into the soil outside of the septic tank through a drain field system or one or more seepage pits.

SERVICE LATERAL: The sanitary sewer waste piping which extends from the District main pipeline to the property line cleanout. The property line cleanout is part of the building lateral.

SEWER MAIN PIPELINE: A pipeline that receives wastewater from other sewer main pipelines, private sanitary sewer facilities, and building laterals.

SEWER SERVICE: Granting the privilege of sanitary sewer facility use to agencies, customers or persons in accordance with specific conditions and requirements.

SKI CLUB: An establishment which makes rooms available for use by members of a club or group on a temporary basis for periods of two weeks at a time shall be rated according to the number of fixture units on the premises and as private fixtures.

SNACK BAR: An establishment which uses only disposable products for food service and does not provide seating for the use of its customers.

SPECIAL DISTRICT: The Northstar Community Services District

STANDARDS: The Standards for Sewer Improvements for the Northstar Community Services District.

STANDARD SPECIFICATIONS: Whenever reference is made to the "Standard Specifications" it shall refer to the latest edition of the State of California, Department of Public Works, Division of Highways STANDARD SPECIFICATIONS. Where the terms "State" or "Engineer" are used in the "Standard Specifications" or any documents or instruments where this document or the developers specifications govern, they shall be construed to mean the District or the General Manager as defined in this article.

STATEMENT OF FACTS: Any information or documentation provided to the District by the owner or their agent.

STREET: Any public highway, road, street, avenue, alley, way, public place, public easement or right-of-way.

STREET PROPERTY LINE: A building line, where one has been established by ordinance; otherwise, the street property line itself.

STUB OUT: The connection point to the sanitary sewer. This point of connection is usually located near the property line at the terminus of the service lateral. A term also used for a short, capped extension of the District's sanitary sewer system for future pipeline extension.

SWIMMING POOL: All swimming or wading pools containing 2,000 gallons of water or more, and all non-residential whirlpool baths and hot tubs. All swimming pools, non-residential whirlpool baths and hot tubs, may discharge backwash and drain wastewater into the public sewer system.

If swimming pool draining and backwash is discharged to the sanitary sewer system, written approval must be obtained from the General Manager. No person shall discharge any substance into the sewer system without first notifying the District. The General Manger obtains the right to prohibit the draining of swimming pools when, in his/her opinion, such activity would deleteriously affect the operation of the sewer system-generally July 15 through September 15 and April 15 through May 15, but not inclusively or exclusively. Draining operations shall take place only between the hours of 9 P.M. and 7 A.M. or the any other time with prior approval of the General Manger.

TAPPING: The forming of a Tee or Wye branch connection to an existing sewer main pipeline by installing a Tee or Wye Saddle.

TEE: A fitting for a branch on which the spur joins the barrel of the pipe at an angle of approximately 90 degrees.

TOXIC WASTE: Any waste that is poisonous or hazardous to human, animal and/or plant life.

TRAP: A fitting or device which provides a liquid seal to prevent the emission of sewer gas or air without materially affecting the flow of wastewater or waste water through it.

T-TSA: Tahoe-Truckee Sanitation Agency, a regional wastewater treatment facility.

USER FEES: A regular charge to a owner or designated representative for the use of the public sanitary sewer system.

WASTEWATER: The spent water of a community, which may be a combination of liquid and water carried wastes from residences, commercial buildings, industrial plants, etc.

WASTEWATER PUMPING PLANT: Any works or device used to raise wastewater from a lower to a higher level or to overcome friction in a pipeline.

WASTEWATER TREATMENT FACILITY: Any arrangement of devices and structures used for treating wastewater.

WYE OR "Y": A fitting for a branch on which the spur joins the barrel of the pipe at an angle of approximately 45 degrees.

Abbreviations

ASTM	American Society for Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association, Inc.
NEMA	National Electrical Manufacturers Association
NEC	National Electrical Code
UBC	Uniform Building Code
UPC	Uniform Plumbing Code

ELEMENT 4: OPERATION AND MAINTENANCE PROGRAM

This section of the SSMP describes NCSD's Operation and Maintenance Program for its Sanitary Sewer System.

4.1 Regulatory Requirements for the Operation and Maintenance Program Element

With regard to the Operation and Maintenance Program, the SWRCB requires that the SSMP include the elements listed below that are appropriate and applicable:

1. Maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable storm water conveyance facilities.

2. Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The Preventive Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders.

3. Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and television inspections of manholes and sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a Capital Improvement Plan (CIP) that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the CIP.

4. Provide training on a regular basis for staff in sanitary sewer system operations and maintenance and require contractors to be appropriately trained.

5. Provide equipment and replacement part inventories, including identification of critical replacement parts.

4.2 Sanitary Sewer System Maps and Drawings

Staff maintains an overall sewer system map using ArcGIS Software. Hard copies of the system map are available at both the NCSD Administration office and the NCSD Corporate Yard Office. Digitally, the system map is available via the District's asset management software (Vueworks). Additionally, the system map is hosted via ArcGIS Online for mobile devices and internet users. Through ArcGIS Online, users not only have access to the system map, but they can also locate and open specific construction as-builts which are georeferenced as a layer on the system map. ArcGIS Online has an added benefit in that updates to system topology can be made remotely via mobile devices. This streamlines efforts in updating the system map. The system map is also updated as necessary when new sewer facilities are constructed.

In addition to the overall sewer system map, as-built construction drawings for sanitary sewer facilities are maintained. Hard copies of as-built construction drawings are stored at the NCSD Corporate Yard Office. As-builts are stored digitally on a shared Network Drive and are available District wide. Digital as-built drawings are also available to mobile and internet users via ArcGIS Online Applications.

4.3 Preventive Maintenance

All maintenance activities are logged as work orders in the District's asset management database program (Vueworks). Preventive maintenance activities for the sewer system currently include the following:

- Gravity Sewer Cleaning: Previously the District cleaned all gravity system mains every five years. This is now extended to six years unless related system failures occur. This is done primarily with high pressure jet rodding with District resources.
- Inverted Siphon Sewer Cleaning: Between 1972 and 2008, the two inverted siphon lines were cleaned with periodic high-volume flushing. In 2008 a sewer pigging project was performed on these lines under contract with SFE Global. Pigging was performed by SFE Global for a second time in 2014 and a third time recently in 2020. Pigging projects will continue to be performed every six years. This work will be contracted out. High volume flushing is to be performed once per month in June, July and August between pigging operations. Flushing is performed with District resources. Only one main is in service at a time, so an unused line is always available should a problem arise in the main in service.
- Pumping Facility Maintenance: There are three District Sewer Lift stations: Highway 267, Indian Hills, and the Retreat. Daily inspection and maintenance is performed at each facility.
- Closed Circuit (CC) TV: Previously, the District performed CCTV video inspection of its collection system on a seven-year basis. This is now reduced to six years so that mains can be inspected in coordination with cleaning schedules. The District rates sewer mains according to NASSCO's Pipeline Assessment and Certification Program (PACP).
- Priority Areas: Staff has identified the following priority areas. These areas are inspected and cleaned as noted. The priority areas noted are primarily related to design constraints, and there is not much that can be done to mitigate them. For instance, the District has drop manholes to reduce slopes of mains in mountainous terrain, but velocities during peak flows tend to send flows through the bypass piping of the manhole. These manholes are designed to allow this, but it causes debris to build on the manhole walls. This in turn requires increased service frequency. There are also instances where slopes are minimal, and these mains and manholes are serviced more frequently as a precaution. Some of the mains listed as priority areas had blockages that led to SSOs prior to 2004. There may not be a problem with the pipe installation, but these are kept on the priority list as a precaution. Priority areas are kept on this list until correction projects take place, if applicable. Where a problem can be mitigated, staff make every effort to do so in a timely manner.

  The following are the District's Priority Areas:

  1. SSMH #80 at the intersection of Basque and Wolf Tree. Annual Maintenance
  2. SS Main #676. This main is located in Northstar Drive downstream of SSMH #238. SSMH #238 is the SSMH just to the west of the intersection of Beaver Pond and Northstar Drive. Annual Maintenance
  3. SSMH #194 located behind 1065 Martis Landing. Annual Maintenance
  4. SSMH #188 located behind 1073 Martis Landing. Annual Maintenance
  5. SSMH #157 located between the Tomkins Memorial Trail and 159 Basque. Annual Maintenance
  6. SS Main #315. This main is located downstream of SSMH #149. The line is located in the road at 257 Basque. Annual Maintenance

7. SS Main #497. This main is located downstream of SSMH #17. It is located at a creek crossing downstream of the Highlands Fire Station. Annual Maintenance
8. SSMH #3 located in the common area of Ski Trail condos. Annual Maintenance
9. SS Main #689. This main is located behind the Rocky Point condos. Annual Maintenance
10. SS Main #124. This main is located behind 204 Bitter Brush. Annual Maintenance
11. SSMH #387. This main is located behind 2538 North Summit. Annual Maintenance
12. SS Mains #12, #29, #537 behind Employee Housing. 4-Year cleaning schedule.
13. SS Main #757 including SSMHs 160 and 161. This main is located behind 1123 Martis. Root intrusion has been observed in this main and connecting manholes. Annual Maintenance
14. SSMH #34 between SS Mains #480 and #481. This manhole is located in front of 366 Skidder Trail. Annual Maintenance
15. Indian Hills and 267 lift stations will be cleaned with the VacCon annually.

4.4 Rehabilitation and Replacement Plan

In general, the District's sanitary sewer system is in good condition, based on findings from inspections. The CCTV inspection program was instituted in 2008 when the District purchased its Aires sewer camera and Chevy TV Van. CCTV inspection has revealed that, overall, the system has very few problems. Significant problems encountered during CCTV were addressed immediately. Repairs typically entailed excavating and repairing sags or offsets in sewer mains. Repairs will continue to be made as problems are identified during inspection. As compared to other systems throughout the country, the District's sanitary sewer system is considered to be relatively young, with all piping installed after 1972.

Future improvement needs have been accounted for in the District's Capital Replacement Plan, originally adopted under Resolution 11-04 on April 20, 2011, and revised and adopted by the District Board on September 19, 2018. A separate sewer system reserve fund for future capital expenditures has been established to fund future replacement needs. The 100-year sewer system CIP has approximately $55M worth of capital expenses scheduled. The CIP accounts for capital improvements for infrastructure, facilities, and equipment. Over time, approximately 75% of the capital improvement costs will be for infrastructure replacement. See attached table in the Element 4 Appendix for the updated sewer system CIP schedule.

4.5 Training

NCSD staff and management are trained on a regular basis in the safety aspects and in the use of equipment necessary for performing work on the sanitary sewer system, as documented on signature sheets. For example, NCSD is trained in confined-space entry, personal protective equipment, emergency response, traffic control, trench safety, hydration, as well as in the use of heavy equipment in connection with repair work on the sanitary sewer system.

Contractors are required to have valid and appropriate licenses to perform work and are also required to have safety programs in place before commencing their activities. The Contractors' safety programs must meet all local, state, and federal requirements as well as any additional requirements imposed by NCSD. NCSD provides full-time inspection when work is occurring on or in the sanitary sewer system or when excavation or backfill activities are occurring in the vicinity of the sanitary sewer system.

4.6 Equipment and Replacement Parts Inventories

Vehicle Inventory

All Vehicles are stored at the Corporate Yard (51 Trimont Lane, Truckee, CA 96161). The following is the District's vehicle inventory with *italics* denoting items critical to Sewer System Operation and Maintenance:

1. B2 - Blanchet Blower
2. B3 - Kodiak Snow Blower
3. B4 - Trackless Blower
4. B6 - Trackless Blower
5. C1 - Case 580K Super N Backhoe
6. C2 - Case 580SN Backhoe
7. CS1 - Crafco Crack Seal Trailer
8. D2 - International Dump/Sander Truck
9. F1 - Flusher F800. Includes 450' flusher hose with the Harben pump
10. FKL1 - Daewoo G30E Forklift
11. L1 - John Deere 624 E Loader
12. L2 - John Deere 624 GH Loader
13. L3 - Cat 950 G Loader
14. P1 - Ford Expedition
15. P2 – F150 pick up
16. P6 - Chevy 3500 Dump Body
17. P7 - Ford F550 Dump Body w/ Sander Plow
18. P8 - Ford F350 Super Duty Plow w/ 100 gal diesel fuel transfer tank
19. P9 - Chevy TV Van
20. P10 - Ford F150 w/ Camper Shell
21. S1 - Schwartz Sweeper
22. Toro Trail Machine
23. TV2 - Rausch Push Camera
24. TV1 - Aires TV Camera
25. U1 - Ford F550 Utility Truck
26. U2 - Ford F250 Utility Truck w/ lift gate
27. U3 - F250 Utility Truck
28. V2 - International VacCon Vactor

Equipment Inventory

The following equipment is available at the NCSD Corporate Yard. Most items are stored in the Box Car (* Denotes storage in the Wood Shop. ** Denotes Storage in the Sand Barn). *Italics* denote items critical to Sewer System Operation and Maintenance:

1. *Large Honda Sump/Trash Pump with Intake Hose* **
2. Tsurmi Jump Pump *
3. *350ft blue 2" quick connect discharge hose.*
4. *105ft grey 2" quick connect discharge hose.* **
5. *Threaded Yellow Wire Bead Intake Hose Roll (rated to 600 psi)* **
6. *350ft blue 3" layflat discharge hose***
7. *500ft red 3" layflat discharge hose* **
8. *20ft threaded green intake hose (rated at 150 psi)* **
9. *250ft F-1 Flusher Hose* **
10. Mini Air Tank
11. 6 gal portable electric air compressor *
12. (2 count) Honda 2000 portable generators
13. (1 count) Honda 6500 portable generator
14. (1 count) small clamshell tool
15. (1 count) large clamshell tool

Spare Parts Inventory

The following spare parts are available at the NCSD Corporate Yard. Most items are stored in the Box Car (* Denotes storage in the Wood Shop. ** Denotes Storage in the Sand Barn). *Italics* denote items critical to Sewer System Operation and Maintenance.

(4 Count*) Coupling – MR-51-44 – 4" ACP/DIP to 4" CIP/Schedule 40 PVC*

1. *(4 Count) Coupling – Fernco 1056-44 – 4" CIP/PVC to 4" CIP/ PVC*
2. *(6 Count) Coupling – Fernco 1056-66 – 6" CIP/PVC to 6" CIP/ PVC*
3. *(6 Count) Coupling – Fernco 1051-66 – 6" ACP/DIP to 6" CIP/ PVC*
4. *(1 Count) Coupling – Fernco 1051-88 – 8" ACP/DIP to 8" CIP/ PVC*
5. *(1 Count) Coupling – Fernco 1056-88 – 8" CIP/PVC to 8" CIP/ PVC*
6. (1 Count) Coupling – Fernco 1056-1010 – 10" CIP/PVC to 10" CIP/ PVC
7. (2 Count) Coupling – Fernco 0410-688 – 10" adjustable repair coupling
8. (3 count) coupling – fernco 1056-1212 12" CIP/PVC to 12" CIP/CIP
9. (1 count) coupling – Maxadaptor– 4" universal coupling
10. (1 count) coupling – Maxadaptor– 6" universal coupling
11. *(8 Count) Coupling – 4" PVC (gasketed)*
12. *(5 Count) Coupling – 4" PVC (non gasketed)*
13. *(4 Count) 22.5 Elbow – 4" PVC (gasketed)*
14. *(4 Count) 22.5 Elbow – 4" PVC (non gasketed)*
15. *(4 Count) 45 Elbow – 4" PVC (gasketed)*
16. *(3 Count) 45 Elbow – 4" PVC (non gasketed)*
17. *(1 Count) 90 Elbow – 4" PVC (gasketed)*

18. *(2 Count) 90 Elbow – 4” PVC (non gasketed)*
19. *(2 Count) wye – 4” PVC (gasketed)*
20. *(1 count) wye – 4” PVC (non gasketed)*
21. *(1 Count) Threaded End Cap - 4” PVC*
22. *(6 Count) Coupling – 6” PVC (gasketed)*
23. *(6 Count) Coupling – 8” PVC (gasketed)*
24. *(1 Count) Tee – 8”X4” PVC*
25. *(1 Count) Threaded End Cap - 8” PVC*
26. *(1 Count) gasketed End Cap - 8” PVC*
27. *(2 Count) 90 Elbow – 2” ABS*
28. *(2 Count) coupling – 2” ABS*
29. *(2 Count) 22.5 Elbow – 2” ABS*
30. *(2 Count) Long Sewer Plug – 4”*
31. *(2 Count) Quick Cap with Hose Bib – 4”*
32. *(2 Count) Test Ball Plug – 6”*
33. *(1 Count) threaded C/O Plug – 6” PVC*
34. *(3 Count) Suregrip Plug – 8”*
35. *(1 Count) threaded C/O Plug – 8” PVC*
36. (2 Count) Suregrip Plug – 10”
37. (1 Count) Test Ball Plug – 10”
38. *(2 Count) Test Ball Plug – 12”*
39. *(4 Count) Cretex Chimney Seal Aluminum Rings*
40. *(3 Count) Cretex Chimney Seal Rubber Rings*
41. *(10 Count) Ram Neck Strips – 3”X42.5”*
42. *(10 Count) Ram Neck Roll – 1”X12’*
43. *(2 Count) Steel Float Ball – 8”*
44. *(1 Count) Round Steel C/O lids*
45. (3 Count) Older style triangle lids
46. *(2 Count) 26” Manhole lid*
47. *(1 Count) 26.25” Manhole lid*
48. *(4 count) 25.25” manhole lid*
49. (2 count) 25.37” manhole lid
50. (1 count) 20’ stick 4” SDR35
51. (1 count) 20’ stick 6” SDR35
52. (1 count) 20’ stick 8” SDR35
53. (1 Count) Emergency Universal Lid

*54. (1 Count) Hwy 267 Lift Station Pump ***

Element 4 Appendix
CIP Financial Analysis Table
Sewer System TVI and Flushing Schedule – Updated March 2024

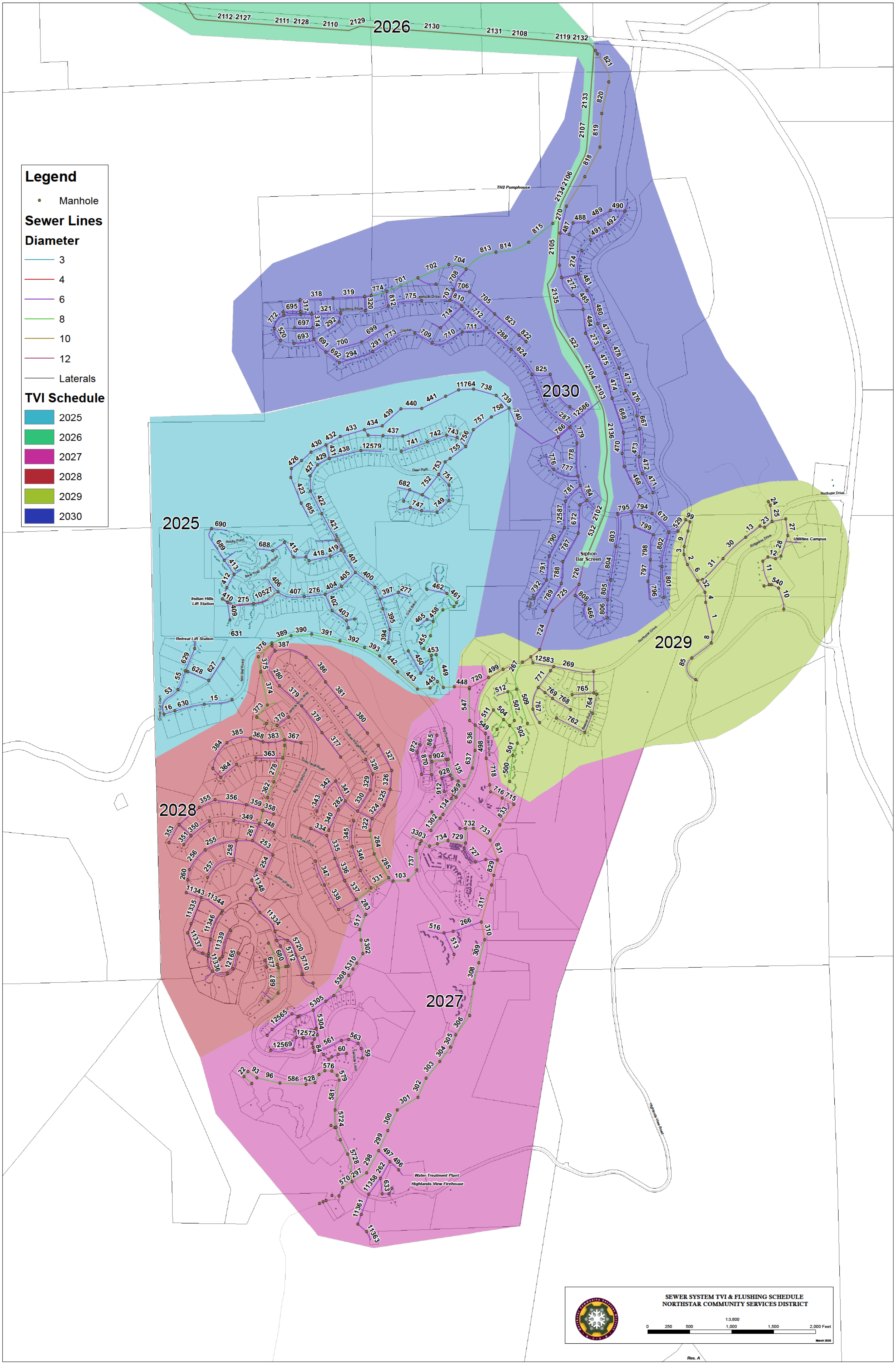
Sewer System - Financial Analysis Summary Table

	inflation factor	interest rate
	3.20%	3.82%
		$ 1,202,812

Fiscal Year	Mains	Laterals	CO	Manholes	Infrastructure Subtotal	Facilities	Equipment	Annual Capital Expense		Adj. Annual Capital Expense	100% Funded inflated annual reserve contribution	Fully Funded Balance
FY2023-24	$ -	$ -	$ -	$ -	$ -	$ -	$ 116,049	$ 116,049	0	$ 116,049	$ 1,202,812	$ 6,575,338
FY2024-25	$ -	$ -	$ -	$ -	$ -	$ 22,708	$ 7,601	$ 30,309	1	$ 31,278	$ 1,241,302	$ 8,036,540
FY2025-26	$ -	$ -	$ -	$ -	$ -	$ 126,952	$ 23,275	$ 150,227	2	$ 159,996	$ 1,281,024	$ 9,464,564
FY2026-27	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,536	$ 19,536	3	$ 21,472	$ 1,322,017	$ 11,126,655
FY2027-28	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	4	$ -	$ 1,364,321	$ 12,916,015
FY2028-29	$ -	$ -	$ -	$ -	$ -	$ 138,805	$ 138,240	$ 277,045	5	$ 324,301	$ 1,407,980	$ 14,493,085
FY2029-30	$ -	$ -	$ -	$ -	$ -	$ 25,857	$ 5,028	$ 30,884	6	$ 37,309	$ 1,453,035	$ 16,462,447
FY2030-31	$ -	$ -	$ -	$ -	$ -	$ 188,822	$ 4,163	$ 192,985	7	$ 240,592	$ 1,499,532	$ 18,350,253
FY2031-32	$ -	$ -	$ -	$ -	$ -	$ 5,270	$ 20,237	$ 25,508	8	$ 32,818	$ 1,547,517	$ 20,565,932
FY2032-33	$ -	$ -	$ -	$ -	$ -	$ 26,664	$ -	$ 26,664	9	$ 35,404	$ 1,597,038	$ 22,913,185
FY2033-34	$ -	$ -	$ -	$ -	$ -	$ 78,494	$ -	$ 78,494	10	$ 107,555	$ 1,648,143	$ 25,329,056
FY2034-35	$ -	$ -	$ -	$ -	$ -	$ 33,979	$ 212,335	$ 246,313	11	$ 348,309	$ 1,700,884	$ 27,649,201
FY2035-36	$ -	$ -	$ -	$ -	$ -	$ 3,934	$ 28,687	$ 32,621	12	$ 47,605	$ 1,755,312	$ 30,413,108
FY2036-37	$ -	$ -	$ -	$ -	$ -	$ 30,573	$ 41,245	$ 71,819	13	$ 108,162	$ 1,811,482	$ 33,278,208
FY2037-38	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,893	$ 5,893	14	$ 9,159	$ 1,869,449	$ 36,409,726
FY2038-39	$ -	$ -	$ -	$ -	$ -	$ 6,252	$ 116,794	$ 123,046	15	$ 197,362	$ 1,929,272	$ 39,532,488
FY2039-40	$ -	$ -	$ -	$ -	$ -	$ 6,788	$ 2,146	$ 8,934	16	$ 14,789	$ 1,991,008	$ 43,018,849
FY2040-41	$ -	$ -	$ -	$ -	$ -	$ 30,747	$ -	$ 30,747	17	$ 52,523	$ 2,054,721	$ 46,664,366
FY2041-42	$ -	$ -	$ -	$ -	$ -	$ 15,525	$ 5,028	$ 20,552	18	$ 36,233	$ 2,120,472	$ 50,531,184
FY2042-43	$ -	$ -	$ -	$ -	$ -	$ 28,957	$ 4,163	$ 33,120	19	$ 60,256	$ 2,188,327	$ 54,589,546
FY2043-44	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,675	$ 5,675	20	$ 10,656	$ 2,258,353	$ 58,922,564
FY2044-45	$ 14,332,546	$ 450,894	$ 1,088,750	$ 996,850	$ 16,869,041	$ -	$ -	$ 16,869,041	21	$ 32,686,169	$ 2,330,621	$ 30,817,857
FY2045-46	$ 4,875,361	$ 1,649,204	$ 135,000	$ 1,639,000	$ 8,298,565	$ 302,185	$ 23,275	$ 8,624,025	22	$ 17,245,006	$ 2,405,200	$ 17,155,293
FY2046-47	$ 5,797,786	$ 1,950,512	$ 630,938	$ 1,359,670	$ 9,738,906	$ 60,662	$ 33,947	$ 9,833,515	23	$ 20,292,792	$ 2,482,167	$ (0)
FY2047-48	$ 49,197	$ -	$ -	$ -	$ 49,197	$ -	$ -	$ 49,197	24	$ 104,774	$ 2,561,596	$ 2,456,822
FY2048-49	$ -	$ -	$ -	$ -	$ -	$ 103,480	$ 17,236	$ 120,716	25	$ 265,313	$ 2,643,567	$ 4,928,928
FY2049-50	$ -	$ -	$ -	$ -	$ -	$ 39,854	$ -	$ 39,854	26	$ 90,395	$ 2,728,161	$ 7,754,979
FY2050-51	$ -	$ -	$ -	$ -	$ -	$ 44,077	$ 44,564	$ 88,641	27	$ 207,485	$ 2,815,463	$ 10,659,197
FY2051-52	$ 1,770,814	$ 629,843	$ 165,938	$ 507,950	$ 3,074,545	$ -	$ 13,046	$ 3,087,591	28	$ 7,458,497	$ 2,905,557	$ 6,513,439
FY2052-53	$ -	$ -	$ -	$ -	$ -	$ 3,957	$ 25,964	$ 29,921	29	$ 74,591	$ 2,998,535	$ 9,686,197
FY2053-54	$ -	$ -	$ -	$ -	$ -	$ 50,947	$ 169,440	$ 220,388	30	$ 566,994	$ 3,094,488	$ 12,583,704
FY2054-55	$ 1,181,873	$ 398,445	$ 129,375	$ 377,390	$ 2,087,083	$ 30,000	$ 6,309	$ 2,123,392	31	$ 5,637,686	$ 3,193,512	$ 10,620,228
FY2055-56	$ -	$ -	$ -	$ -	$ -	$ 33,048	$ 5,675	$ 38,723	32	$ 106,101	$ 3,295,704	$ 14,215,523
FY2056-57	$ -	$ -	$ -	$ -	$ -	$ 90,329	$ 15,545	$ 105,873	33	$ 299,376	$ 3,401,167	$ 17,860,347
FY2057-58	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	34	$ -	$ 3,510,004	$ 22,052,616
FY2058-59	$ -	$ -	$ -	$ -	$ -	$ -	$ 142,825	$ 142,825	35	$ 430,124	$ 3,622,324	$ 26,087,227
FY2059-60	$ -	$ -	$ -	$ -	$ -	$ 47,819	$ 195,969	$ 243,787	36	$ 757,670	$ 3,738,239	$ 30,064,328
FY2060-61	$ -	$ -	$ -	$ -	$ -	$ 8,039	$ 5,455	$ 13,493	37	$ 43,278	$ 3,857,862	$ 35,027,370
FY2061-62	$ -	$ -	$ -	$ -	$ -	$ 5,270	$ 22,507	$ 27,777	38	$ 91,941	$ 3,981,314	$ 40,254,788

FY2062-63	$ -	$ -	$ -	$ 16,250	$ 16,250	$ 28,957	$ 11,781	$ 56,988	39	$ 194,666	$ 4,108,716	$ 45,706,571
FY2063-64	$ -	$ -	$ -	$ -	$ -	$ 136,956	$ -	$ 136,956	40	$ 482,801	$ 4,240,195	$ 51,209,956
FY2064-65	$ -	$ -	$ -	$ -	$ -	$ 22,708	$ -	$ 22,708	41	$ 82,612	$ 4,375,881	$ 57,459,445
FY2065-66	$ -	$ -	$ -	$ -	$ -	$ -	$ 36,235	$ 36,235	42	$ 136,044	$ 4,515,909	$ 64,034,261
FY2066-67	$ -	$ -	$ -	$ -	$ -	$ 208,978	$ 32,009	$ 240,987	43	$ 933,728	$ 4,660,418	$ 70,207,060
FY2067-68	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,568	$ 11,568	44	$ 46,257	$ 4,809,552	$ 77,652,265
FY2068-69	$ -	$ -	$ 67,500	$ -	$ 67,500	$ 30,175	$ 116,049	$ 213,724	45	$ 881,942	$ 4,963,457	$ 84,700,097
FY2069-70	$ 1,798,812	$ 655,603	$ 65,625	$ 440,710	$ 2,960,751	$ 46,043	$ 22,901	$ 3,029,694	46	$ 12,902,233	$ 5,122,288	$ 80,155,696
FY2070-71	$ 202,751	$ 131,408	$ -	$ 164,180	$ 498,339	$ 53,180	$ 4,585	$ 556,104	47	$ 2,444,002	$ 5,286,201	$ 86,059,843
FY2071-72	$ 1,032,422	$ 243,737	$ 43,125	$ 377,110	$ 1,696,394	$ 28,775	$ -	$ 1,725,169	48	$ 7,824,509	$ 5,455,360	$ 86,978,179
FY2072-73	$ 799,283	$ 274,383	$ 62,813	$ 213,210	$ 1,349,689	$ 26,664	$ 5,455	$ 1,381,808	49	$ 6,467,744	$ 5,629,931	$ 89,462,933
FY2073-74	$ -	$ 373,095	$ 16,875	$ -	$ 389,970	$ 48,816	$ -	$ 438,786	50	$ 2,119,521	$ 5,810,089	$ 96,570,986
FY2074-75	$ 601,568	$ -	$ -	$ 212,930	$ 814,498	$ 30,000	$ 745	$ 845,243	51	$ 4,213,529	$ 5,996,012	$ 102,042,480
FY2075-76	$ 35,136	$ 20,838	$ 18,750	$ -	$ 74,724	$ 3,934	$ -	$ 78,658	52	$ 404,655	$ 6,187,884	$ 111,723,732
FY2076-77	$ 504,252	$ -	$ -	$ 147,090	$ 651,342	$ 91,235	$ 41,143	$ 783,721	53	$ 4,160,881	$ 6,385,897	$ 118,216,595
FY2077-78	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,028	$ 5,028	54	$ 27,546	$ 6,590,245	$ 129,295,167
FY2078-79	$ 1,071,793	$ 50,079	$ 3,750	$ 509,350	$ 1,634,972	$ -	$ 4,163	$ 1,639,135	55	$ 9,268,259	$ 6,801,133	$ 131,767,117
FY2079-80	$ 290,482	$ 6,794	$ -	$ -	$ 297,276	$ -	$ 5,675	$ 302,952	56	$ 1,767,812	$ 7,018,769	$ 142,051,577
FY2080-81	$ 1,628,849	$ 429,076	$ 37,500	$ 982,840	$ 3,078,265	$ 191,493	$ 44,564	$ 3,314,322	57	$ 19,958,940	$ 7,243,370	$ 134,762,378
FY2081-82	$ 1,454,591	$ 215,853	$ 75,000	$ 709,110	$ 2,454,554	$ -	$ 13,046	$ 2,467,600	58	$ 15,335,473	$ 7,475,158	$ 132,049,985
FY2082-83	$ 49,243	$ 140,088	$ -	$ -	$ 189,331	$ 28,957	$ 9,794	$ 228,082	59	$ 1,462,826	$ 7,714,363	$ 143,345,832
FY2083-84	$ -	$ 81,796	$ 5,625	$ -	$ 87,421	$ 168,980	$ 164,413	$ 420,814	60	$ 2,785,299	$ 7,961,223	$ 153,997,566
FY2084-85	$ 364,833	$ 200,554	$ -	$ 212,930	$ 778,317	$ 9,642	$ 203,569	$ 991,528	61	$ 6,772,772	$ 8,215,982	$ 161,323,482
FY2085-86	$ 931,875	$ 204,256	$ 46,875	$ 409,610	$ 1,592,617	$ 16,295	$ 23,275	$ 1,632,187	62	$ 11,505,649	$ 8,478,893	$ 164,459,283
FY2086-87	$ -	$ -	$ -	$ -	$ -	$ -	$ 43,499	$ 43,499	63	$ 316,449	$ 8,750,218	$ 179,175,396
FY2087-88	$ 96,716	$ 325,815	$ 120,000	$ 65,000	$ 607,530	$ -	$ -	$ 607,530	64	$ 4,561,090	$ 9,030,225	$ 190,489,030
FY2088-89	$ -	$ -	$ -	$ -	$ -	$ 51,710	$ 138,240	$ 189,950	65	$ 1,471,699	$ 9,319,192	$ 205,613,205
FY2089-90	$ 315,681	$ 33,679	$ 56,250	$ 132,240	$ 537,851	$ 39,854	$ 5,028	$ 582,732	66	$ 4,659,389	$ 9,617,406	$ 218,425,646
FY2090-91	$ -	$ -	$ 5,625	$ -	$ 5,625	$ 164,777	$ 15,944	$ 186,346	67	$ 1,537,662	$ 9,925,163	$ 235,157,007
FY2091-92	$ -	$ -	$ -	$ -	$ -	$ 34,764	$ 20,237	$ 55,002	68	$ 468,378	$ 10,242,768	$ 253,914,394
FY2092-93	$ -	$ -	$ -	$ -	$ -	$ 3,957	$ 745	$ 4,701	69	$ 41,315	$ 10,570,537	$ 274,143,146
FY2093-94	$ -	$ -	$ -	$ -	$ -	$ 87,157	$ -	$ 87,157	70	$ 790,466	$ 10,908,794	$ 294,733,741
FY2094-95	$ -	$ -	$ -	$ -	$ -	$ 30,000	$ 4,585	$ 34,585	71	$ 323,702	$ 11,257,875	$ 316,926,744
FY2095-96	$ -	$ -	$ -	$ -	$ -	$ 12,505	$ 7,933	$ 20,438	72	$ 197,409	$ 11,618,127	$ 340,454,064
FY2096-97	$ -	$ -	$ -	$ -	$ -	$ 90,329	$ 33,301	$ 123,630	73	$ 1,232,368	$ 11,989,907	$ 364,216,949
FY2097-98	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,893	$ 5,893	74	$ 60,621	$ 12,373,584	$ 390,443,000
FY2098-99	$ -	$ -	$ -	$ -	$ -	$ -	$ 116,049	$ 116,049	75	$ 1,232,025	$ 12,769,539	$ 416,895,437
FY2099-00	$ -	$ -	$ -	$ -	$ -	$ 6,788	$ 2,146	$ 8,934	76	$ 97,884	$ 13,178,164	$ 445,901,123
FY2100-01	$ -	$ -	$ -	$ -	$ -	$ 9,825	$ -	$ 9,825	77	$ 111,088	$ 13,599,866	$ 476,423,323
FY2101-02	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,028	$ 5,028	78	$ 58,665	$ 14,035,061	$ 508,599,091
FY2102-03	$ -	$ -	$ -	$ -	$ -	$ 28,957	$ 4,163	$ 33,120	79	$ 398,826	$ 14,484,183	$ 542,112,933
FY2103-04	$ -	$ -	$ -	$ -	$ -	$ -	$ 26,430	$ 26,430	80	$ 328,455	$ 14,947,677	$ 577,440,869
FY2104-05	$ -	$ -	$ -	$ -	$ -	$ 22,708	$ 11,781	$ 34,489	81	$ 442,320	$ 15,426,003	$ 614,482,794
FY2105-06	$ -	$ -	$ -	$ -	$ -	$ 6,533	$ 23,275	$ 29,808	82	$ 394,515	$ 15,919,635	$ 653,481,156
FY2106-07	$ -	$ -	$ -	$ -	$ -	$ 60,662	$ 33,947	$ 94,609	83	$ 1,292,248	$ 16,429,063	$ 693,580,952
FY2107-08	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	84	$ -	$ 16,954,793	$ 737,030,537
FY2108-09	$ -	$ -	$ -	$ -	$ -	$ 18,105	$ 5,455	$ 23,560	85	$ 342,723	$ 17,497,347	$ 782,339,727
FY2109-10	$ -	$ -	$ -	$ -	$ -	$ 55,812	$ 195,969	$ 251,780	86	$ 3,779,859	$ 18,057,262	$ 826,502,507
FY2110-11	$ -	$ -	$ -	$ -	$ -	$ 36,210	$ 45,308	$ 81,518	87	$ 1,262,960	$ 18,635,094	$ 875,447,037

FY2111-12	$ -	$ -	$ -	$ -	$ -	$ -	$ 20,991	$ 20,991	88	$ 335,615	$ 19,231,417	$ 927,784,916
FY2112-13	$ -	$ -	$ -	$ -	$ -	$ 41,052	$ 5,210	$ 46,261	89	$ 763,330	$ 19,846,822	$ 982,309,792
FY2113-14	$ -	$ -	$ -	$ -	$ -	$ 58,540	$ 169,440	$ 227,980	90	$ 3,882,123	$ 20,481,921	$ 1,036,433,823
FY2114-15	$ -	$ -	$ -	$ -	$ -	$ 47,864	$ 6,309	$ 54,173	91	$ 951,994	$ 21,137,342	$ 1,096,210,944
FY2115-16	$ -	$ -	$ -	$ -	$ -	$ 10,186	$ 5,675	$ 15,861	92	$ 287,655	$ 21,813,737	$ 1,159,612,285
FY2116-17	$ -	$ -	$ -	$ -	$ -	$ 239,551	$ 14,800	$ 254,351	93	$ 4,760,418	$ 22,511,777	$ 1,221,660,833
FY2117-18	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	94	$ -	$ 23,232,154	$ 1,291,560,430
FY2118-19	$ -	$ -	$ -	$ -	$ -	$ 120,700	$ 154,606	$ 275,306	95	$ 5,487,657	$ 23,975,583	$ 1,359,385,964
FY2119-20	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	96	$ -	$ 24,742,801	$ 1,436,057,309
FY2120-21	$ -	$ -	$ -	$ -	$ -	$ 314,174	$ 26,209	$ 340,384	97	$ 7,226,022	$ 25,534,571	$ 1,509,223,247
FY2121-22	$ -	$ -	$ -	$ -	$ -	$ -	$ 14,562	$ 14,562	98	$ 319,030	$ 26,351,677	$ 1,592,908,222
FY2122-23	$ -	$ -	$ -	$ -	$ -	$ 28,957	$ -	$ 28,957	99	$ 654,692	$ 27,194,931	$ 1,680,297,555
Totals	**$ 39,185,867**	**$ 8,465,953**	**$ 2,775,313**	**$ 9,473,420**	**$ 59,900,552**	**$ 4,383,452**	**$ 3,396,610**	**$ 67,680,613**		**$ 250,600,370**		



Legend
Manhole
Sewer Lines
Diameter
3
4
6
8
10
12
Laterals
TVI Schedule
2025
2026
2027
2028
2029
2030
2026
2030
2025
2029
2028
2027
TH2 Pumphouse
Indian Hills Lift Station
Retreat Lift Station
Siphon Bar Screen
Utilities Campus
Water Treatment Plant
Highlands View Firehouse
SEWER SYSTEM TVI & FLUSHING SCHEDULE
NORTHSTAR COMMUNITY SERVICES DISTRICT
1:3,600
0 250 500 1,000 1,500 2,000 Feet
March 2026
Res. A

ELEMENT 5: DESIGN AND PERFORMANCE PROVISIONS

This section of the SSMP describes NCSD's design and performance provisions.

5.1 Regulatory Requirements for the Design and Performance Provisions Element

The SWRCB requirements for the design and performance provisions element are as follows:

1. Design standards and specifications for the installation of sewer pipe materials, minimum size criteria, minimum cover, strength, slope, and backfill.

2. Standard procedures for installation and testing of new sewer pump stations, and ancillary connections.

3. Standard specifications for rehabilitation and repair of sewer pipes and manholes such as grouting slip lining, and pipe bursting.

5.2 SSMP Compliance

The NCSD Code, Sewer Ordinance 22-05, meets the intention of the above regulatory requirements (See attached Section 3 above). Specifically, section 7 governs the installation of Sanitary Sewer Facilities. Supplemental to the body of the Sewer Ordinance are Appendices A-5, A-6, and the District's Standard Drawings. Ordinance excerpts related to the design and performance provisions are included below.

Minimum Size

Residential Building Laterals: The diameter of gravity building laterals shall not be less than the pipeline diameter exiting the structure, or less than 4 inches for a single residence or two residences. A 6-inch diameter pipeline or larger shall be used for more than two dwelling units.

Commercial Building Laterals: The minimum pipeline diameter for new gravity building laterals shall not be less than 6 inches. Existing 4-inch building laterals proposed for commercial use shall be tested in accordance with Section 10.03, page 50. If the existing 4-inch building lateral fails the test, the entire 4-inch pipeline shall be removed or abandoned, and the commercial building lateral shall be upgraded to a 6-inch diameter pipeline.

Sewer Pipe Materials

GRAVITY INSTALLATIONS:

		Minimum Cover		Maximum
Type of Pipe	Class of Pipe	Non-Traffic	Traffic	Cover
PVC	SDR 35	36"	48"	12'
PVC	DR 25	36"	48"	16'
PVC	DR 18	36"	36"	16'
PVC	DR 14	36"	36"	-
PVC	CL 200 (C900)	36"	36"	-
DI	CL 51 or greater	36"	36"	-

PRESSURE INSTALLATIONS

Force main pipelines shall be designed and approved on a case-by-case basis. Considerations shall include design static and dynamic pressures, pressure cycling, alignments, and any other condition considered unique to the project.

Type of Pipe	Minimum Class of Pipe	Minimum Cover Non-Traffic	Minimum Cover Traffic
PVC	CL 150	30"	36"
DI	CL 51	30"	36"

NOTE: Any other pipe used for construction of sanitary sewer facilities must have written approval from the District.

Minimum Pipeline Cover Requirements

A minimum of 30 inches compacted earth fill shall cover all gravity and force building and service laterals. Cover less than 48 inches in vehicular traveled ways requires heavier walled pipe as listed in Appendix A-5 of the Sewer Ordinance on Page 75.

Minimum Slope Requirements

Residential Building Laterals: Trenches shall be on an even grade with a minimum slope of 0.0208 (1/4-inch fall per linear foot) for 4-inch diameter pipeline and 0.0035 (1/24 inch fall per linear foot) for 6-inch diameter pipeline. Holes for connecting pipe collars shall be dug so that each joint of pipe will have an even bearing over 6-inches of sand bedding placed on the trench bottom.

Commercial Building Laterals: Trenches shall be on an even grade with a minimum slope of 0.0035 (1/24-inch fall per linear foot) for 6-inch diameter pipeline.

All Other Sewer Pipes: Sanitary sewer grades shall be designed to provide a minimum velocity of 2 feet per second when flowing full. The following table indicates the slopes, which will provide that velocity, and these shall be used as the standard for design. Minimum acceptable slopes are also shown. These minimum slopes shall be used only when topographic features preclude standard slopes and require written approval from the General Manager for their use.

SLOPE IN FEET/FOOT

Diameter	2 feet/Second Flow	Minimum Acceptable
4"	0.0208 (1/4" per foot)	0.0208 (1/4" per foot)
6"	0.0050	0.0035
8"	0.0035	0.0025
10"	0.0025	0.0015
12"	0.0020	0.0008
18"	0.0012	0.0006

Whenever a change in the size of the pipe, or an angle of 20 degrees or greater in alignment occurs, the flowline of the pipe flowing into manholes shall be a minimum of 0.17 feet above the flowline of the pipe flowing from the manhole, or an amount necessary to match the inside crowns of the pipe, whichever is greater.

Backfill

Trenches shall be on an even grade with a minimum Class 1 Backfill for sanitary sewer pipelines and related appurtenances that are constructed for the District shall have a minimum specific gravity of 2.5.

Backfill around and to at least 1 foot over pipe shall be made with Class 1 Backfill material compacted as placed. A difference in level on either side of the pipe not to exceed 4 inches shall be maintained to hold the pipe firmly in place.

Backfill from a point at least 1 foot over the top of the pipe to finish grade shall be made with Class 2 or Class 3 Backfill. When the sewer trench lies within the right-of-way of a street this backfill shall be Class 2. Class 3 Backfill may be used in areas outside the pavement of streets and highways involved.

In connection with backfill, the following tests shall be made in conformance with the requirements set forth in these Specifications:

Test Method No. California Tests	or ASTM
Relative Compaction	ASTM D1557 & D1556
Sand Equivalent	217
Resistance (R-Value)	301
Sieve Analysis	202

Backfill shall not be placed until the pipe or other facility has been inspected by an authorized District Representative and approved for backfilling. The percentage composition by weight as determined by laboratory sieves shall conform to the following requirements.

Class 1 Backfill

Sieve Sizes	Percentage Passing Sieves
3/8”	100

Sand equivalent not less than 20.
Bulk Specific Gravity of Class 1 Backfill shall be at least 2.5.

Class 2 Backfill

Sieve Sizes	Percentage Passing Sieves
1"	100
3/4"	90-100
No. 4	35-60
No. 30	10-30
No. 200	2-9

Sand equivalent not less than 20.

Bulk Specific Gravity of Class 2 Backfill shall be at least 2.6.

Class 3 Native Backfill

Sieve Sizes	Percentage Passing Sieves
3"	100

Sand equivalent not less than 20.

Class 4 Backfill

Sieve Size	Percentage Passing Sieves
1"	90-100
3/4"	70-100
1/2"	25-60
3/8"	10-40
#4	0-10
#8	0-5

Bulk Specific Gravity shall be at least 2.5

Material for Class 1, Class 2, Class 3, and Class 4 Backfill shall be placed in uniform horizontal layers not exceeding 0.67 foot in thickness before compaction and shall be brought up uniformly on all sides of the trench. If the contractor can satisfactorily demonstrate to the General Manager an alternative method of placing the backfill so that all requirements, other than the layer thickness, are met, the General Manager will permit the contractor to use the alternative method. Under no circumstance will the contractor use the alternative method unless the General Manager's approval is obtained in writing.

Each layer of backfill shall be compacted to a relative compaction as indicated in the Standard Drawings, Typical Sewer Trench, Figures 14, 15, or 16, pages 165, 167, or 169.

The District reserves the right to perform compaction tests, or have compaction tests performed through a licensed geotechnical testing firm, to verify compaction of the backfilled trench section. All tests by the District will be performed in such a manner as to not unnecessarily delay the work. The owner or their agent shall not be required to reimburse the District for the initial tests performed. If subsequent tests are required due to compaction failures, the owner or their agent shall pay for all subsequent compaction tests.

The use of backfill material other than Class 1, Class 2, and Class 3 is not permitted unless approval is granted, in writing, from the General Manager.

Class 4 Backfill material may be substituted for Class 1 Backfill, if approved by the General Manager or their designated representative in writing, under the following conditions:

- When large amounts of groundwater are encountered within the trench section, or;

- When trench depths exceed 12 feet in depth and placement of Class 1 Backfill material at the prescribed relative compaction is not possible.

If Class 4 Backfill material is substituted for Class 1 material, 140 NC filter fabric, or equivalent, must be placed on top of the Class 4 Backfill before proceeding with additional approved backfill.

Groundwater may be removed from the trench and placed in the existing sanitary sewer if all of the following conditions are met:

- The contractor requests, in writing, to place said groundwater into the existing sanitary sewer, and receives, in writing, from the General Manager permission to do so. This written request by the contractor and subsequent written reply from the General Manager will be only on a case-by-case basis.

- The volume of groundwater placed into the existing sanitary sewer shall not exceed a predetermined amount (in gallons per minute) as designated in writing by the General Manager.

- All pump/hose inlets shall be screened to prevent rocks or gravel from entering the existing sanitary sewer system. If high concentrations of silts are suspended in the groundwater, settling basins may be required before the water may be placed into the existing District sanitary sewer system.

Initial backfill shall be to 0.7 of the vertical outside diameter of the pipe in 8 inch maximum lifts.

Backfill material shall be "shovel sliced" on both sides of the pipe, with care to assure that the spaces under the pipe haunches have been filled.

Field repairs to PVC pipes are not acceptable unless the General Manager has given his/her prior approval for each repair.

Mechanical compactors shall not be used directly over the pipe with less than 1 foot of cover.

Paving over trenches shall not be placed until the backfill has been inspected by an authorized District representative. Trench surfacing and trench restoration in Nevada/Placer County, or State of California right-of-way shall conform to the requirements of the agency having jurisdiction.

Backfill around manholes and the pit excavated for boring operations shall be made in the same manner as above specified for trenches, except as otherwise provided under manholes.

If at any time during the period of responsibility there shall be any settlement of the trenches, cracking of the newly applied pavement, or separation of the newly applied pavement from the existing pavement requiring repairs to be made in any street highway, or easement, or should any other defect appear in the system due to the contractor's operations, the owner or their agent shall promptly repair all defects in accordance with the requirements of the responsible agency.

Trench Backfill Force Mains: Class 1 Backfill for sanitary sewer force main pipelines and related appurtenances which are constructed for the District shall have a minimum specific gravity of 2.5. Trench backfill methods and materials for force mains, shall be as specified for sewer pipelines with the following exceptions:

- The height of backfill over the pipe before testing shall not be less than 12 inches.

- All thrust blocks shall be in place before the pipeline is hydrostatically tested.

➢ All joints, bends, angles, or fittings shall be left exposed until testing has been completed.

Every precaution shall be taken against floating the pipe. In case of such floating, the contractor shall replace the pipe to its proper location at his/her own expense and replace any damaged pipe which may have resulted.

Sewer Pump Stations

The District operates three sewer pump stations: the Highway 267 lift station, the Indian Hills lift station, and the Retreat lift station. All have on-site backup generators, and maintenance is performed regularly. Both pumps at the Indian Hills lift station were replaced in 2012. One of two pumps at the Highway 267 lift station was replaced in 2012. Flows and wet well levels are monitored via SCADA at all pump stations, and alarms are triggered should there be any system failures. Below are specification for new pump station installations:

Pump stations shall have a duplex pump configuration with controls designed to alternate pumps. Controls shall include Hand-Off-Auto switches and running lights for each pump. Pump electrical supply shall be single phase for pumps rated at 5 horsepower or less where possible. Pumps shall be sized for the ultimate design flow of the area being serviced by the station and with a minimum of 4 feet per second flow velocity in the force main.

Submersible Pump Stations: Submersible pumps shall be of the explosion-proof, intrinsically safe, type. If circumstances require, the pump shall incorporate a grinder or cutter type blade/impeller system. Pump design shall be of the Flygt rail and discharge base mount type or approved equal. Lifting chains shall be stainless steel and rated for the lifting requirements provided by the pump manufacturer. Each pump discharge pipeline shall include a swing check valve with external lever and weight and an eccentric plug valve before the two discharge pipelines join. Valves shall be located in a separate vault outside of the wet well where possible. External valve vaults shall have a valved drain pipeline plumbed into the wet well. The drain pipeline valve shall be accessible by means of a riser pipe boxed to grade between the vault and the wet well (see Standard Drawings, Figure 19, Submersible Pump Station (Section View), page 175 and Figure 20, Submersible Pump Station (Plan View, page 177). Wet well piping and fittings shall be flanged ductile iron only. Submersible pump controllers shall be of a type equal in design and manufacture to preferred current District submersible controllers. All site-related issues shall be in accordance with Pump Station Structures, Appendix A-6.15, page 125. All electrical and telemetry equipment shall be in accordance with Pump Station Electrical Work, Appendix A-6.16, page 130.

Drywell Centrifugal Wastewater Pumps: Centrifugal pumps shall be of the vertical or horizontal close-coupled, self-priming centrifugal type specifically designed for the handling of raw, unscreened sanitary domestic wastewater. Each pump shall be of heavy, cast-iron construction and shall include a motor with the pump impeller mounted directly on the one-piece motor-pump shaft.

Each pump at its rated speed shall be designed to retain adequate liquid in the pump casing to insure unattended automatic repriming in a complete open system without suction of discharge check valves and with a dry suction leg. Upon completion of repriming cycle, pumps shall deliver full rated capacity at rated Total Dynamic Head (TDH) at the designed total dynamic suction lift.

The openings and passages of the pump shall be large enough to permit the passage of a sphere 3 inches in diameter and any trash or stringy material which can pass through the average 4-inch building collection system. The pump must be equipped with a removable cover plate or rotating assembly allowing complete access to the pump interior to permit service and repairs without disturbing suction or discharge piping. The pump volute casing shall contain no openings of a lesser diameter than the sphere size specified. Screens or any internal devices that create a maintenance nuisance or interfere with priming and performance of the pump will not be permitted.

The pump shaft shall be sealed against leakage by a double mechanical seal installed in a bronze seal housing constructed in two sections with registered fit. Both the stationary sealing member and mated rotating member shall be of Tungsten-Titanium carbide alloy.

The impeller shall be two-vane, semi-open or enclosed type, non-clog, cast in ductile iron, and shall be balanced. The impeller shall be keyed and secured to the motor-pump shaft by a stainless-steel device. The impeller shall not be screwed or pinned to the motor-pump shaft and shall be readily removable without the use of special tools. To prevent the build-up of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shroud. The shroud shall remain full diameter so that close, minimum clearance from shroud to volute is maintained.

The seal system lubricant shall be taken from the pump discharge through a 40-micron or better filter. The filter shall be readily accessible for cleaning and maintenance. The filter shall be isolated with brass valves. The seal system shall contain a brass valve connected near the top of the seal housing to permit the relief of any air trapped in the seal unit. A manually operated brass valve shall also be provided to vent the pump volute.

The pump volute shall be of heavy, cast-iron construction, free from projections that might cause clogging or interfere with flow through the pump.

A heavy, cast-iron base to provide maximum rigidity and balance shall support the pump. The height of a vertical pump base shall be sufficient to permit the use of an increasing suction elbow which shall be provided when the nominal pump size is smaller than the suction line. The suction and discharge openings shall be flanged, faced, and drilled 125-pound American Standard.
Upon request, manufacturer must submit to the District for their evaluation and approval, a list of self-priming wastewater pump installations reflecting of satisfactory, automatic operations while permanently installed in an unattended wastewater lift stations.

Workmanship and materials throughout shall be of the best quality per code and specifications.

Pump Motors: The motors shall be designed for continuous operation at full load with a temperature rise of not more than 40 degrees centigrade above ambient temperature. Motors shall be capable of frequent starts each hour as required to meet the flow requirements without overheating. Motors shall also be rated for the altitude at which they are to be installed.

Residential Pump Systems

For all building sites in which the improvement plans designate a pumped service or for any owner wishing to construct a structure on a portion of a lot or parcel for which gravity service was not provided, the owner shall install a sewage pump as specified herein for the purpose of lifting sewage to the public sewer. All means necessary to provide gravity flow shall be exhausted prior to acceptance by the District regarding pumped service applications.

A pumped sewer service shall consist of a gravity sewer, a wastewater holding tank, one or more pumps, a force main, electrical controls, and an alarm system. The pump and holding tank shall be installed in a location such as to be reasonably accessible for inspection and maintenance. If the holding tank is located outside of the building foundation it shall not be located within 5 feet of any building used as a dwelling, within 10 feet of any property line or within 50 feet of any lake, stream, or reservoir. Where installed, the owner at the owner's expense shall maintain such installations.

Installation:

Gravity Pipeline - The gravity sewer lateral from the building sewer to the waste water holding tank shall be tested in accordance with Sewer Lateral Testing, Section 7.11, page 32. Pipe must be grouted or sealed to a watertight condition at the point of holding tank penetration.

Wastewater Holding Tank - The holding tank shall be a solid impervious walled container. All openings in the walls of the tank, including pipe or conduit penetrations, are to be sealed to prevent inflow of surface water, infiltration of ground water, or exfiltration of contained wastewater. The tank shall have a minimum capacity of 150 gallons. The tank shall be vented with a 1 1/4-inch minimum vent line. The tank shall be buried to a depth such that the top cover of the tank is 18 inches below finished grade. A weatherproof housing, with adequate insulation, shall be installed and extended to 6 inches above finished grade. It shall be the owner's responsibility to determine groundwater conditions that may cause the tank to float when empty and to provide the appropriate solutions to prevent it. Internal ballast that reduces the tank capacity below 150 gallons will not be acceptable.

Pumping Equipment - Pumps shall be centrifugal of the non-clog or grinder type. Pumps shall be capable of passing a minimum of a 2-inch diameter sphere. Pumps and motors shall be sized so as to maintain a minimum of 4-feet per second flow velocity throughout the entire discharge piping system when a maximum of one pump is pumping under actual installed conditions. A copy of the pump specifications and pump curve shall be required and made available to the District inspector before testing is allowed.

Electrical - The electrical control cabinet shall be isolated from the holding tank. All wiring, controls, conduits, boxes, etc. shall meet or exceed National Electrical Code (NEC) requirements for materials, ratings, placement, and installation etc. All equipment located in the holding tank shall be U.L. approved for its specific and proper use. All wiring in the area above the holding tank shall be provided with protection from physical damage by a combination of cable routing and/or conduits. Any wiring that hinders entry or view into the holding tank when opened will not be acceptable. All electrical connections shall be in an approved electrical junction box. All conduits leaving the holding tank, or the enclosed area above or surrounding the holding tank, shall be sealed. A circuit disconnecting means for all circuits must be located within sight of the holding tank unless a lockout device is installed on the disconnecting means for each individual circuit attached to or related to the pump system at the holding tank.

Alarm System - The holding tank and electrical controls shall include an alarming system that produces an audible and visual alarm when the liquid level in the holding tank exceeds a predetermined safe level. The audible and visual devices indicating such an alarm state shall be located within the building or structure served by the sewage system with the intent to notify the occupant of the possibility of a wastewater spillage. The alarm system power shall be supplied through a dedicated circuit, separate from the pump power supply. It is recommended that the alarm system include a battery backup to provide alarm functionality during an electrical power outage.

Discharge Piping - The discharge pipeline shall be ductile iron, polyvinyl chloride (PVC), polyethylene, or an approved pressure rated material designed for wastewater. The piping shall be pressure class 150 minimum and rated for the pressure service being installed. The pipeline size shall be 2-inch diameter minimum and not be of a size smaller than the pump discharge port. The discharge pipeline shall be fitted with an approved pressure rated check valve and a gate valve. The discharge pipeline shall also include a 1/4-inch pressure test port located between the check portion of the check valve and the gate valve. The gate valve shall be located on the discharge side of the check valve. Both valves and the test port shall be located as close to the pump or holding tank as possible and in such a manner that they are accessible for operation and for maintenance or repairs. It is recommended that valves are installed with unions and boxed to grade.

Discharge pipelines shall have a trench cutoff block located every 50 linear feet of pipe, at changes in pipeline type and/or grade, and at the pump tank. Thrust blocks shall be located at all fittings that change the direction of the pipe. Thrust blocks shall be constructed of concrete with a minimum size of 2 cubic feet.

A siphon break shall be installed on the discharge pipeline at its connection point to the gravity sewer. A cleanout in accordance with Installation of Cleanouts, Section 7.09, page 31, shall be placed in the discharge pipeline at the property line, if the siphon break can be placed in a practical manner such that sufficient gravity slope can be maintained from the property line to the District main pipeline.

<u>Inspection and Testing</u>:

The gravity portion of the pipeline from the building to the holding tank shall be tested in accordance with the Sewer Lateral Testing, Section 7.11, page 32.

A visual inspection shall be performed to check for the following:

- Proper venting of the holding tank.
- An acceptable weatherproof, insulated box with an insulated lid directly above the holding tank.
- A weather tight seal on the holding tank lid and at all pipe or conduit penetrations.

The discharge pipeline shall be pressure tested with air or water to a pressure of 150 percent of the calculated maximum possible working pressure (the Total Dynamic Head, or TDH) for the installed pump. The maximum possible working pressure for the system can be assumed to occur at the pump's shut off point. The pump shut off point can be obtained from the pump's performance curve by following the curve to the point at which it meets the axis representing the head of liquid.

The pressure must remain constant for 10 minutes. The required test equipment shall be provided by the owner or owner's agent and be acceptable to the District.

The electrical system and controls shall be inspected and approved by the local governing authority for building electrical inspection. Pumping and alarm tests shall only be performed after the electrical system has been inspected and approved by the proper authority. The District Inspector shall require proof of such approval before starting any of the following functional tests:

- The pump shall be started and stopped so the check valve can be tested for proper operation.

- The pumping system shall be tested for a discharge pipeline velocity of 4 feet per second. The flow velocity test shall be performed with the discharge pipeline full of water and the pumping system functional under normal operating conditions.

- The pump shall be run to pump down the holding tank to allow a visual inspection of the tank and to check it for leaks.

- The alarm system shall be checked for proper function of audio and visual alarms.

Septic tanks converted for use as holding tanks shall be air, water, or vacuum tested. The test shall be the same as specified for sanitary sewer pipelines, manholes, and grease and sand oil interceptors. If the converted septic tank fails the test, it shall be abandoned in accordance with Abandoned Sewers and Sewage Disposal Facilities, Section 7.16, page 38 and a new holding tank meeting the requirements for Residential Pump Systems shall be installed in its place.

Rehabilitation and Repair

The District does not currently have specific specifications for large scale rehabilitation projects. Based on infrastructure age and the fact the system is in overall good overall condition, the first large scale rehabilitation project isn't scheduled until the year 2044. Specifications for rehabilitation will be prepared closer to this date based on the technologies available at the time.

Any repairs deemed necessary upon inspection are performed in accordance with the District's Construction Specifications included as Appendix A6 of the Sewer Ordinance.

ELEMENT 6: OVERFLOW EMERGENCY RESPONSE PLAN

This section of the SSMP describes NCSD's Overflow Emergency Response Plan.

6.1 Regulatory Requirements for the Overflow Emergency Response Plan Element

The SWRCB requirements for the overflow emergency overflow response plan element are as follows:

1. Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner.

2. A program to ensure an appropriate response to all overflows.

3. Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach waters of the State in accordance with the State-mandated Monitoring and Reporting Program (MRP). All SSOs shall be reported in accordance with the MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The SSMP should identify the officials who will receive immediate notification.

4. Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained.

5. Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities.

6. A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

7. A program for water quality testing to assess impacts from SSOs on surface waters in which 50,000 gallons or greater are spilled to surface waters.

6.2 SSMP Compliance

There are four Categories of SSOs as defined below:

1. **Category 1** - Discharges of untreated or partially treated wastewater of **any volume** resulting from the District's sanitary sewer system failure or flow condition that:

    - Reach surface water and/or reach a drainage channel tributary to a surface water; or

    - Reach a Municipal Separate Storm Sewer System (MS4) and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or groundwater infiltration basin (e.g., infiltration pit, percolation pond).

2. **Category 2 –** Discharges of untreated or partially treated wastewater of **1,000 gallons or greater** resulting from the District's sanitary sewer system failure or flow condition that **do not** reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.

3. **Category 3** – All other discharges of untreated or partially treated wastewater resulting from the District's sewer system failure or flow condition.

4. **Private Lateral Sewage Discharge (PLSD)** – Discharges of untreated or partially treated wastewater resulting from blockages or other problems **within a privately owned sewer lateral** connected to the enrollee's sanitary sewer system or from other private sewer assets. PLSDs that the District becomes aware of may be voluntarily reported to the California Integrated Water Quality System (CIWQS) online SSO Database.

NOTIFICATION REQUIREMENTS

1. For any Category 1 SSO greater or equal to 1,000 gallons that results in a discharge to a surface water or spilled in a location where it probably will be discharged to surface water, either directly or by way of a drainage channel or MS4, the District shall, as soon as possible, but no later than two (2) hours after (A) the District has knowledge of the discharge, (B) notification is possible, and (C) notification can be provided without substantially impeding cleanup or other emergency measures, notify the Cal OES and obtain a notification control number.

2. To satisfy notification requirements for each applicable SSO, the District shall provide the information requested by Cal OES before receiving a control number. Spill information requested by Cal OES may include:

i. Name of person notifying Cal OES and direct return phone number.

ii. Estimated SSO volume discharged (gallons).

iii. If ongoing, estimated SSO discharge rate (gallons per minute).

iv. SSO Incident Description

a. Brief narrative

b. On-scene point of contact for additional information (name and cell phone number).

c. Date and time enrollee became aware of the SSO

d. Name of sanitary sewer system agency causing the SSO

e. SSO cause (if known).

v. Indication of whether the SSO has been contained.

vi. indication of whether surface water is impacted.

vii. Name of surface water impacted by the SSO, if applicable.

viii. Indication of whether a drinking water supply is or may be impacted by the SSO.

ix. Any other known SSO impacts.

x. SSO incident location (address, city, state, and zip code).

3. Following the initial notification to Cal OES and until such time that the District certifies the SSO report in the CIWQS Online SSO database, the District shall provide updates to Cal OES regarding substantial changes to the estimated volume of untreated or partially treated sewage discharged and any substantial change(s) to known impact(s).

4. PLSDs: It is strongly encouraged, but not required, that the District notify Cal OES of discharges greater than or equal to 1,000 gallons of untreated or partially treated wastewater that result or may result in a discharge to surface water resulting from failures or flow conditions within a privately owned sewer lateral or from other private sewer asset(s) if the District becomes aware of the PLSD.

The District Sewage Overflows and Emergency Response Plan is included as attachment 1 in the Element 6 Appendix.

Emergency Response Plan Distribution

The Emergency response plan is updated as necessary. Anytime the emergency response plan is updated it is redistributed to the Operations Department and key management district wide. During SSO events, management staff ensures that staff and contractors adhere to the Emergency Response Plan and the procedures that they have been trained to perform.

Traffic and Crowd Control

Very few portions of the sanitary sewer system experience heavy traffic and/or crowds; however, it is critical that NCSD staff and contractors be aware of vehicular traffic, pedestrian traffic, cyclists, skiers, recreational trail users, and all other traffic and crowds that may be encountered. Safety equipment such as flashing lights, beacons, cones, signs, barricades, safety vests, caution tape, and other means must be used at the work area to clearly identify the presence of NCSD staff and contractors.

When a project requires vehicular traffic control, NCSD or its contractors must have a traffic control plan in place that meets all the requirements of the Federal Highway Administration's Manual on Uniform Traffic Control Devices for Streets and Highways. The plan must also adhere to all the requirements of the California Department of Transportation (CalTrans), including both general provisions and all requirements of the

CalTrans Encroachment Permit obtained by NCSD. When a traffic control plan is required, a contractor must submit its plan to NCSD for approval prior to beginning work activities.

Response to Overflows When Snow Cover is Present

When snow cover is present, and a sewer overflow is discovered the same steps are to be taken to eliminate the cause of the overflow and contain the discharge. Snow will typically melt at the point of the overflow, but as much contaminated snow should be recovered as possible. Any and all District snow removal equipment is to be used to access the SSO as appropriate.

Other Response Activities

Other emergency response activities may include the following, depending on the severity of the overflow:

- Notification of other local sewer districts to receive mutual aid.
- Notification of Truckee Meadows Water Authority (775-834-8090).
- Notification of affected residents with front door hangers.
- Notification of the local media by the designated NCSD representative, in order to issue a public service announcement.
- Additional water quality testing in the Martis Creek.
- Initiation of the Standardized Emergency Management System (SEMS).

Element 6 Appendix

1. Sewer Overflows Emergency Response Plan
2. SSO Response – Field Checklist and Documentation
3. SSO Response - Sampling Collection, Procedures & Information
4. Post SSO Documentation Form

Northstar Community Services District
900 Northstar Drive, Truckee, CA 96161
P: 530.562.0747 • F: 530.562.1505 • www.northstarcsd.org

Date: March 7, 2025

To: All Employees

From: Eric Martin, Director of Public Works

Subject: SEWAGE OVERFLOWS AND EMERGENCY RESPONSE PLAN

The key to emergency preparedness is a prompt and efficient response plan. In the event of a sewer overflow the following actions are to be taken **IMMEDIATELY**.

1. DISTRICT NOTIFICATIONS

Make efforts to eliminate the cause and contain the overflow and notify the following people in sequential order until contact has been made. The District Staff listed below will assess the situation and contact the applicable governing entities listed in items 3-5 of this memo. **Only in the event that no one on this list can be contacted should anyone perform the requirements of items 2-3 of this memo.**

Shaun Evans	Utility Operations Supervisor		
		Work	(530) 562-0669 ext 144
		Cell	(530) 308-2021
		Home	(775) 771-1896
Teto Contardi	Senior Utility Services Worker		
		Work	(530) 562-0669 ext 145
		Cell	(530) 308-0115
		Home	(775) 746-5412
Eric Martin	Director of Public Works		
		Work	(530) 550-6133
		Cell	(530) 308-1679
Josh Detwiler	Technical Program Administrator		
		Work	(530) 550-6123
		Cell	(530) 308-0190

2. ACTIONS AT THE SCENE OF OVERFLOW

Contain-Control-Correct. Recover as much up the overflow volume as possible. Document the SSO using the Appropriate Field Checklist and Documentation Form. Take several photos that adequately document the overflow.

If an alarm occurs that triggers response to an SSO, the person on call will determine source and type of problem, and initiate necessary action.

DO NOT CHLORINATE and thoroughly flush and dilute the overflow if the overflow is:

- near Martis Creek or other surface waters that could reach Martis Creek. Take any action necessary to prevent all overflows from entering Martis Creek and any other surface waters.

- in a forested area and does not pose a public health risk.

CHLORINATE and thoroughly flush the area if the overflow is in a public area and could pose a public health risk. Use recipes below to prepare a 2% chlorine solution.

Using Standard Household Bleach (5.25% trade percentage) – Bleach will make up approximately 1/3 of total solution. Approximately 2/3 will be clean water.

- Use 0.35 gallons (5.6 cups) for a 1-gallon solution
- Use 1.7 gallons for a 5-gallon portable sprayer
- Use 175 gallons for the 500-gallon tank on the flusher truck
- Use 200 gallons for the 600-gallon tank on the Vac-Con vactor truck

Using Commercial Sodium Hypochlorite (12% trade percentage) – NaOCl will make up approximately 1/7 of total solution. Approximately 6/7 will be clean water.

- Use 0.15 gallons (2.4 cups) for a 1-gallon solution
- Use 0.74 gallons for a 5-gallon portable sprayer
- Use 75 gallons for the 500-gallon tank on the flusher truck
- Use 85 gallons for the 600-gallon tank on the Vac-Con vactor truck

3. SSO WATER QUALITY MONITORING PROGRAM

In compliance with the subsection D.7(v) of the SSS WDRs, ***for spills of 50,000 gallons or greater that have reached surface waters***, the District shall, within 48 hours of becoming aware of the SSO, sample the water quality of the surface waters for total and fecal coliform, as well as, ammonia. All water quality analyses will be handled by a certified laboratory. If surface water monitoring is not possible for reasons including, but not limited to, safety or access restrictions, the District will, as best as possible, account for spill travel time and possible scenarios.

4. NOTIFICATION

For any Category 1 SSO greater or equal to 1,000 gallons that results in a discharge to a surface water or spilled in a location where it probably will be discharged to surface water, either directly or by way of a drainage channel or MS4, the District shall, as soon as possible, but no later than two (2) hours after (A) the District has knowledge of the discharge, (B) notification is possible, and (C) notification can be provided without substantially impeding cleanup or other emergency measures, notify the Cal OES and obtain a notification control number.

State Office of Emergency Services (800) 852-7550

5. REPORTING

Category 1 and Category 2 SSOs – All SSOs that meet the criteria for Category 1 or Category 2 SSOs shall be reported to the CIWQS Online SSO Database.

a. Draft reports for Category 1 and Category 2 SSOs shall be submitted to the CIWQS Online SSO Database within three (3) business days of the District becoming aware of the SSO.

b. A final Category 1 or Category 2 SSO report shall be certified through the CIWQS Online SSO Database within 15 calendar days of the end date of the SSO.

Category 3 SSOs – All SSOs that meet the above criteria for Category 3 SSOs shall be reported to the CIWQS Online SSO Database and certified within 30 calendar days after the end of the calendar month in which the SSO occurs.

ADDITIONAL TELEPHONE NUMBERS:

Answering Service (Answer West)	(775) 825-2222
ControlPoint Engineering	(530) 957-1304 (Matt Boring)
ControlPoint Engineering	(916) 884-3180 (Jason Foster)
Farr West Engineering	(775) 853-7267 (Matt Van Dyne)
San Joaquin Electric	(775) 841-5558 (Jim Andrews)
AT&T Telephone	(530) 332-1321 (Data lines)
Charter Communications	(530) 546-8555
Placer County Public Works/Road Dept.	(530) 581-6220
Placer County Encroachment Permits	(530) 581-6221 (Tim Boyer)
Liberty Energy	(530) 546-1737 (Angie Custer)
Southwest Gas Locations/Emergency	(775) 831-1066 or (530) 583-5531
Underground Service Alert	811 or (800) 642-2444
Truckee Sanitary District	(530) 587-3804
Tahoe Truckee Sanitation Agency	(530) 587-2525
Incline Village G.I.D.	(775) 832-1100
Tahoe City P.U.D.	(530) 583-3796
North Tahoe P.U.D.	(530) 546-4212
Truckee Donner P.U.D.	(530) 587-3896
Olympic Valley P.S.D.	(530) 583-4692 or (775) 746-1404
Placer County Sheriff's Department	(530) 581-6331
California Highway Patrol	(530) 582-7500

<u>SSO Categories</u>

Category 1 - Discharges of untreated or partially treated wastewater of **any volume** resulting from the District's sanitary sewer system failure or flow condition that:

- Reach surface water and/or reach a drainage channel tributary to a surface water; or
- Reach a Municipal Separate Storm Sewer System (MS4) and are not fully captured and returned to the sanitary sewer system or not otherwise captured and disposed of properly. Any volume of wastewater not recovered from the MS4 is considered to have reached surface water unless the storm drain system discharges to a dedicated storm water or groundwater infiltration basin (e.g., infiltration pit, percolation pond).

Category 2 – Discharges of untreated or partially treated wastewater of **1,000 gallons or greater** resulting from the District's sanitary sewer system failure or flow condition that **do not** reach surface water, a drainage channel, or a MS4 unless the entire SSO discharged to the storm drain system is fully recovered and disposed of properly.

Category 3 – All other discharges of untreated or partially treated wastewater resulting from the District's sewer system failure or flow condition.

Private Lateral Sewage Discharge (PLSD) – Discharges of untreated or partially treated wastewater resulting from blockages or other problems **within a privately owned sewer lateral** connected to the enrollee's sanitary sewer system or from other private sewer assets. PLSDs that the District becomes aware of may be <u>voluntarily</u> reported to the California Integrated Water Quality System (CIWQS) online SSO Database.

SSO Response - Field Checklist & Documentation

Initial Reporting & Response

Reporting Party (Callers Name & Phone #):____________________

Call Received (Date/Time):____________________ Received by (District Personnel):____________________

District On-Site Arrival (Date/Time):____________________ Responding District Employee(s):____________________

Spill Discovery, Time Notes, Information & Response

(Best Available Information based on Site interviews, District Investigations, Etc. - note: document all attempts)

SSO Discovery (by NCSD) (If Different than Arrival Time) (Date/Time):____________________

Estimated Time SSO Began (Make Contact with Residents and Businesses to Accurately Estimate The Start Time)

(Date/Time/Contacts/comments):____________________

Is Sewer Currently Spilling: (YES / NO)

Spill Address/Location (GPS Coordinates Required):____________________

Spill Appearance Point: Building P/L C/O MH Gravity Sewer Force main Lift Station

Other and/or Comments:____________________

Final Spill Destination: Beach Building Hillside adjacent to hwy Street/curb/gutter

Surface water Unpaved surface Other paved surface

Other and/or Comments:____________________

Cause of SSO Identified at (Date/Time):____________________

Failed at: Mainline Lower lateral Upper lateral Force main Lift station

Other and/or Comments:____________________

Spill Cause: Roots Grease Debris Vandalism Capacity Design Mechanical failure

Other and/or Comments:____________________

Manager/Supervisor Notified (Required for all SSOs) (Date/Time):____________________

Cause of SSO Eliminated at (Date/Time):____________________

SSO End Time (Date/Time):____________________

Description of Response Measures Taken and SSO Comments:____________________

____

____

Containment, Clean up & Response:

Volume of Spill Recovered (Do Not Count Wash Down Water):____________________

Containment and/or Clean Up Began (Date/Time):____________________

Clean up & Response Ended/Completed (Date/Time):____________________

Description of Containment & Clean up Measures Taken and Comments (as applicable):____________________

____

____

Spill & Flow Rate (If Active Spill):

● **REFERENCE PICTURES, TABLES, AND CHARTS:**

*SEE APPENDIX ____ FOR FLOW ESTIMATION PICTURES & TABLES

Flow Rate (gal / min) = ______________________________

● **CALCULATION:**

1 - Cross Sectional Area of Flow (avg. depth x avg. width) = (sq. ft.) =______________________________

2 - Speed of Flow (use improvised float and measure time of travel) = (ft./sec.) = ______________________________

CALCULATION = **1** x **2** x 7.48 x 60 = (gal./min.) = ______________________________

Spill Volume (If Not Active Spill):

(USE MOST APPLICABLE METHOD -OR- ALL AS APPLICABLE)

● **EYEBALL ESTIMATE** (Imagine a Known Volume Amount Tipped Over)

(1 Gallon Jug - 5 Gallon Bucket - 32 Gallon Trash Can - 55 Gallon Drum)

VOLUME = (Known amount) x (how many) = (gal) = ______________________________

● **MEASURED VOLUME ESTIMATE** (Field Measurments)

[Draw Sketch of Spill Area Below]

1 - Area (Divide Wetted Areas Up and Add Together *if Necessary*) = (sq. ft.) = ______________________________

2 - Apply % Wet or % Soil Moisture Content *if Necessary*) = (%) = ______________________________

3 - Average Depth = (inches) = ______________________________

CALCULATION = **1** x **2 x 3** x 7.48 ÷ 12 = (gal) = ______________________________

Sketch and/or Diagrams of SSO Area(s):

SSO Personnel:

Responding Party (NCSD):______________________________

Manager/Supervisor (NCSD):______________________________

Additional Support (NCSD):______________________________

Other:______________________________

Spill Category

#1 - Was Spill Greater than 1,000 gallons [YES / NO]

#2 - Was there a discharge to a drainage channel and/or surface water? [YES / NO]

#3 - Was there a discharge to stormdrain that was NOT FULLY captured? [YES / NO]

If **YES** to any of the above, **Category 1 Spill**

Sampling (If Required by OES, Co. Health, NTPUD Duty Sup, or Other as applicable)

(Complete: "SSO SAMPLING COLLECTION & PROCEDURES" Worksheet)

Category 1

Information:

Determined to Be **Category 1** (Date/Time):_______ Discovered Entered Waterway (Date/Time):________________

Total Spill Volume:____

Spill Volume Entered Waterway (if applicable):____

Reporting & Notifications (with Time frames):

***SEE EMERGENCY RESPONSE PLAN

SSO Response - Sampling Collection, Procedures & Information - Field Crew or Manager

Take Samples if required by an environmental or health regulatory agency or State law, or voluntarily by NCSD Manager/Supervisor

Sampling Instructions (For Affected Water body):

- **Equipment As Required:** Personal Protective Equipment & Sterile Sample Containers/Bottles
- **Sub-Surface Grab Sample Requirements:** Obtain Accurate Representation of Area and Contamination

  3 sets each incident and parameter: 1) Background Sample (100' +/- Upstream)
  2) Entry Point Area
  3) Downstream (100' - 300' +/-)
- **Collect Samples To Represent True Condition of Areas**

  Collect at 6" below the surface
  Avoid debris or scum layer from surface
  Obtain from Middle of Creek or other as applicable

- **Protect and Handle Samples as Required To Represent True Condition of Areas**

  Secure and Label as necessary
  Cooler and Transport to Lab as necessary (6 hrs max. elapse time)
  Chain of custody forms as applicable

SSO & Sample Information

SSO Spill Location Name:______________________________

Location Sample Taken:______________________________

Date & Time Sample Taken:______________________________

Individual(s) & Organization who performed the Sampling:______________________________

____

Sample & Water Quality Analysis

Parameter	Date/Time of Analysis	Technique (ASTM or Other)	Results	Individual Performing Analysis
☐ E Coli				
☐ BOD				
☐ Ammonia				
☐ pH				
☐ Other:________				

Agency Results Reported to:

☐ County Health
☐ Regional Water Quality Control Board
☐ Other (as applicable):______________________________

Sketch and/or Diagrams of Sampling Area(s) & Location(s)

Post-SSO Briefings, Findings & Review - Manager/Supervisor

SSO Spill Location Name:____

Estimated SSO Start Date:____________________ SSO Event ID (CIWQS):______________________
Residents and Local Businesses Contacted to Estimate Start Date:______________________

Spill Appearance Point: (circle applicable) Building Cleanout Manhole Force main Gravity Sewer Pump station
Other:____

Final Spill Destination: (circle applicable) Beach Building Hillside adjacent to highway Street/curb & gutter
Surface water Unpaved surface Other paved surface
Other:____

Estimated Spill Volume and Estimation Method (reported in CIWQS):______________________

Estimated Spill Volume Recovered:____

Cause of Spill:

Failed at: (circle applicable) Mainline Lower lateral Upper lateral Force main Lift station
Other:____

Spill Cause: (circle applicable) Roots Grease Debris Vandalism Capacity Design Mechanical failure
Other:____

Final Cause Determination:

____

____

Follow-up or Corrective Action Taken:

____

____

Briefings & Discussions with District Personnel

Operations Crew Meeting Date:____
Staff Member Leading Discussion:____
Summary/Conclusion from Meeting: ____
____

Management Team Meeting Date:____
Staff Member Leading Discussion:____
Summary/Conclusion from Meeting:____
____

Sanitary Sewer Management Plan (SSMP) Monitoring & Review

Affected and/or Applicable SSMP Section(s) and/or Element(s):______________________
____

Is SSMP effective in addressing, preventing and/or minimizing this type of SSO (YES / NO)

Does SSMP require review/modification(s) to eliminate/reduce this type of SSO from occurring again (YES / NO)
If YES, which section(s) and/or element(s): ____
____

Schedule and/or Date for SSMP review/modification:______________________

* Attach additional sheets/pages or write on back if additional explanation and/or information is necessary

ELEMENT 7: FATS, OILS AND GREASE (FOG) CONTROL PROGRAM

7.1 Regulatory Requirements for the System Evaluation and Capacity Assurance Plan Element

The summarized requirements for the FOG Control element of the SSMP are:

The collection system agency shall evaluate its service area to determine whether a FOG control program is needed. If the collection system agency determines that a FOG program is not needed, the collection system agency must provide justification for why it is not needed. If FOG is found to be a problem, the collection system agency must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. The FOG source control program shall include the following as appropriate:

(a) An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;

(b) A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;

(c) The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;

(d) Requirements to install grease removal devices (such as traps or interceptors), design standards for the grease removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;

(e) Authority to inspect grease producing facilities, enforcement authorities, and a determination of whether the Agency has sufficient staff to inspect and enforce the FOG ordinance;

(f) An identification of sewer system sections subject to FOG blockages and the establishment of a cleaning maintenance schedule for each section; and

(g) Development and implementation of source control measures, for all sources of FOG discharged to the sewer system, for each sewer system section identified in (f) above.

7.2 Regulatory Compliance

The District's Grease Reduction Program is presented in Chapter 8 of the Sewer Ordinance. The District has undertaken public outreach by distributing notices to homeowners in the past providing educational information regarding best practices for disposing of fats, oils, and grease. Moving forward, this will continue to be done in the local property owners' association newsletter on an annual basis. The District typically generates very little FOG waste in its sewer system, and a detailed plan/schedule for FOG waste disposal has been determined to be unnecessary at this time.

The District has no specific sewers with a history of FOG-related issues within Northstar; however, scheduled sewer cleaning is performed to minimize the number and severity of FOG-related SSO events. The District's approach to preventing FOG-related SSOs has been effective and the District will continue to follow this approach unless and until new FOG-related problems arise. The District will also continue to require new and remodeled commercial FOG sources to install grease removal equipment.

Grease Reduction Program

The following is the District's Grease Reduction Program taken from chapter 8 of the Sewer Ordinance:

GREASE REDUCTION PROGRAM

8.01 Commercial Food Establishments

Any commercial establishment serving food such as, but not limited to:

restaurants	coffee shops
delicatessens	bakeries
donut shops	take-out
ice cream stations	

or commercial food manufacturing facilities such as, but not limited to:

packing establishments	slaughterhouses
canneries	

or commercial facilities such as, but not limited to:

hospitals	motels/hotels
markets	recreation or reception halls
schools	conference centers
churches	

Where any grease or other objectionable materials may be discharged into a public or private sanitary sewer system shall have installed on the premises an appropriately sized grease interceptor or grease trap as required by Chapter 7, Uniform Plumbing Code.

The facilities listed above can be classified into the following categories based on the type of facility, the nature and volume of the waste flow produced, the hours of operation, and the number of meals served per day:

- Industrial - commercial facilities as defined in sections 709 and 710 of the Uniform Plumbing Code, and those facilities designated by the General Manager.

- High Volume - full menu type establishments operating more than 16 hours per day and/or serving 500 or more meals per day.

- Medium Volume - full menu or specialty menu type establishments serving full meals 8 to 16 hours per day, and/or 100 to 400 meals per day.

- Small Volume - fast food, take-out or specialty type food establishments with limited menus, a minimum of dish washing, and/or minimal seating capacity.

The General Manager or his/her designated representative shall approve the size, type and location of each grease trap or interceptor.

Waste in excess of 140 degrees Fahrenheit (60 degrees Celsius) shall not be discharged into a grease trap or interceptor.

For the purpose of this division, the term "fixture" shall mean and include each plumbing fixture, appliance, apparatus or other equipment required to be connected to or discharged into a grease trap or interceptor by any provision of this division.

Waste discharge from fixtures and equipment in the above-mentioned types of establishments which may contain grease or other objectionable materials, including, but not limited to, scullery sinks, pot and pan sinks, dishwashers, food waste disposal, soup kettles, etc., and floor drains located in areas where such objectionable materials may exist, may be drained into the sanitary waste through a grease trap or interceptor when approved by the General Manager. Exception: Toilets, urinals, and other fixtures containing fecal material may not flow through interceptors, traps, or sand/oil interceptors.

District personnel will periodically schedule inspections of grease traps and interceptors. It shall be the responsibility of the owner or their agent to maintain grease traps and interceptors in an efficient operating condition by periodic removal and proper disposal of the accumulated grease. No such collected grease shall be introduced into any drainage piping or public or private sanitary sewer facility.

The owner or their agent shall post and maintain a current grease trap/interceptor cleaning and maintenance log on the premises and shall always have the log available for review by District personnel.

8.02 Grease Interceptors

Industrial facilities and High Volume food establishments as defined in Commercial Food Establishments, Section 8.01, page 41, are required to install a grease interceptor. Medium Volume food establishments may require a grease interceptor as determined by the General Manager.

Interceptors shall be constructed and installed at the expense of the owner, in accordance with the Standard Drawings, Grease Interceptor, Figure 24, page 185.

Each grease interceptor shall be installed and connected that it shall be easily accessible at all times for inspection, cleaning, and removal of the intercepted grease. A grease interceptor may not be installed in any part of a building where food is handled. The proper location of the grease interceptor shall meet the Uniform Plumbing Code Requirements and the approval of the General Manager.

Each commercial facility or business establishment for which a grease interceptor is required shall have an interceptor which shall serve only that business establishment.

Buildings remodeled for use requiring interceptors shall be subject to these regulations.

Grease interceptors shall have a minimum 750-gallon capacity.

Interceptors shall be installed in such a manner that surface drainage may not enter. Interceptors located in vehicle traffic areas shall be capable of withstanding an H-20 axle load. The access port cover shall be at least 1/2 inch below finished grade and shall also be capable of withstanding an H-20 axle load. Except as otherwise provided, the cover and access ports shall be gas tight. The waste shall enter the interceptor through the inlet pipe only. Interceptors shall be so designed that they will not become air bound. Each interceptor shall be properly vented, as required by Section 708(d), Uniform Plumbing Code.

Grade rings may be used to establish final grade for the access ports and shall be installed using Kent Seal or, Ram-Nek and Ram-Nek primer.

Interceptors shall be tested in the same manner as manholes. The test shall be witnessed by a District Inspector.

Abandoned grease interceptors shall be emptied and filled in the same manner as required for abandoned septic tanks as described in Section 1119, Uniform Plumbing Code.

8.03 Grease Traps

Small Volume food establishment as described in Commercial Food Establishments, Section 8.01, page 41, may choose to install a grease trap in place of a grease interceptor. Medium Volume food establishments, after careful review of UPC requirements based on actual or estimated waste flows, may also be allowed to install a grease trap in lieu of a grease interceptor.

No grease trap shall be installed which has an approved rate of flow of more than 55 gallons per minute, nor less than 20 gallons per minute, except with prior written approval of the General Manager.

Each plumbing fixture or piece of equipment connected to a grease trap shall be provided with an approved type of flow control or a restricting device installed in a readily accessible and visible location in the tailpiece or the drain outlet of each such fixture.

Flow control devices shall be so designed that the flow through such device or devices shall at no time be greater than the rated capacity of the grease trap. No flow control device having adjustable or removable parts shall be approved.

Each grease trap required by this section shall have an approved rate of flow, expressed in gallons per minute, which is not less than 40 percent of the total capacity in gallons of fixtures discharging into said trap.

The grease retention capacity of the trap, expressed in pounds of grease, shall not be less than two times the approved rate of flow in gallons per minute.

Any grease trap installed with the inlet more than 4 feet lower in elevation that the outlet of any fixture discharging into such grease trap shall have an approved rate of flow which is not less than 50 percent greater than that given in the preceding paragraph. No more than four separate fixtures shall be connected to or discharged into any one grease trap.

Each fixture discharging into a grease trap shall be individually trapped and vented in an approved manner. An approved type grease trap may be used as a fixture trap for a single fixture when the horizontal distance between the fixture outlet and the grease trap does not exceed 4 feet and the vertical tailpipe or drain does not exceed 2 1/2 feet.

No water jacketed grease trap or grease interceptor shall be approved or installed. No mechanical grease trap shall be allowed.

Each grease trap shall have an approved water seal of not less than 2 inches in depth or the diameter of its outlet whichever is greater.

8.04 Sand/Oil Interceptors

Every private or public wash rack used for cleaning vehicles, machinery or machine parts or facilities used for vehicle maintenance shall drain or discharge into a sand/oil interceptor of an approved design for this use.

The minimum internal dimensions of the interceptor shall be approximately 24 inches wide by 72 inches long with 57 inches between the tank bottom and the bottom opening of the 90-degree bend at the outlet for a 490-gallon minimum liquid capacity (see Standard Drawings, Sand/Oil Interceptor, Figure 25, page 187).

The inlet and outlet sewer piping shall conform to District specifications. The sewer outlet pipe shall have a downward pointing 90-degree bend inside the tank. The bottom entrance to the 90-degree bend shall extend 6 inches below the invert of the outlet pipe. The top of the sewer inlet and outlet pipes shall be at least 30 inches below the pavement surface where they enter and exit the tank.

The tank shall have a minimum of one self-sealing access port and shall be maintained in a leak tight condition so there is no entry of surface storm water. There shall also be no leakage of groundwater into the tank, and waste flow shall not be allowed to flow into the surrounding ground. Grade rings may be used to establish final grade for the access ports and shall be installed using Kent Seal or Ram-Nek and Ram-Nek primer.

When the tank is located in a vehicle traffic area, the access port(s) shall be set at least 1/2 inch below finished grade. Tank covers and access ports located in vehicle traffic areas shall be capable of withstanding an H-20 axle load.

District personnel will periodically schedule inspections of sand/oil interceptors. It shall be the responsibility of the owner or their agent to maintain the sand/oil interceptor in an efficient operating condition by periodic removal and proper disposal of the accumulated sand and oil. No such collected sand and oil shall be introduced into any drainage piping or public or private sanitary sewer facility.

The owner or their agent shall post and maintain a sand/oil interceptor cleaning and maintenance log on the premises and shall always have the log available for review by District personnel.

All trapped materials removed from the interceptor, including filters and filter media, shall be disposed of in accordance with current existing environmental codes and regulations. It is the responsibility of the owner or their agent to determine the governing agency and comply with the code requirements.

Sand/oil Interceptors shall be tested in the same manner as manholes. The test shall be witnessed by a District Inspector.

Abandoned sand/oil interceptors shall be emptied and filled in the same manner as required for abandoned septic tanks as described in Section 1119, Uniform Plumbing Code.

Vehicle Wash Installations: All vehicle wash installations shall be equipped with an appropriate sand/oil interceptor. Potable water piping to the wash installation shall be metered to verify water consumption. No other facility other than the wash installation shall be fed potable water through the meter.

Vehicle wash installations shall utilize a recycle system. The clarification, filtration and recycle system shall be designed by the owner or their agent and approved by the District. When a recycle system is used, there shall be a closed shutoff valve in the sewer outlet pipeline external to the interceptor tank. It shall have the necessary access and protection.

It shall be the responsibility of the owner or their agent to maintain the system for proper operation. The District shall be notified at least 72 hours in advance of any emptying and/or flushing of the system into the sanitary sewer.

The design automated full-service vehicle wash installations must be approved by the District on an individual basis.

Vehicle Maintenance Facilities: Each vehicle maintenance facility shall have a sand/oil interceptor that meets the minimum tank requirements described above.

8.05 Time of Compliance

All commercial establishments serving food, commercial food manufacturing facilities, and commercial facilities described in Commercial Food Establishments, Section 8.01, page 41, and all private or public wash facilities used for cleaning vehicles, machinery or machine parts, or facilities used for vehicle maintenance as described in Sand/Oil Interceptors, Section 8.04, page 44, shall be required to install a grease interceptor/trap, or a sand/oil interceptor within the 60 day period after the first occurrence of any of the following events:

- transfer of ownership or interest in the parcel, the facility, or the business;
- the issuance by the County/District of any building permit for the construction, reconstruction or related work to be performed on the premises costing more than $5,000;
- the backup or discharge of wastewater on or from the premises due to grease, oil, or sand build up in their building plumbing or building lateral;

- or 90 days after receiving written notice from the General Manager of the necessity for installation of such facilities.

ELEMENT 8: SYSTEM EVALUATION AND CAPACITY ASSURANCE PLAN

This section of the SSMP describes NCSD's System Evaluation and Capacity Assurance Plan.

8.1 Regulatory Requirements for the System Evaluation and Capacity Assurance Plan Element

The SWRCB requirements for the System Evaluation and Capacity Assurance Plan are to prepare and implement a CIP that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. The plan must include the following:

1. Evaluation: Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by a hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events.

2. Design Criteria: Where design criteria do not exist or are deficient, undertake the evaluation identified (in the above task) to establish appropriate design criteria.

3. Capacity Enhancement Measures: The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.

4. Schedule: Schedule of completion dates shall be developed for all portions of the CIP. The schedule shall be reviewed and updated in accordance with the updating and recertification requirements of SWRCB Order No. 2006-003-DWQ.

8.2 Regulatory Compliance

NCSD last completed a Sanitary Sewer Capacity Analysis in February 2015. A copy of the sewer capacity analysis is included in the Element 8 Appendix. The previous capacity analysis, prepared in 2005, included development of a hydraulic model that accounts for pipe and manhole attributes, land use, dwelling unit information, unit wastewater flow generation values, diurnal flow patterns, infiltration and inflow rates, snowmelt baseflow, and rainfall data. The 2005 analysis considered both existing sewer infrastructure at the time as well as new infrastructure proposed as part of the Northstar Highlands Development. This model was updated in 2015 by Farr West Engineering for the proposed Martis Valley West Parcel development. System improvements necessary to service the development have been identified.

To reduce I/I from residential connections, the District requires that a successful sewer lateral pressure test be performed at the time of sale or when improvements are permitted if five years or more has passed from the last successful sewer lateral pressure test (see section 7.11 of the District's Sewer Ordinance). A database is maintained with successful sewer lateral pressure test dates.

Evaluation: Actions Needed To Evaluate Those Portions of The Sanitary Sewer System That Are Experiencing Or Contributing To An SSO Discharge Caused By A Hydraulic Deficiency

The Sewer Capacity Analysis performed in 2005 with update in 2015 meets the regulation requirements for evaluating portions of the sewer system that may experience hydraulic deficiencies during times of peak flows and weather events.

NCSD has not had any hydraulic deficiency related SSO discharges on the sanitary sewer system to date. This includes the flood event of January 1-3, 1997, the flood event between December 30, 2005, and January 1, 2006, and the flood events in January and February of 2017. These were all extreme events and compounding this, they occurred over the peak ski season, which is typically the highest wastewater loading period due to heavy visitation by tourists to the region. The flood of January 1997 was the result of more than 180 percent of normal snowpack in December 1996 followed by an unseasonably warm and extremely heavy rain event that occurred from December 30, 1996, through January 3, 1997, which melted almost all of the snowpack below 7,000 feet. The United States Geological Survey (USGS) estimated that the recurrence interval of the January 1997 Truckee River stream flow peaks at the Farad and Reno gauging stations were slightly less than 50 years. The flood event that occurred over the New Years' Day holiday of 2006 occurred as the result of an unseasonably warm and heavy rain event compounded with a low snowpack, which was incapable of absorbing the rainfall. The amount of precipitation received during the month of December, 11 inches total, was about 250 percent of the amount received in a typical December, but the average snow depth on the ground of only 3 inches was a meager 36 percent of the normal depth at that time of year. Both of these flood events resulted in large volumes of I/I entering the system, which added to the high baseline flows that were already occurring during the holiday season.

Because hydraulic deficiency related SSO discharges have not occurred on the sanitary sewer system to date, determining deficiencies based on actual SSO discharges is not applicable to NCSD at this time. Instead, the evaluation must be based on modeling analyses and a prediction that even larger flood events may occur in the future during time periods when wastewater loadings are equal to or greater than the loadings experienced during the aforementioned flood events. Only these types of scenarios (extremely large flood events coupled with high wastewater loadings) have the capability of causing SSO discharges, unless there is a pipeline obstruction.

Design Criteria

The design criteria for the sanitary sewer system are to avoid SSO discharges during extreme flow periods and to maintain a minimum flow velocity of 2 feet per second at minimum flow periods. The model for the sanitary sewer system, as described above, uses complex computational analyses to calculate the flow rate and flow depth over a simulation period. The basis for the hydraulic analyses in all three models is the Manning Formula, as follows:

Q = 1.49/n *A*R2/3*S1/2

Where:

Q = Flow - (cubic feet per second)

n = Friction loss coefficient with an assigned value of 0.013

A = Cross-sectional area of flow - (square feet)

R = Hydraulic radius (cross sectional area

divided by wetted perimeter) - (feet)

S = Slope of the hydraulic gradient

Capacity Enhancement Measures

The Sanitary Sewer Capacity Analysis prepared in March 2005 and updated in 2015 concluded that at final build out, the sewer system has sufficient capacity to handle a 10 year-6 hour design storm. At a 25 year-6 Hour event, some pipes would flow full; however sufficient capacity exists to prevent sewer overflows. With the economic downturn beginning in 2008, much of the Highlands Development remains incomplete. Development densities have also been reduced for remaining projects within the Highlands Development. The Martis Valley West Parcel Development will not be approved until identified system improvements are made to the District's parallel sewer siphon mains. For the reasons mentioned above, there is no immediate need for system improvements that would increase capacity. Should development be proposed that was not included as part of the Highlands Development capacity analysis, or the Martis Valley West Parcel Sewer Capacity Study, a new capacity analysis will be required of the developer.

Element 8 Appendix

2005 Sewer Capacity Analysis

2015 Martis Valley West Parcel Sewer Capacity Study

Northstar Community Services District

Sewer Capacity Analysis

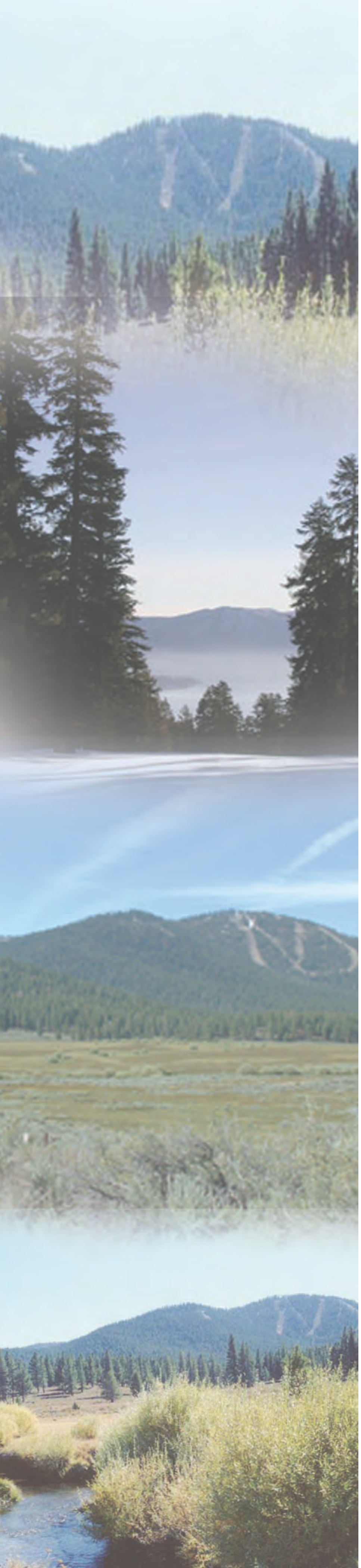
March 2005

Submitted to
Northstar Community Services District

Submitted by
ECO:LOGIC Engineering

ECO:LOGIC

Consulting Engineers



NORTHSTAR COMMUNITY SERVICES DISTRICT

Sewer Capacity Analysis

March 2005

Submitted to

Northstar Community Services District
908 Northstar Drive
Truckee, CA 96161

Submitted by

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NCSD04-006

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Consulting Engineers

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Section 1

Introduction

The Northstar Community Services District (Northstar CSD) owns and operates a primarily gravity collection system serving Northstar-at-Tahoe. Wastewater flows from the Northstar Community (Community) are collected and conveyed via gravity pipeline and siphon line(s) to a gravity discharge outlet, where wastewater then flows to the Tahoe-Truckee Sanitation Agency treatment facilities. A pump station at State Route 267 injects wastewater collected from the lower sewer lines of the Northstar Community into the siphon line.

This report evaluates the capacity of mainlines within the system that will be affected by the construction of the Highlands Development project and the Sawmill Heights employee housing. The analysis includes the use of the dynamic flow routing hydraulic model, *InfoWorks*, to assess the sewer system capacity. The use of the dynamic model allows evaluation of the sewer system at several design flow conditions and for evaluation of potential sewer improvements.

The remainder of this report is organized into the following major sections:

- Wastewater Flows
- Collection System Hydraulic Model
- Collection System Capacity Evaluation
- Conclusions and Recommendations

Section 2
Wastewater Flows

This section includes the data sources and assumptions used in developing the hydraulic model. In addition, it also establishes current wastewater flow rates and describes the methodology for determining peak sanitary flows, groundwater infiltration, and rainfall dependent inflow and infiltration for historical and design storm conditions.

DATA SOURCES AND ASSUMPTIONS

Sources of flow data included two flow monitoring stations, the "267 monitor" and the "Fire Station monitor". These two flow monitors only cover a portion of the Community. The 267 monitor receives flows from properties off of Skidder Trail and Basque Road. This flowshed is entirely residential. The Fire Station monitor receives flows from residential properties on Silver Fox, Eagle Feather Court, and portions of Grouse Ridge. In addition, some condo property off of Northstar Drive, Northstar Village, and Big Springs Day Lodge are also tributary to the Fire Station monitor. The Northstar sewer system is presented in Figure 2-1.

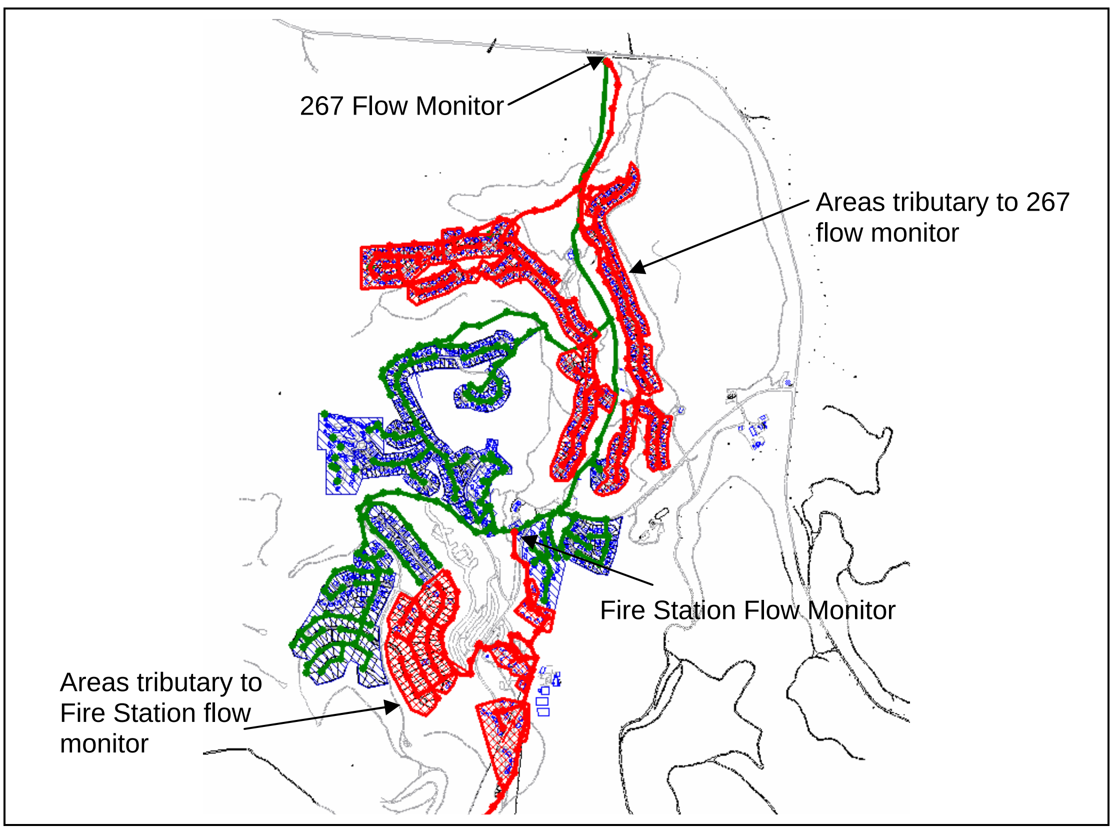


Figure 2-1
Northstar CSD Sewer System and Areas Tributary to Flow Monitors

Average daily flow data was provided by the Northstar CSD for January 12, 2004 through January 12, 2005 (Figure 2-2). Detailed daily flow data was provided for specific days during this time period. Each of these specific days and the condition it represents are presented in Table 2-1.

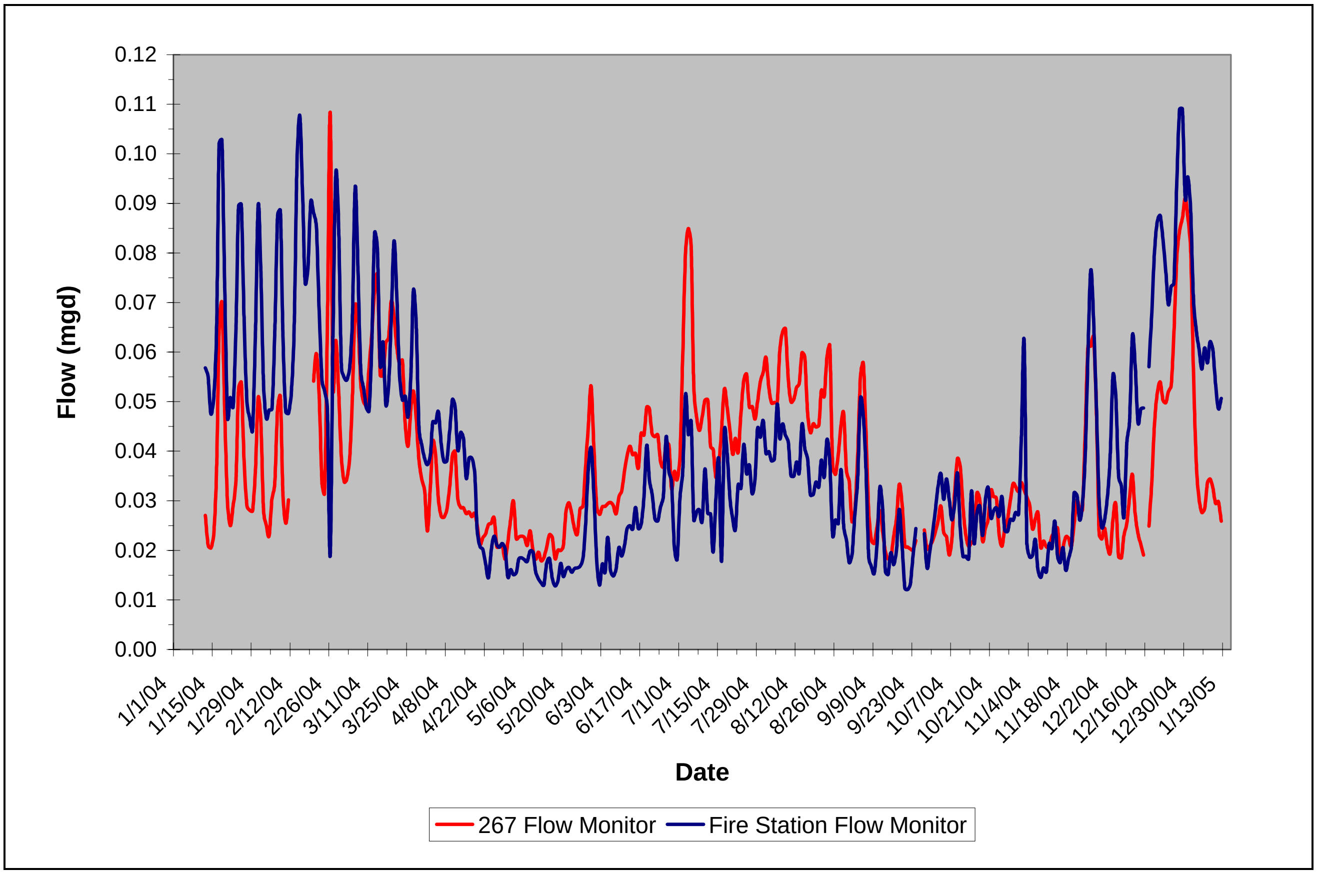


Figure 2-2
Northstar CSD Average Daily Wastewater Flow

Table 2-1
Conditional Information for 2004 Dates with Detailed Flow Data

Date (2004)	Condition (Weather Description)	Max Temp, °F	Avg Temp, °F	Day of the Week	Assumptions
Jan. 24	Snow	37	32	Saturday	Used to determine weekend diurnal flow profile; Assumed low I/I (precipitation is snow, not rain, and temperature is near freezing); Assumed high occupancy
Jan. 25		33	22	Sunday	Used to determine weekend diurnal flow profile; Assumed low I/I (no precipitation and temperature is near or below freezing); Assumed high occupancy
Jan. 28		36	31	Wednesday	Used to determine weekday diurnal flow profile; Assumed low I/I (no precipitation and temperature is near freezing); Assumed high occupancy
Jan. 29		42	33	Thursday	Used to determine weekday diurnal flow profile; Assumed low I/I (no precipitation and temperature is near freezing); Assumed high occupancy
Feb. 28		35	26	Saturday	Used to determine weekend diurnal flow profile; Assumed low I/I (no precipitation and temperature is near or below freezing); Assumed high occupancy
Feb. 29		35	24	Sunday	Used to determine weekend diurnal flow profile; Assumed low I/I (no precipitation and temperature is near or below freezing); Assumed high occupancy
Mar. 19	Snowmelt	66	49	Friday	Used to determine snowmelt infiltration; Temperature significantly above freezing for week prior to March 19th; No precipitation. Assumed that flow above base sanitary flow is due to snowmelt infiltration; Occupancy assumed to be similar to May 21st and June 4th
May 21		59	42	Friday	Used to determine base sanitary flow at 25% occupancy; Occupancy assumed to be similar to March 19th, May 28th, June 4th; No precipitation; No snowmelt
May 28	Rain (0.11 inches)	53	48	Friday	Used to determine RDII due only to rainfall; Occupancy assumed to be similar to May 21st,June 4th; No snowmelt
June 4		82	58	Friday	Used to determine base sanitary flow at 25% occupancy; Occupancy assumed to be similar to March 19th, May 21st, 28th; No precipitation; No snowmelt
Dec. 31	Snow and Holiday	32	28	Friday	Used to determine 100% occupancy; Assumed near 100% occupancy due to holiday and weekend conditions; Assumed snowmelt and effect of snowfall on wastewater flow minimal since temperature at or below freezing
Jan. 1, 2005	Snow and Holiday	30	28	Saturday	Used to determine 100% occupancy; Assumed near 100% occupancy due to holiday and weekend conditions; Assumed snowmelt and effect of snowfall on wastewater flow minimal since temperature at or below freezing
Jan. 2, 2005	Snow and Holiday	32	26	Sunday	Used to determine 100% occupancy; Assumed near 100% occupancy due to holiday and weekend conditions; Assumed snowmelt and effect of snowfall on wastewater flow minimal since temperature at or below freezing

Detailed flow data was provided in random time increments based on radio communication between the monitor and the central SCADA terminal unit. Hourly flow data was computed from the random time increments.

Precipitation, temperature, and weather data was gathered from the California Department of Water Resources, California Data Exchange Center (CDEC) Resource Directory (http://cdec.water.ca.gov) for the TKE-OBS station and The Weather Underground, Inc. (http://www.wunderground.com) for Truckee-Tahoe, CA.

EXISTING WASTEWATER FLOW CHARACTERIZATION

Wastewater flows within the Northstar Community are primarily generated by residential development, with a small amount of commercial input. Wastewater generation is highly affected by occupancy rates within the Community. Peak wet weather flows are comprised of peak sanitary flow, groundwater infiltration, and rainfall dependent infiltration and inflow (RDII). Sanitary flow is highest during the winter season and on weekends when occupancy is high. Groundwater infiltration is highest in the spring when temperatures have risen above freezing for a significant amount of time and snowmelt runoff and infiltration are high. RDII is highest during rain storm events. Sanitary flow, infiltration, and RDII are all inputs to the hydraulic model. The following sections describe how these inputs were determined and used within the model.

SANITARY FLOW

Sanitary flow is the wastewater generated by residences and commercial businesses within the Community. Average sanitary flow was determined from daily and hourly flow data from 2004. The sanitary flow will change throughout the day as residents and businesses use water and during the week as the occupancy of residences and hotels changes. Hourly flow data from January 28th and 29th, 2004 were used to determine weekday sanitary flow diurnal patterns. Hourly flow data from January 24th and 25th and February 28th and 29th, 2004 were used to determine weekend diurnal patterns. Diurnal patterns were assumed not to be significantly dependent on seasonal occupancy variations.

Sanitary flow quantity is affected by population, occupancy, and wastewater generation rates. At Northstar, higher flows occur during the weekends and during the winter months. Occupancy was assumed to be near 100% during December 31st through January 2nd since this period represents a weekend during a holiday period, during the winter. Related to occupancy, the population of a community will affect the rate at which wastewater is generated. Wastewater generation rates can be expressed in terms of gallons per day per capita (gpd/ca) or gallons per day per equivalent dwelling unit (gpd/EDU or gpd/unit). Initial sanitary flow was determined by multiplying the number of houses, condominiums, and commercial units by the water demand established by ECO:LOGIC for the Northstar Water Model (December, 2002). The wastewater generation rates by land usage type are provided in Table 2-2. These wastewater generation rates were integrated to the hydraulic model and adjusted until they corresponded with measured values obtained from flow monitoring.

Table 2-2
Wastewater Generation Rate by Land Usage Type

Land Usage Type	Wastewater Generation Rate
Residential - House	420 gpd/unit
Residential - Condominium	300 gpd/unit
Commercial	420 gpd/unit

GROUNDWATER INFILTRATION

Groundwater infiltration occurs when groundwater enters the sewer through leaking joints, pipe cracks, damaged lateral connections, or manhole walls. Groundwater infiltration is typically a constant flow, which varies seasonally with the groundwater levels rising and falling above and below the sewer pipe as well as with the depth of surface freezing during the winter months. Groundwater infiltration includes extraneous water that enters the system during spring snowmelt conditions. Infiltration due to snowmelt was computed by comparing the flow in the sewer system on March 19th, 2004 to May 21st and June 4th, 2004. All three dates were Fridays and the occupancy and, thus, base sanitary flow was assumed to be similar. The daily flow for May 21st and June 4th represented sanitary flow with no groundwater infiltration. The daily flow on March 19th represented groundwater infiltration due to snowmelt in addition to the sanitary flow. Temperature and precipitation data for March 19th indicate that no rain or snowfall was occurring and the average temperature was in the upper 40 degrees Fahrenheit, with highs in the upper 60s for at least the week prior to March 19th. These conditions would be favorable for winter snowmelt. Groundwater infiltration due to snowmelt was determined to be 490 and 770 gpd per acre for areas tributary to the 267 monitor and the Fire Station monitor, respectively. Since all areas of the Community are not tributary to the flow monitors, infiltration rates were applied to other areas of the Community based on proximity to the two monitors. Areas of the Northstar Community assigned a base snowmelt infiltration of 490 gpd per acre are shown in Figure 2-3.

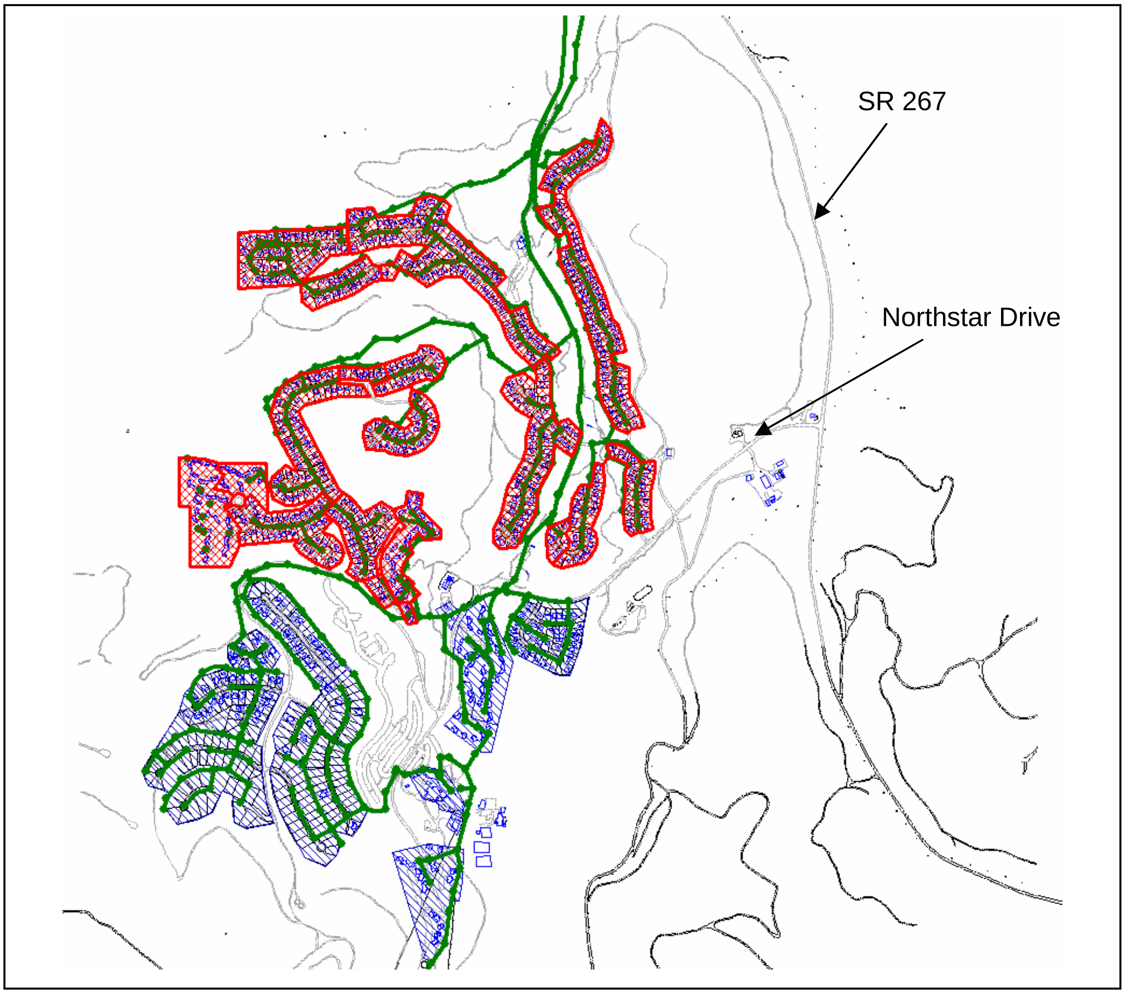


Figure 2-3
Northstar Capacity Analysis - Snowmelt Infiltration Rates

Note: Areas in red indicate snowmelt infiltration baseflow rate equal to 490 gpd/ac. All other areas have a snowmelt infiltration baseflow of 770 gpd/ac.

RAINFALL DEPENDENT INFILTRATION AND INFLOW

Rainfall dependent infiltration and inflow (RDII) is the extraneous water that enters a sewer system during or just after a storm event. Inflow is typically described as water that directly enters a system through roof leaders, clean-outs, or drains; infiltration is water that enters the sewer system through defective pipes, pipe joints, or manhole walls.

RDII is estimated by comparing flow data prior to and after rain events. The relative amount of extraneous water entering the system can be expressed in terms of the “R-value”. The R-value is calculated by dividing the net RDII volume by the sewered area; then dividing by the inches of rainfall to yield volume of rainfall. The units are expressed in terms of volume of rain per volume of net RDII, which is the same as percent rainfall entering the system. R-values were calculated for each monitored area within the Community. Since all areas of the Community are not monitored, an average R-value of 2.82% was used for the entire community. This value is typical to slightly conservative compared to other community’s sewer systems.

The R-value describes the percent of rainfall entering the sewer system, but does not describe the pattern and magnitude of the RDII resulting from a given storm. To determine the shape of the RDII response, a routing value was developed based on how the area responds to the rain event. Low routing values represent a faster and more intense system response to rainfall; high routing values represent a more attenuated response to the rainfall.

PEAK DESIGN FLOWS

Peak flows in the Northstar sewer system occur during time periods when occupancy is at or near 100% (peak sanitary flow), temperature is significantly above freezing (peak snowmelt infiltration), and design storm conditions are occurring (peak RDII). Design storm development and the input of the above conditions into the model are discussed below.

DESIGN STORM HYETOGRAPH

For the purpose of sewer system capacity planning, it is desirable to determine peak flows resulting from more significant rain events than those measured in 2004. Typical design storm conditions included storms with a 10-year return period and a duration of 6 hours (10 year-6 hour storm), a 25 year-6 hour storm, and a 25-year-24 hour storm. A 25 year-6 hour design storm is generally chosen if a specific design storm condition is not required.

To project flows at higher intensity rain events than those observed in 2004, design storm hyetographs (rainfall intensity over time) are developed. For a given design rain event, the hyetograph shows rainfall intensity at 15 minute intervals (10 year-6 hour storm and 25 year-6 hour storm) and 30 minute intervals (25 year-24 hour storm). Design storm hyetograph development is discussed below. The design rainfall is then routed into the system using the previously established R-values and routing values developed during model calibration. When integrated into the hydraulic model, the storm peak was coincided with the peak diurnal sanitary flow.

DESIGN STORM HYETOGRAPH DEVELOPMENT

Design storms are developed from statistical analysis of local precipitation records and represent the distribution of rainfall depths over a time increment for a given storm duration and frequency. The design storm concept assumes a precipitation event of a particular frequency will produce RDII of the same frequency.

The storm frequency is typically expressed in terms of the storm return period. Storm duration is usually expressed in hours or days of precipitation. When assessing design storm protection provided by the sewer system, storms with large return periods and short durations provide critical (i.e. large) flows within the sewer. For the purposes of this capacity analysis, a 25 year-6 hour design storm was selected. However, 10 year-6 hour and 25 year-24 hour design storm conditions were also evaluated to characterize system response to different magnitude storms.

Design storms were developed using the methods developed in the Sacramento City and County Drainage Manual, Hydrology Standards, Volume 2, Chapter 4, December 1996, and the Placer County Flood Control and Water Conservation District Stormwater Management Manual, Design Storm Procedures, Appendix V-A and V-B, September 1990. Both methods use depth-duration-frequency relationships for the area that are based on an analysis of continuous rainfall records from the National Weather Service. Depth-duration-frequency coefficients were determined from the Placer County Stormwater Management Manual for an elevation of 6,000 feet, west of the Sierra Nevada Crest. These methods were used to develop the temporal distribution of rainfall over the storm duration. For design purposes, a single cloudburst event with high intensity precipitation in the middle of the storm was assumed. Design storms hyetographs for 10 year-6 hour, 25 year-6 hour, and 25 year-24 hour events are shown in Figures 2-4, 2-5, and 2-6, respectively.

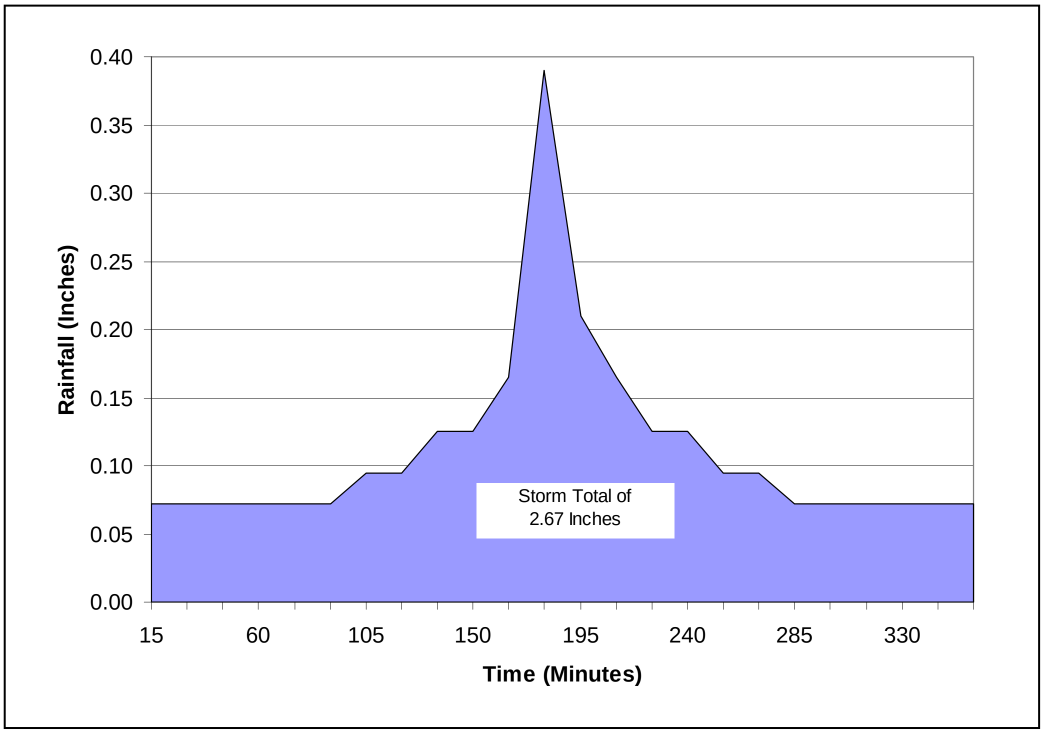


Figure 2-4
Northstar 10 year-6 hour Design Storm Hyetograph

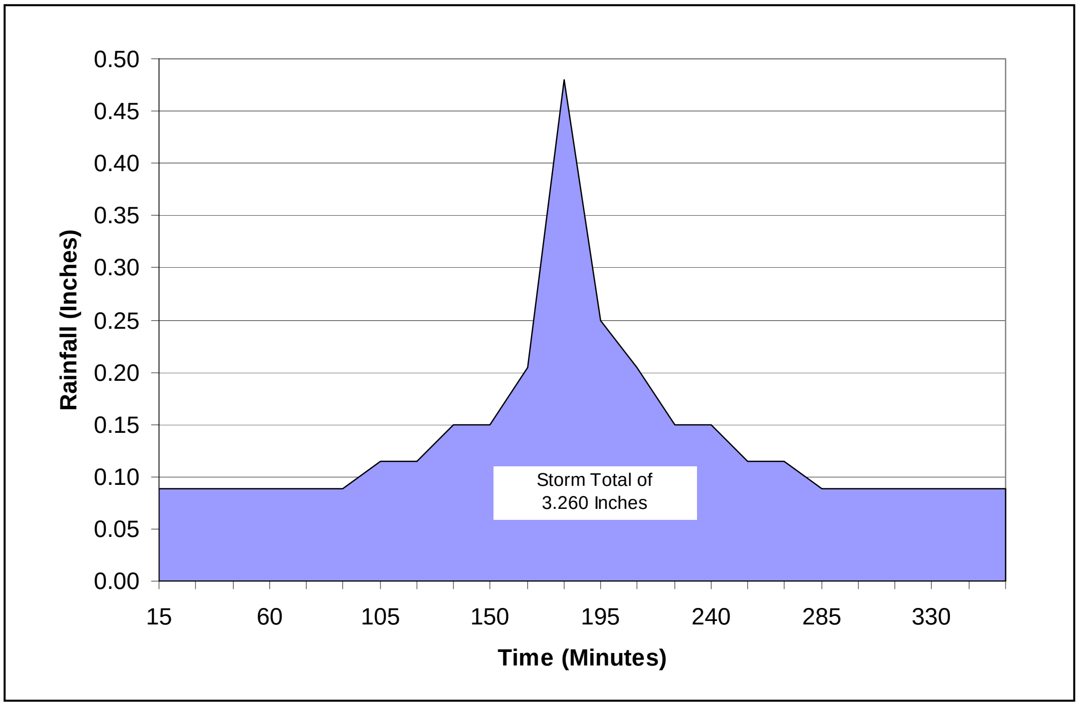


Figure 2-5
Northstar 25 year-6 hour Design Storm Hyetograph

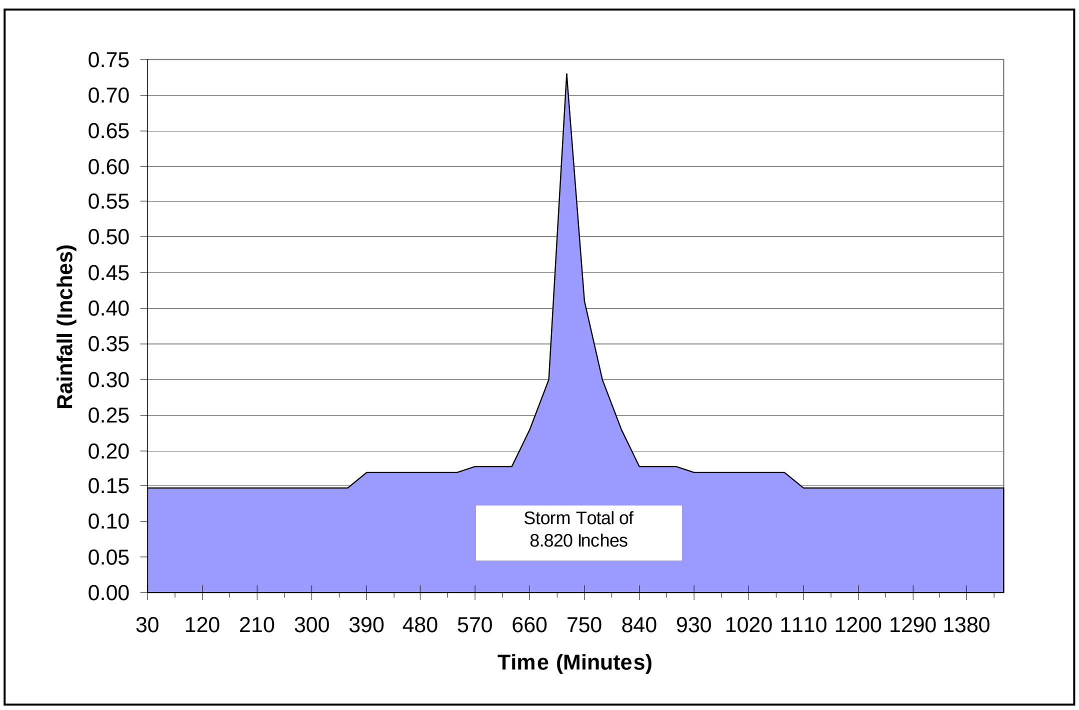


Figure 2-6
Northstar 25 year-24 hour Design Storm Hyetograph

PEAK FLOW CONDITION MODEL INPUT

Peak flow conditions were modeled by coinciding the 25 year-6 hour design storm with peak wastewater flow rates. The following parameters were assumed:

- Snowmelt infiltration is 490 and 770 gpd/ac based on proximity to the 267 or Fire Station flow monitors.
- Occupancy is at 100%.
- The peak RDII from the design storm coincides with the peak diurnal sanitary flow.
- The leakage rate (R-value) is 2.82%.
- A 25 year-6 hour storm produces a total rainfall of 3.26 inches.

In addition, a sensitivity analysis was performed by modeling wastewater flow at 10 year-6 hour design storm and 25 year-24 hour design storm conditions. Results of these analyses are discussed in Section 4.

Section 3

Collection System Hydraulic Model

This section describes the hydraulic modeling software, model construction, and model calibration results. A sewer system hydraulic model was constructed of the Northstar sewers using the *InfoWorks* hydraulic model. The model was calibrated for dry weather (sanitary flow only) at 25% and 100% occupancy, rainfall (with no snowmelt), snowmelt (with no rainfall), and simultaneous rainfall and snowmelt conditions. After calibration, the model was used to predict system peak flows and system response during 10 year-6 hour, 25 year-6 hour, and 25 year-24 hour storm events (discussed in Section 4).

MODEL DESCRIPTION

Dynamic models are generally considered one of the most sophisticated means to assess sewer system capacity. Several modeling packages are available which solve the complete dynamic flow routing equations (St. Venant's equations) for accurate simulation of backwater, looped connections, surcharging, and pressure flow within sewer systems. Wallingford Software's *InfoWorks* was used in this capacity analysis for the following reasons:

- *InfoWorks* accurately simulates sewer system flows and system response during peak wet weather conditions;
- *InfoWorks* allows the user to quickly and easily look at different scenarios (such as different occupancy rates, snowmelt/infiltration conditions, rainfall events, design storm conditions, future development, etc.);
- Rainfall information can be directly included into *Infoworks*;
- Simulated flows and measured flow data can be compared graphically within *InfoWorks*, which assists in model calibration efforts; and
- *InfoWorks* can be easily updated, if future analysis is necessary.

MODEL DEVELOPMENT AND CONSTRUCTION

The hydraulic model contains the following components:

- Pipe and manhole attributes (manhole locations, pipe sizes, slopes, inverts, etc),
- Land use information,
- Dwelling unit information,
- Unit wastewater flow generation values,
- Diurnal flow patterns,
- Infiltration and inflow rates,
- Snowmelt baseflow, and
- Rainfall data.

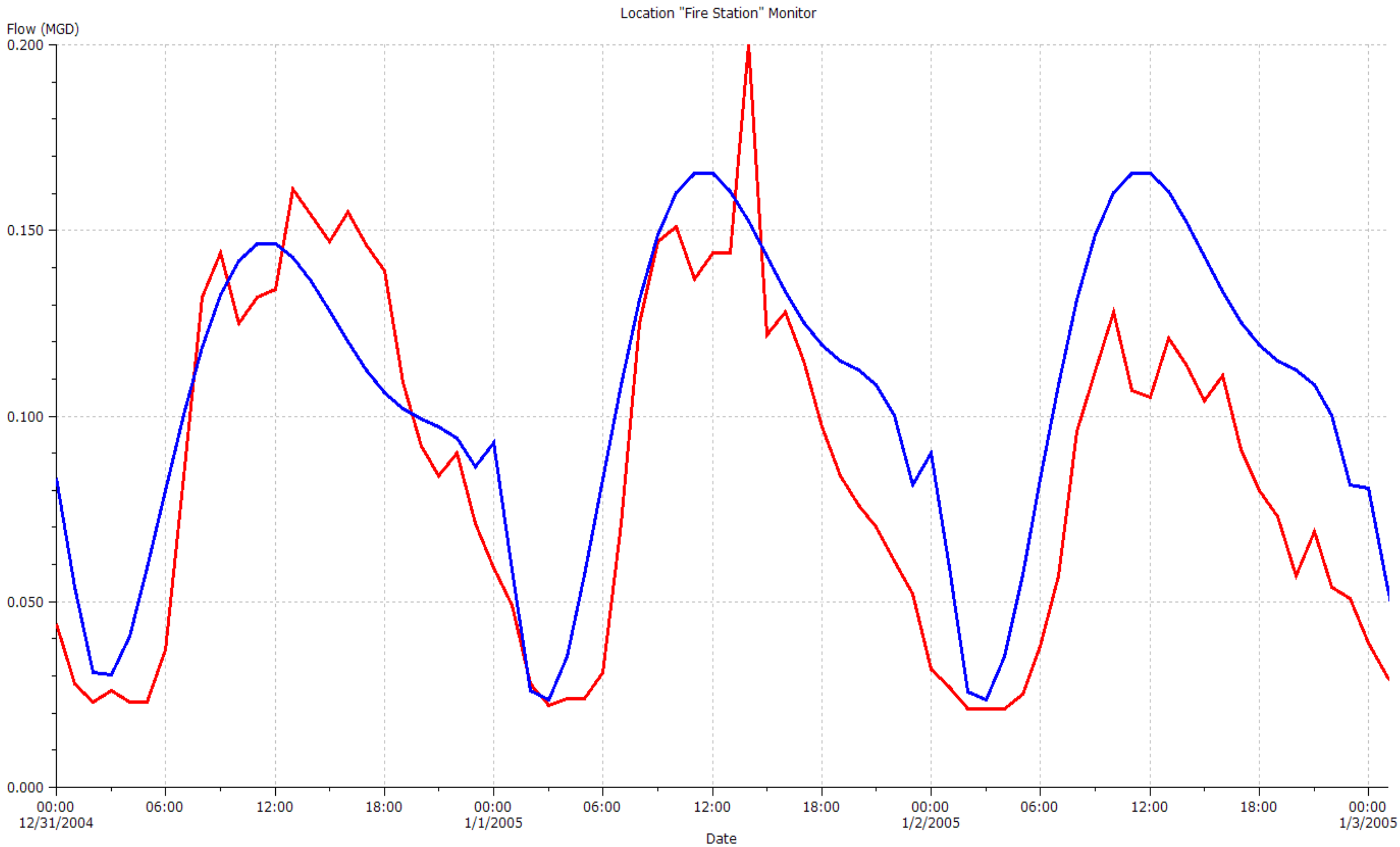
For the purposes of this analysis, the hydraulic model includes all sewers within the Northstar Community, with the exception of less than ten pipelines flowing into the Indian Hills lift station and the lower half of the siphon lines. However, even though the specific pipelines are not included, the flow from these areas is still accounted for within the model. Pertinent physical data (pipe sizes, connecting manholes, manhole locations, invert elevations, rim elevations, etc.) were obtained from Northstar CSD via GIS data.

Once basic infrastructure was integrated into the model, catchment areas were created representing the physical area that contributes flow into a specific manhole "node" within the model. Catchment areas were defined by how sewerlines are connected into the system. Land use information, including the number of houses, condominiums, and/or commercial equivalent units, was assigned to each catchment area. Land use and dwelling unit information was obtained from GIS data and the Northstar Water Model completed by ECO:LOGIC in December 2002. Each catchment area was also assigned wastewater generation rates based on the land use and the diurnal flow curve based on the observed diurnal patterns. From this information, the model was able to simulate base dry weather wastewater flow throughout the Community that could then be compared to actual observed flow data.

MODEL CALIBRATION

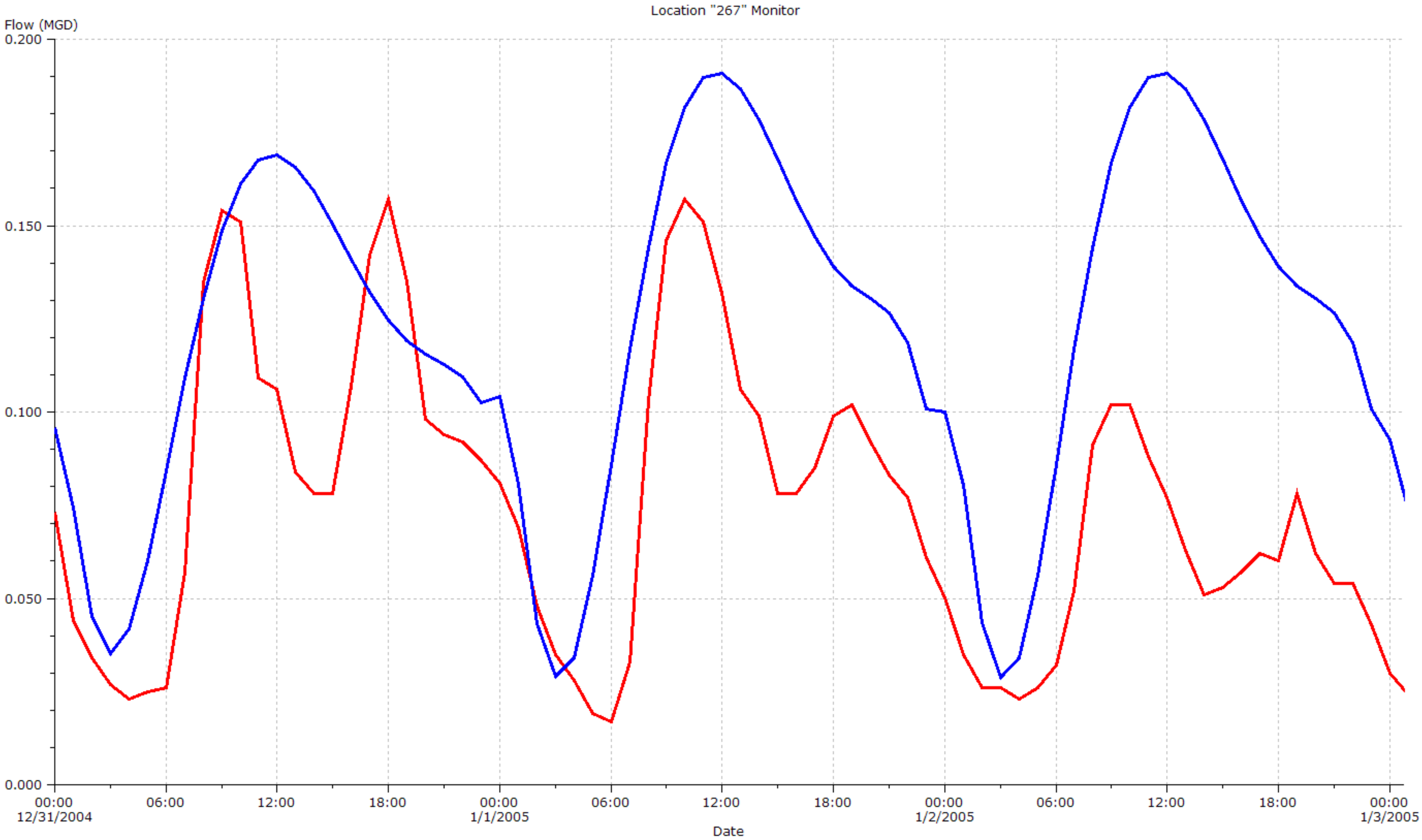
Hourly flow monitoring data from the 267 monitor and the Fire Station monitor were integrated into the model. This information was used to determine how well model predictions compared to actual flow data at the two flow monitoring locations. If a difference existed between the observed and simulated flows, the unit wastewater generation values were adjusted. A new simulation run was completed and the revised simulated flow data was compared to the monitoring station flow data. This process was repeated until the observed flows reasonably matched the simulated flows. For base sanitary flow model calibration, the model was calibrated by adjusting unit wastewater generation values for 100% and 25% occupancy. December 31st, 2004 through January 2nd, 2005 was used to represent 100% occupancy. It was assumed that during this period, sanitary flow was high due to the holiday and weekend conditions occurring simultaneously, and infiltration and inflow was minimal due to winter conditions (precipitation falling as snow and no snowmelt occurring). A comparison of model simulation to actual observed flows during 100% occupancy conditions for the Fire Station and 267 Monitors is provided in Figures 3-1 and 3-2, respectively. May 21st and June 4th, 2004 were used to represent 25% occupancy. During this time period, it was assumed that occupancy was low, most to all of the winter snow had previously melted, and no precipitation was contributing RDII to the system. A comparison of model simulation to actual observed flows during 25% occupancy conditions for the Fire Station and 267 Monitors on May 21st is provided in Figures 3-3 and 3-4, respectively. A comparison of model simulation to actual observed flows during 25% occupancy conditions for the Fire Station and 267 Monitors on June 4th is provided in Figures 3-5 and 3-6, respectively.

After the model was calibrated for base sanitary flow conditions, wet weather and snowmelt calibration was completed. Simulated flows were compared to the measured flows, similar to the



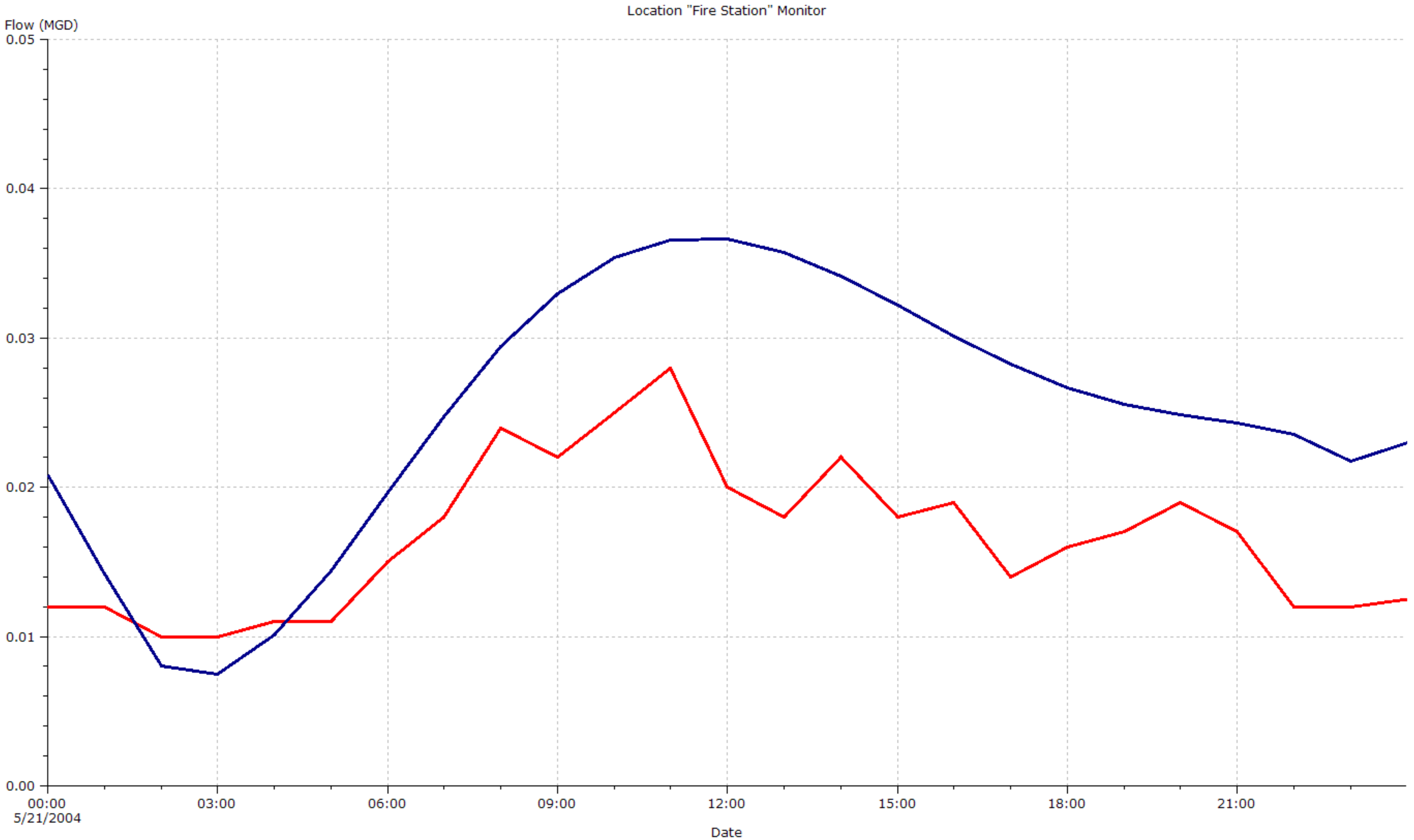
	Flow (MGD) Min	Max	Volume (US Mgal)
Observed Flow - Dec. 31, 2004 - Jan. 2, 2005	0.021	0.200	0.259
Simulated Flow	0.024	0.166	0.320

Figure 3-1
Northstar Fire Station Flow Monitor - December 31, 2004 - January 2, 2005 Observed Flow vs. Simulated Flow



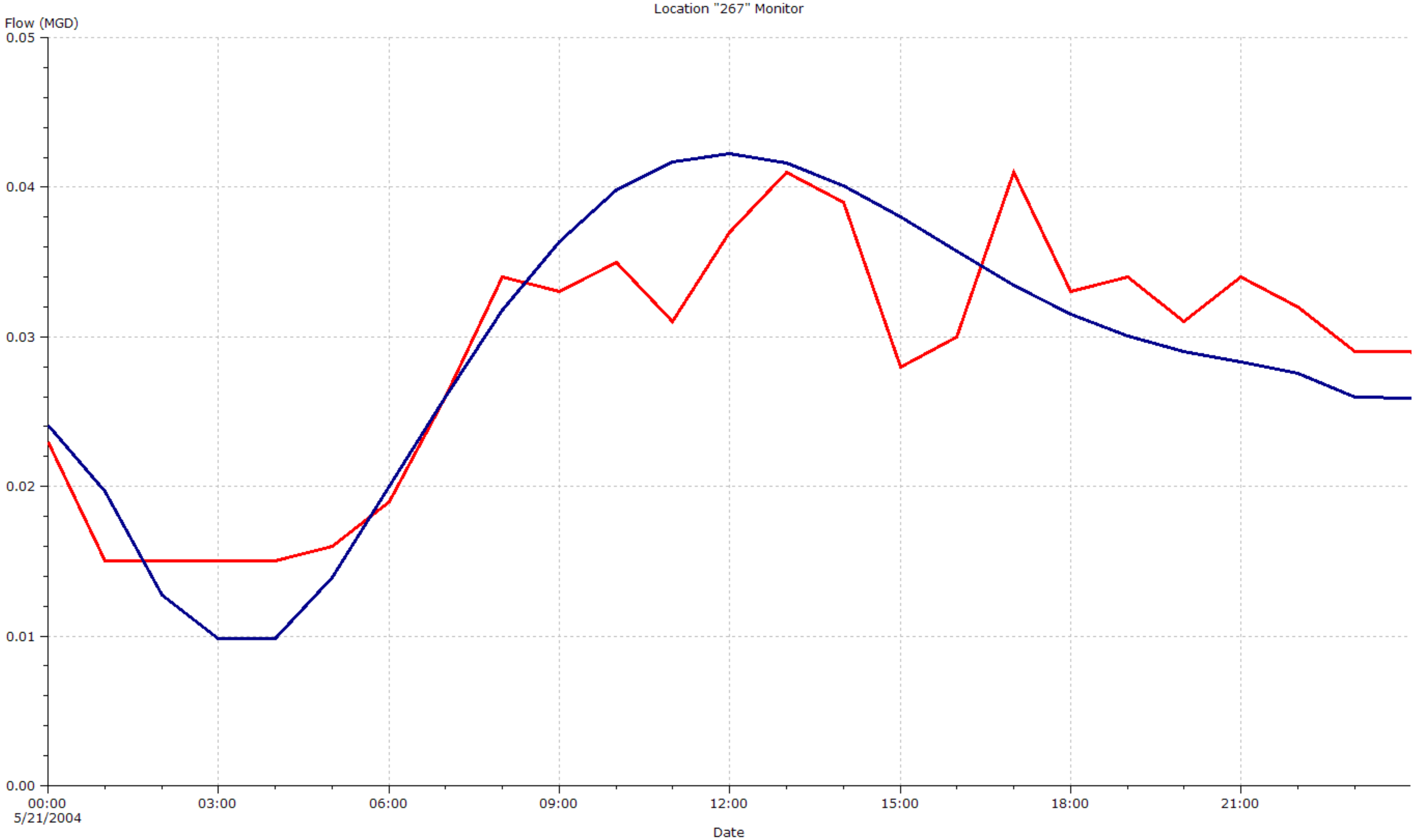
		Flow (MGD)		
		Min	Max	Volume (US Mgal)
Observed Flow - Dec. 31, 2004 - Jan. 2, 2005	red line	0.017	0.157	0.228
Simulated Flow	blue line	0.029	0.191	0.368

Figure 3-2
Northstar 267 Flow Monitor - December 31, 2004 - January 2, 2005 Observed Flow vs. Simulated Flow



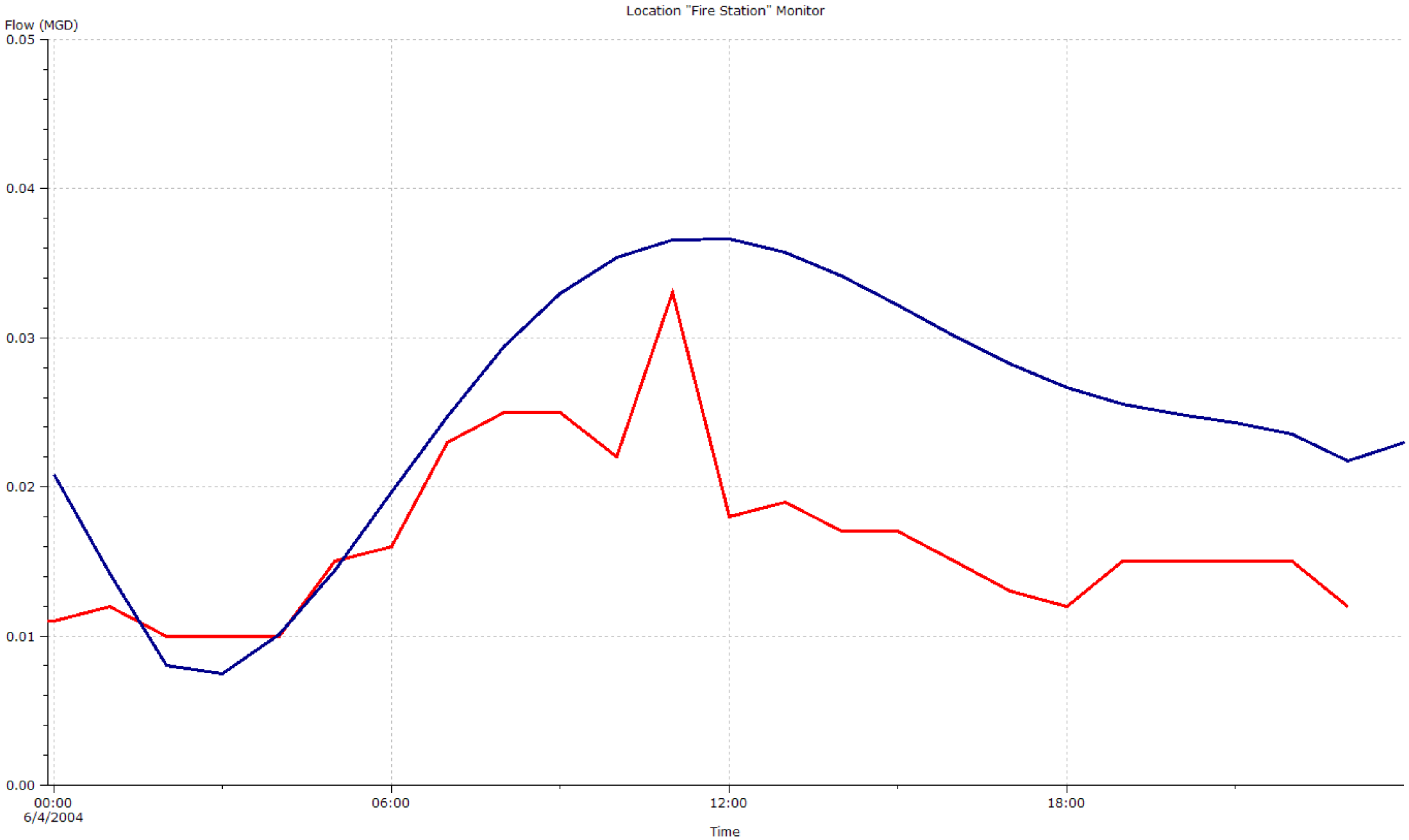
		Flow (MGD)		
		Min	Max	Volume (US Mgal)
Observed Flow - May 21, 2004		0.010	0.028	0.017
Simulated Flow		0.007	0.037	0.025

Figure 3-3
Northstar Fire Station Flow Monitor - May 21, 2004 Observed Flow vs. Simulated Flow



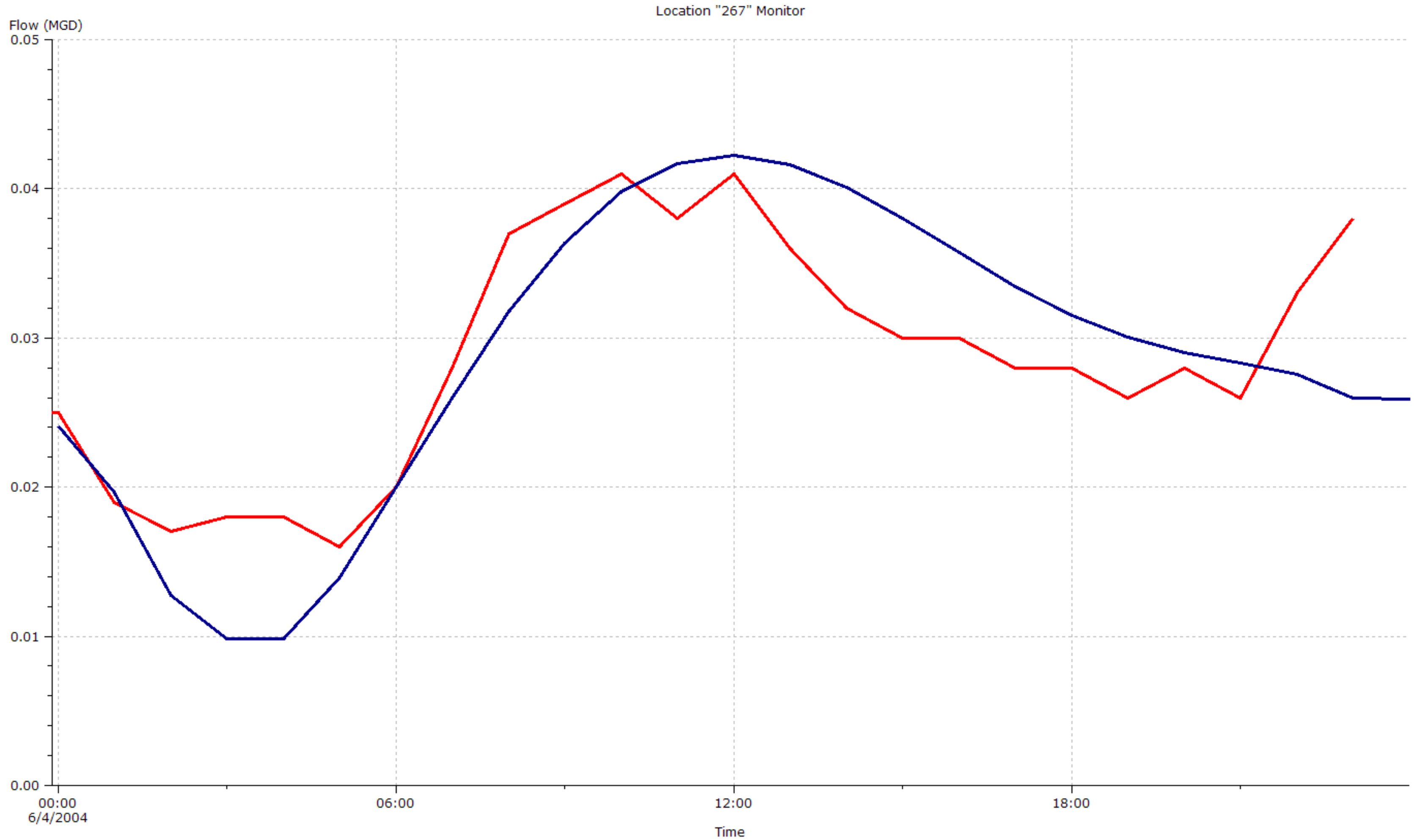
		Flow (MGD)		
		Min	Max	Volume (US Mgal)
Observed Flow - May 21, 2004		0.015	0.041	0.029
Simulated Flow		0.010	0.042	0.029

Figure 3-4
Northstar 267 Flow Monitor - May 21, 2004 Observed Flow vs. Simulated Flow



		Flow (MGD) Min	Max	Volume (US Mgal)
Observed Flow - June 4, 2004		0.010	0.033	0.016
Simulated Flow		0.007	0.037	0.025

Figure 3-5
Northstar Fire Station Flow Monitor - June 4, 2004 Observed Flow vs. Simulated Flow

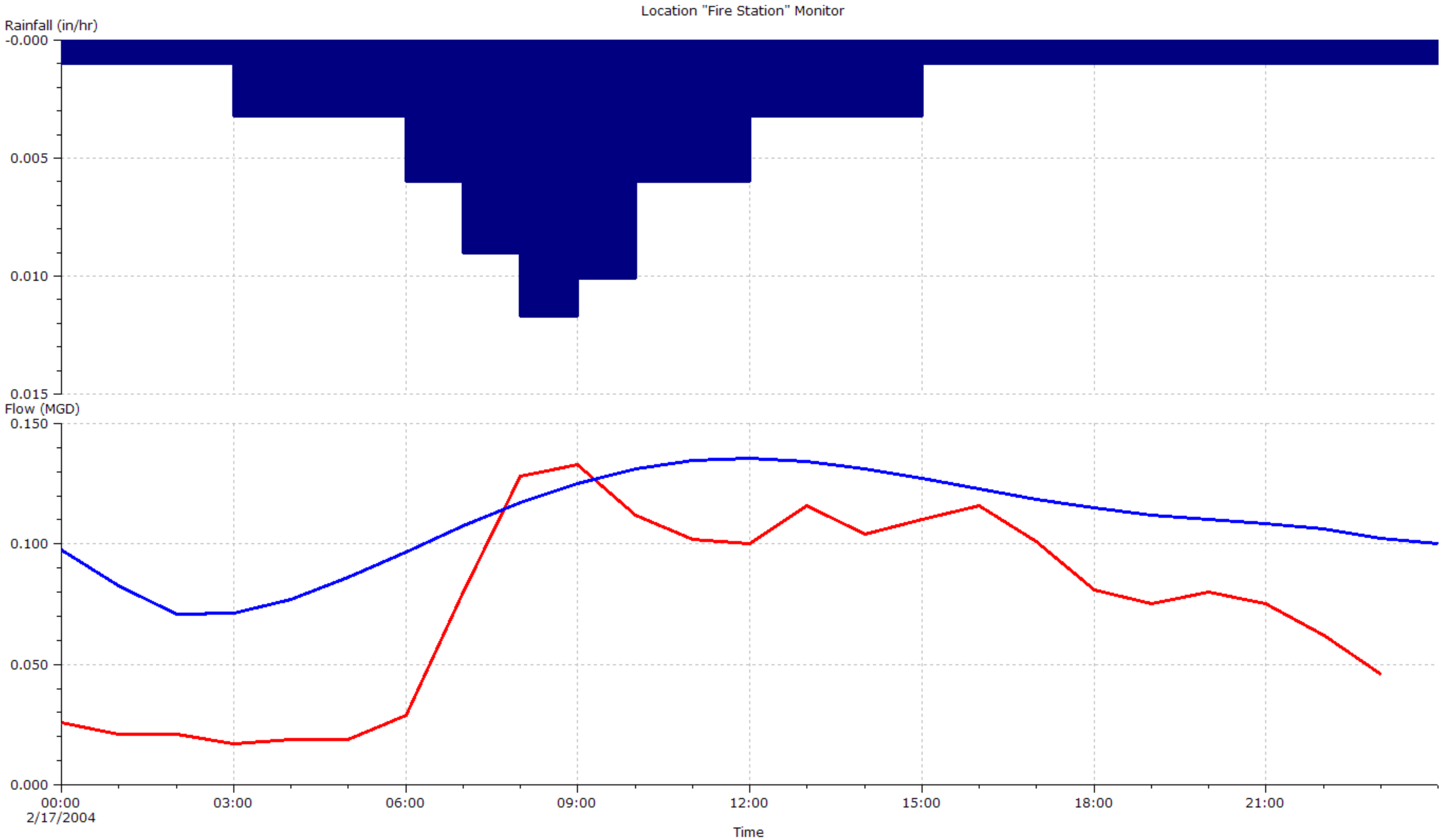


		Flow (MGD)		
		Min	Max	Volume (US Mgal)
Observed Flow - June 4, 2004		0.016	0.041	0.028
Simulated Flow		0.010	0.042	0.029

Figure 3-6
Northstar 267 Flow Monitor - June 4, 2004 Observed Flow vs. Simulated Flow

dry weather calibration process. The flow routing value, leakage rate (R-value), and base snowmelt flow were adjusted for each catchment until the measured flows reasonably matched the observed flows. Calibration was performed to confirm the R-value by comparing the simulated flows and observed flows for May 28th, 2004 at 25% occupancy. It was assumed that the flow on this date represented only base sanitary flow (similar to May 21st and June 4th) and RDII from the small rainstorm occurring on this data (approximately 0.11 inches as measured at the Tahoe-Truckee Airport). Calibration was performed to confirm base flow due to snowmelt only by comparing simulated and observed flows for March 19th, 2005 at 25% occupancy. An analysis of temperature and precipitation data for this date and several weeks leading up to March 19th indicated that the majority of snowfall for the season occurred prior to this date and that the average temperature was above freezing for about 13 days prior to March 19th. In addition, no precipitation occurred around this time period. With temperatures above freezing for a significant period of time prior to March 19th, it was assumed that flow on this date represented only base sanitary flow (similar to May 21st and June 4th) and infiltration due to snowmelt.

After calibrating wastewater generation rates, occupancy values, flow routing values, R-values, and base snowmelt infiltration individually, these parameters were combined and compared to the observed flow conditions on February 17th, 2004. On February 17th, a rainstorm measuring approximately 0.08 inches occurred. Since the exact pattern, timing, and duration of this storm was not known, a storm hyetograph was created as described in Section 2. This storm pattern was used in the model to simulate the flow on February 17th. Peak simulated flow and observed flow were within 98% (Figure 3-7). This analysis provided a confirmation that in addition to being calibrated for each parameter individually, the model was also reasonably calibrated when all the parameters were combined.



	Rainfall			Flow (MGD)		
	Depth (in)	Peak (in/hr)	Average (in/hr)	Min	Max	Volume (US Mgal)
Rain	0.080	0.012	0.003			
Observed Flow - February 17, 2004				0.017	0.133	0.072
Simulated Flow				0.071	0.136	0.109

Figure 3-7
Northstar Fire Station Flow Monitor - February 17, 2004 Observed Flow vs. Simulated Flow

Section 4

Collection System Capacity Evaluation

This section describes the results of modeling design storm conditions at the existing level of development at Northstar as well as with the proposed Highlands Development. Evaluation was focused on sewer lines that will be affected by the Highlands Development and the Sawmill Heights employee housing. Two connecting sections of pipeline will be affected by the Highlands development, pipelines between manholes 370 and 341 and pipelines between manholes 366 and 341 as well as the main sewerline from manhole 341 to the siphon line (Figure 4-1).

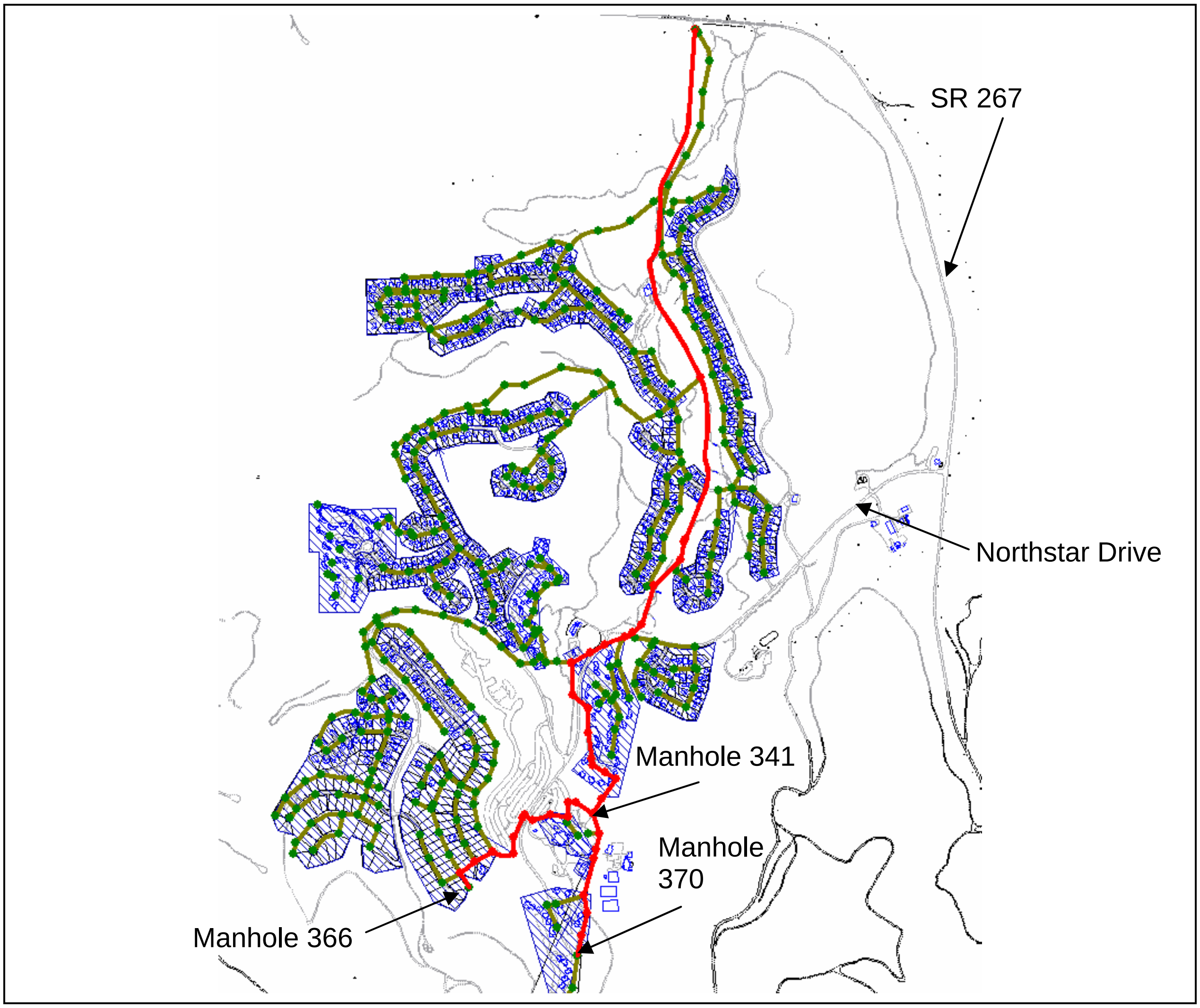


Figure 4-1
Northstar Capacity Analysis - Sewerlines Affected by Highlands Development

The employee housing is served by pipelines from manhole 58 to the pump station on SR 267 where this flow is added to the siphon line (Figure 4-2). Capacity of the main lines of the Northstar Community was evaluated at 25 year-6 hour design storm, 100% occupancy, and with groundwater infiltration due to snowmelt. In addition, 10 year-6 hour and 25 year-24 hour design storm conditions were evaluated to characterize system response to different magnitude storms and an initial assessment of the entire system was performed.

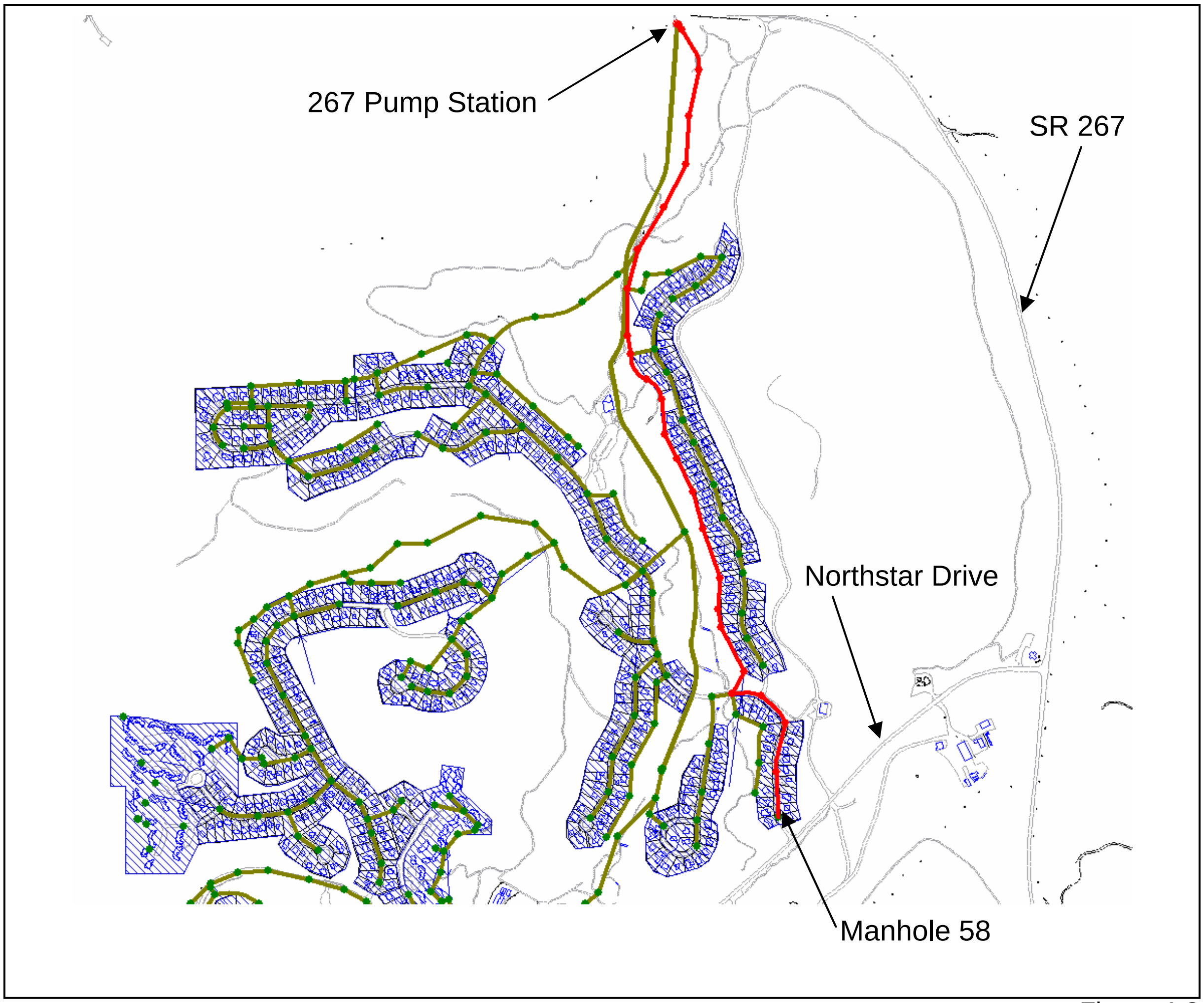


Figure 4-2
Northstar Capacity Analysis - Sewerlines Affected by Sawmill Heights Employee Housing

Sewerlines were evaluated based on the flow condition within the pipeline. Conditions ranged from flowing partially full, flowing full, surcharging beyond full pipe, and surcharging with sewer overflows above ground surface. Sewers can generally accommodate some degree of surcharging beyond full pipe conditions during peak flow conditions. However, acceptable levels of surcharging vary by community. Generally, full pipe conditions are considered acceptable for short periods of time with significant manhole surcharging and sewer overflows considered unacceptable. In addition, it is important to note that once full pipe conditions occur, very little additional flow is needed to cause manhole surcharging and, depending on the depth of the manhole, sewer overflow.

MODEL SIMULATION RESULTS - EXISTING DEVELOPMENT

Under existing conditions, a 25 year-6 hour design storm is predicted to generate a peak flow of 1.47 million gallons per day (mgd) from the Northstar Community. Capacity and wastewater flow in the pipelines from manholes 366 and 370 to the siphon line and from manhole 58 to the siphon line are shown in Table 4-1. Flow is provided for the 25 year-6 hour storm, 25 year-24 hour storm, and the 10 year-6 hour storm. A detailed listing of pipe capacity and flow at each of the design storm conditions is provided in Appendix A.

Table 4-1
Manhole Capacity and Maximum Wastewater Flow at Design Storm Conditions - Existing Development

Manhole number	Capacity (mgd)	25 year-6 hour Storm Maximum Flow (mgd)	25 year-24 hour Storm Maximum Flow (mgd)	10 year-6 hour Storm Maximum Flow (mgd)
366 to 341	0.91 to 3.92	0.13 to 0.15	0.23 to 0.27	0.12 to 0.14
370 to 341	2.55 to 4.65	0.01 to 0.13	0.02 to 0.17	0.01 to 0.12
341 to siphon line	1.46 to 9.10	0.28 to 0.75	0.44 to 1.16	0.26 to 0.71
58 to siphon line	0.53 to 1.74	0.05 to 0.40	0.09 to 0.68	0.05 to 0.37

Although evaluation was focused on sewer lines that will be affected by the Highlands Development and the Sawmill Heights employee housing, the entire sewer system was modeled. Other areas of the Community also may be of concern and should be evaluated further. Full pipe conditions and manhole surcharging are predicted to exist at the 25 year-6 hour design storm condition and manhole overflows are predicted to exist at the 25 year-24 hour design storm condition along the pipelines from manholes 191 to 177 (along Martis Landing). The profile of pipelines along Martis Landing for the 25 year-6 hour condition and the 25 year-24 hour condition are shown in Figures 4-3 and 4-4, respectively.

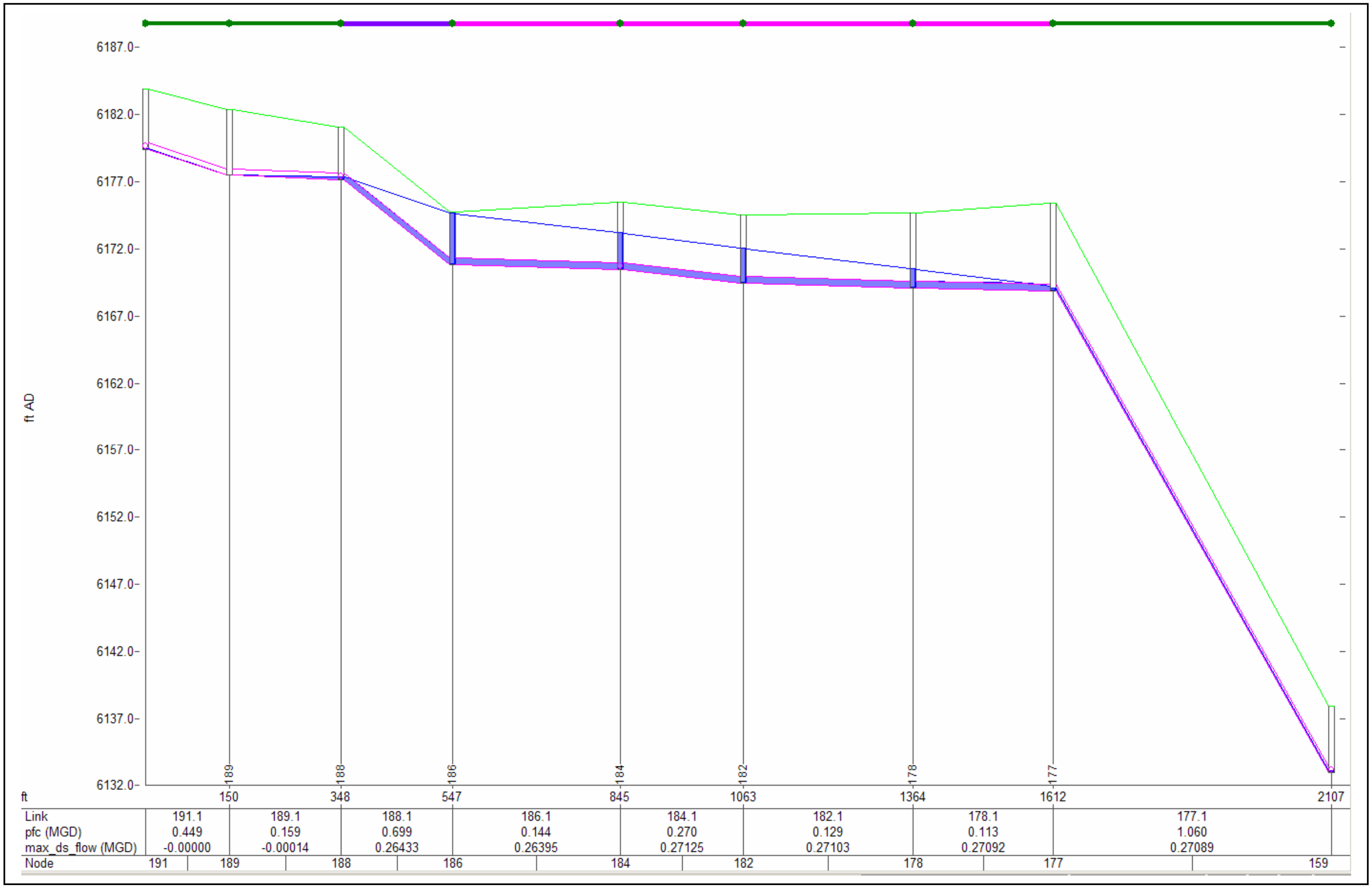
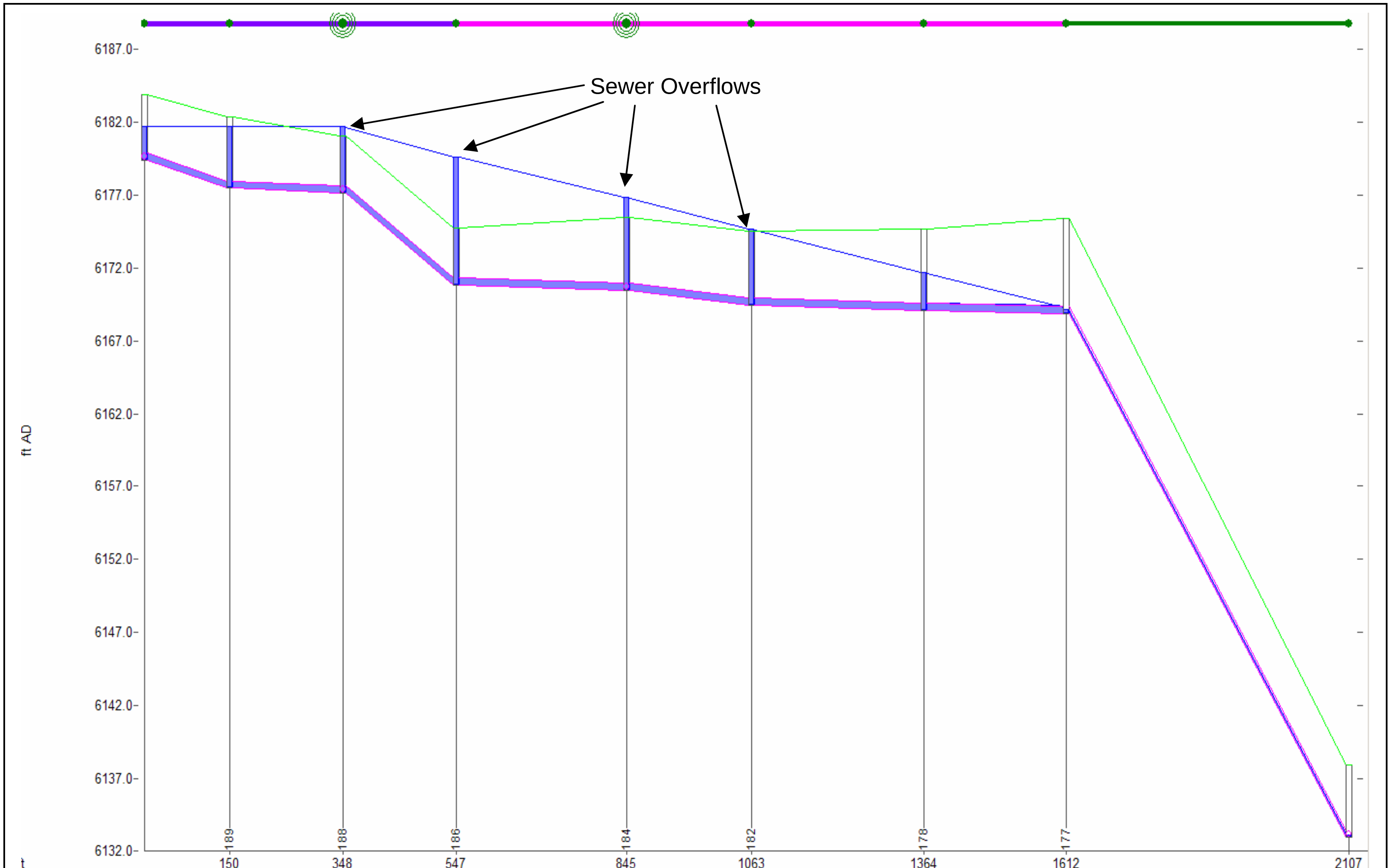


Figure 4-3
Northstar Capacity Analysis - Profile of Martis Landing from Manhole 191 to 159
25 Year-6 Hour Storm at Existing Conditions



Link	191.1	189.1	188.1	186.1	184.1	182.1	178.1	177.1
pfc (MGD)	0.449	0.159	0.699	0.144	0.270	0.129	0.113	1.060
max_ds_flow (MGD)	0.01573	0.04909	0.37652	0.37632	0.37705	0.37705	0.37705	0.37705

Node	191	189	188	186	184	182	178	177	159

Figure 4-4
Northstar Capacity Analysis - Profile of Martis Landing from Manhole 191 to 159
25 Year-24 Hour Storm at Existing Conditions

MODEL SIMULATION RESULTS - HIGHLANDS DEVELOPMENT

To simulate the effect of the Highlands Development and the Sawmill Heights employee housing, subcatchment areas were created in the model based on the *Northstar Highlands Draft Environmental Impact Report*, dated July 2004. Unit information for Phase 1 and at full project buildout for each of the six parcels was obtained from Northstar CSD and integrated into the model. Unit values for each parcel are shown in Table 4-2. For the purposes of modeling, the units were assumed to have similar wastewater generation values to residential - condominium wastewater generation rates. Simulations were performed at 25 year-6 hour and 25 year-24 hour design storm conditions for both Phase 1 and full project buildout conditions. The resulting flows for Phase 1 are provided in Table 4-3. The resulting flows for full project buildout are provided in Table 4-4. Capacities are the same as those given in Table 4-1. A detailed listing of pipe capacity and flow at each of the design storm conditions is provided in Appendix A.

Table 4-2
Highlands Development Parcel Units for Phase 1 and at Full Project Buildout

Parcel	Phase 1 Total Units	Project Buildout Residential Units	Project Buildout Commercial Units	Project Buildout Total Equivalent Units
1	72	334	---	334
2	0	182	28 [(b)]	210
3	0	75	---	75
4	100 [(a)]	101	13 [(c)]	114
5	79	758	---	758
6	96	270	---	270

[(a)] Approx value. Includes 81 dwelling units, approx 5 equiv. commercial units (12,000 ft^2), & 14 equiv. hotel units
[(b)] 72,000 ft^2 of commercial type uses at 0.164 gpd/ft2 at 420 gpd/unit
[(c)] 32,000 ft^2 of commercial type uses at 0.164 gpd/ft^2 at 420 gpd/unit

Table 4-3
Manhole Capacity and Maximum Wastewater Flow at Design Storm Conditions - Highlands Development and Sawmill Heights Employee Housing - Phase 1 Only

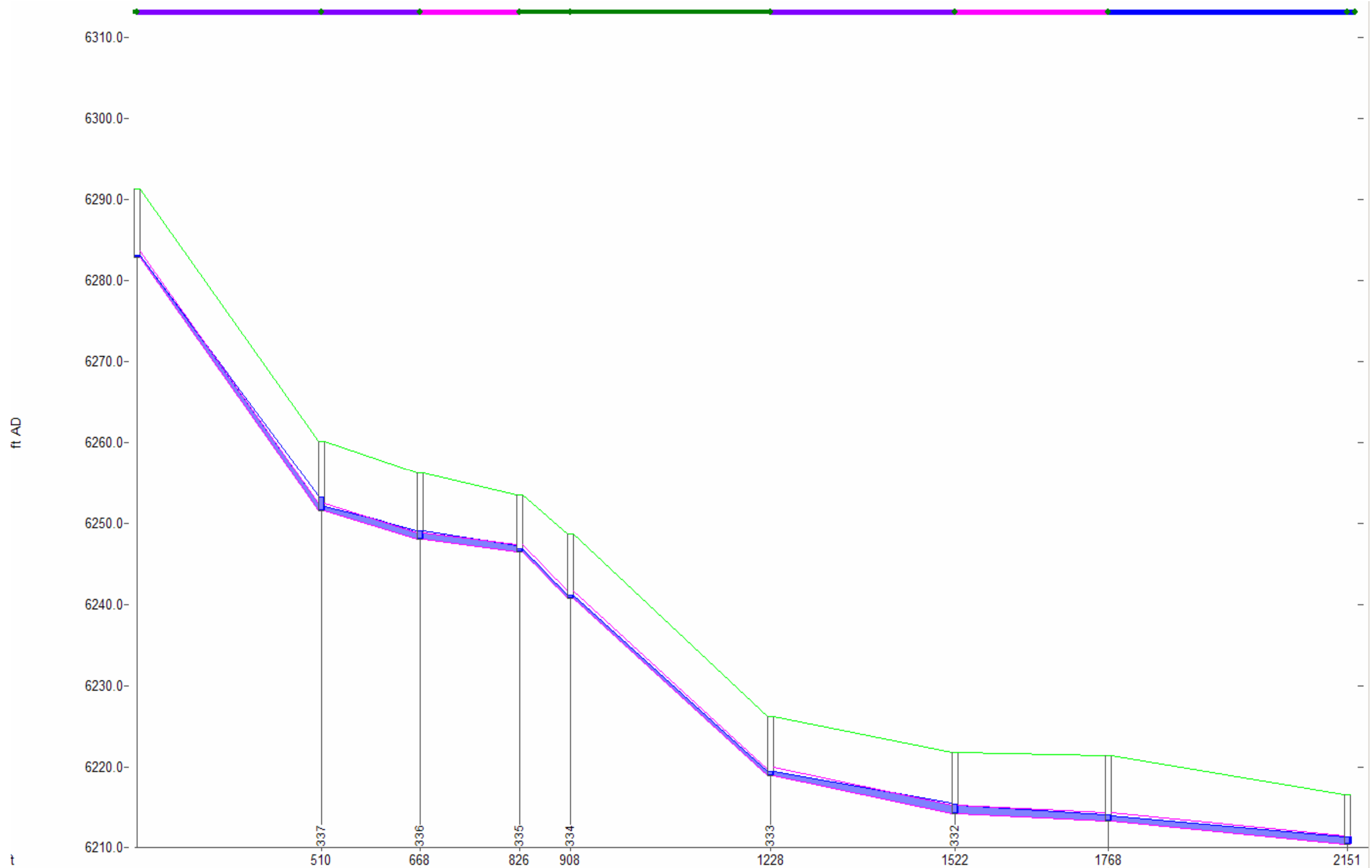
Manhole number	Capacity (mgd)	25 year-6 hour Storm Maximum Flow (mgd)	25 year-24 hour Storm Maximum Flow (mgd)
366 to 341	0.91 to 3.92	0.26 to 0.41	0.52 to 0.80
370 to 341	2.55 to 4.65	0.47 to 0.58	0.92 to 1.08
341 to siphon line	1.46 to 9.10	0.88 to 1.46	1.55 to 2.76
58 to siphon line	0.53 to 1.74	0.06 to 0.46	0.08 to 0.75

Table 4-4
Manhole Capacity and Maximum Wastewater Flow at Design Storm Conditions - Highlands Development and Sawmill Heights Employee Housing - Full Project Buildout

Manhole number	Capacity (mgd)	25 year-6 hour Storm Maximum Flow (mgd)	25 year-24 hour Storm Maximum Flow (mgd)
366 to 341	0.91 to 3.92	0.61 to 0.76	0.82 to 1.47
370 to 341	2.55 to 4.65	0.75 to 0.86	1.16 to 1.46
341 to siphon line	1.46 to 9.10	1.26 to 2.10	1.88 to 3.12
58 to siphon line	0.53 to 1.74	0.16 to 0.55	0.17 to 0.82

For development of Phase 1 only at 25 year-6 hour storm conditions, all pipes are predicted to have sufficient capacity. At 25 year-24 hour storm conditions, several pipeline segments experience full pipe conditions and slight surcharging (less than one foot) occurs along pipelines from 113 to the siphon line. In addition, this restriction in flow causes slight surcharging in the pipelines from manholes 125 to 113. However, significant manhole surcharging is not predicted to occur.

For full buildout of the Highlands Development, several areas of the sewer system experience surcharging beyond full pipe conditions. At 25 year-6 hour storm conditions, pipelines between manholes 338 and 248 show full pipe conditions (Figure 4-5) and, at 25 year-24 hour storm conditions, these pipelines show significant surcharging beyond full pipe conditions (Figure 4-6). Surcharging causes the hydraulic gradeline to increase to between three and four and a half feet above the manhole inverts in some manholes. This level is predicted to be within three and a half feet of the ground level for at least one manhole and within four feet of ground level for several other manholes. In addition, surcharging also occurs in pipelines between manholes 113 and the siphon line. The restriction in flow along these pipelines also causes some manhole surcharging in the pipelines from manholes 125 to 113 and from 25 to 113. The profile of the pipelines between 125 and 107 is shown in Figure 4-7. The greatest height of surcharging upstream of manhole 113 is predicted to be within six feet of the ground level.



Link	338.1	337.1	336.1	335.1	334.1	333.1	332.1	331.1
pfc (MGD)	4.989	2.317	1.477	4.053	4.011	3.150	1.462	2.158
max_ds_flow (MGD)	1.62372	1.62383	1.62379	1.62380	1.62385	1.65656	1.65662	1.65654

Node: 38, 337, 336, 335, 334, 333, 332, 331, 248

Figure 4-5
Northstar Capacity Analysis - Profile of Pipelines from Manhole 338 and 248
25 Year-6 Hour Storm with Full Buildout of Highlands Development

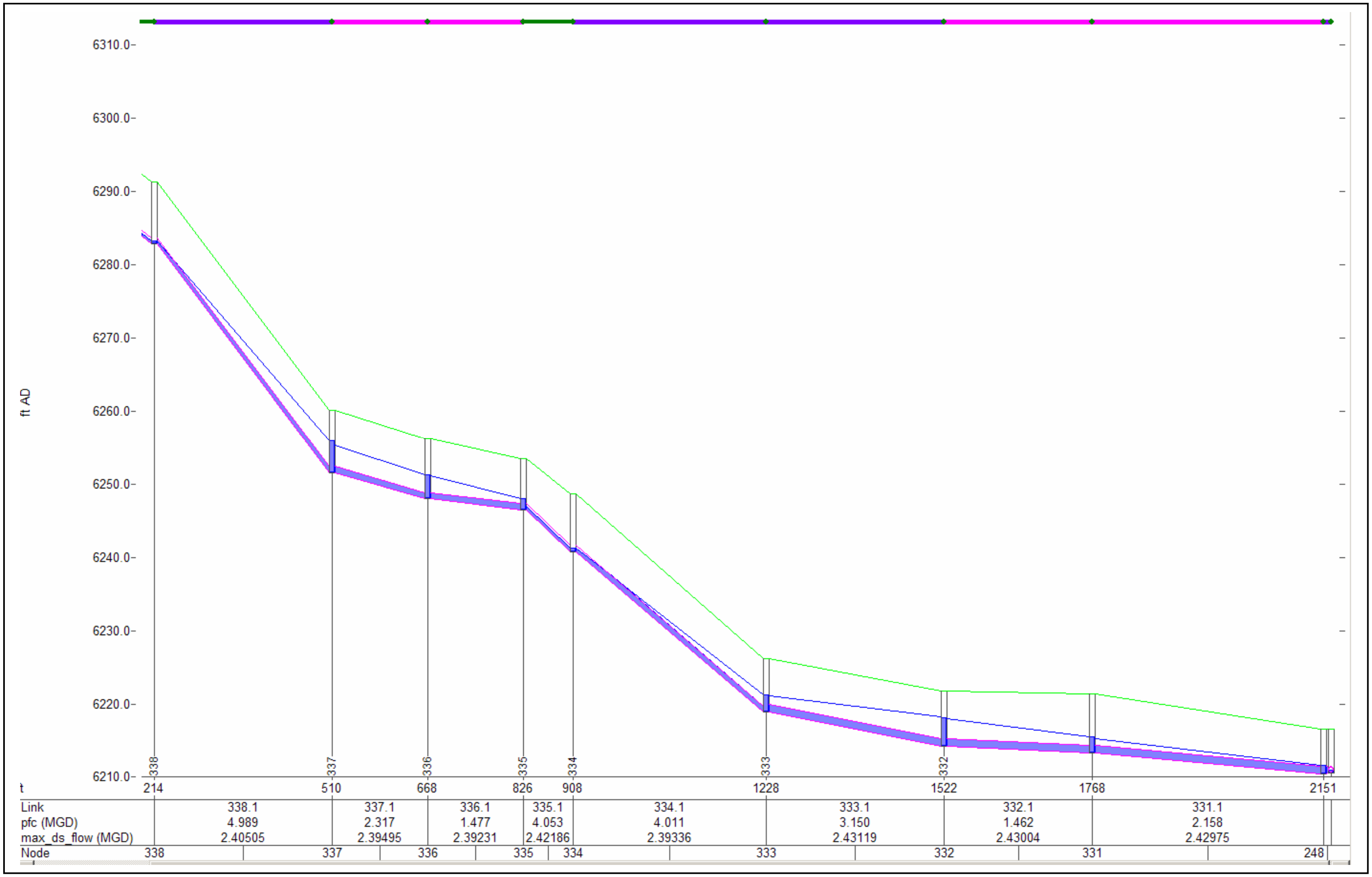


Figure 4-6
Northstar Capacity Analysis - Profile of Pipelines from Manhole 338 and 248
25 Year-24 Hour Storm with Full Buildout of Highlands Development

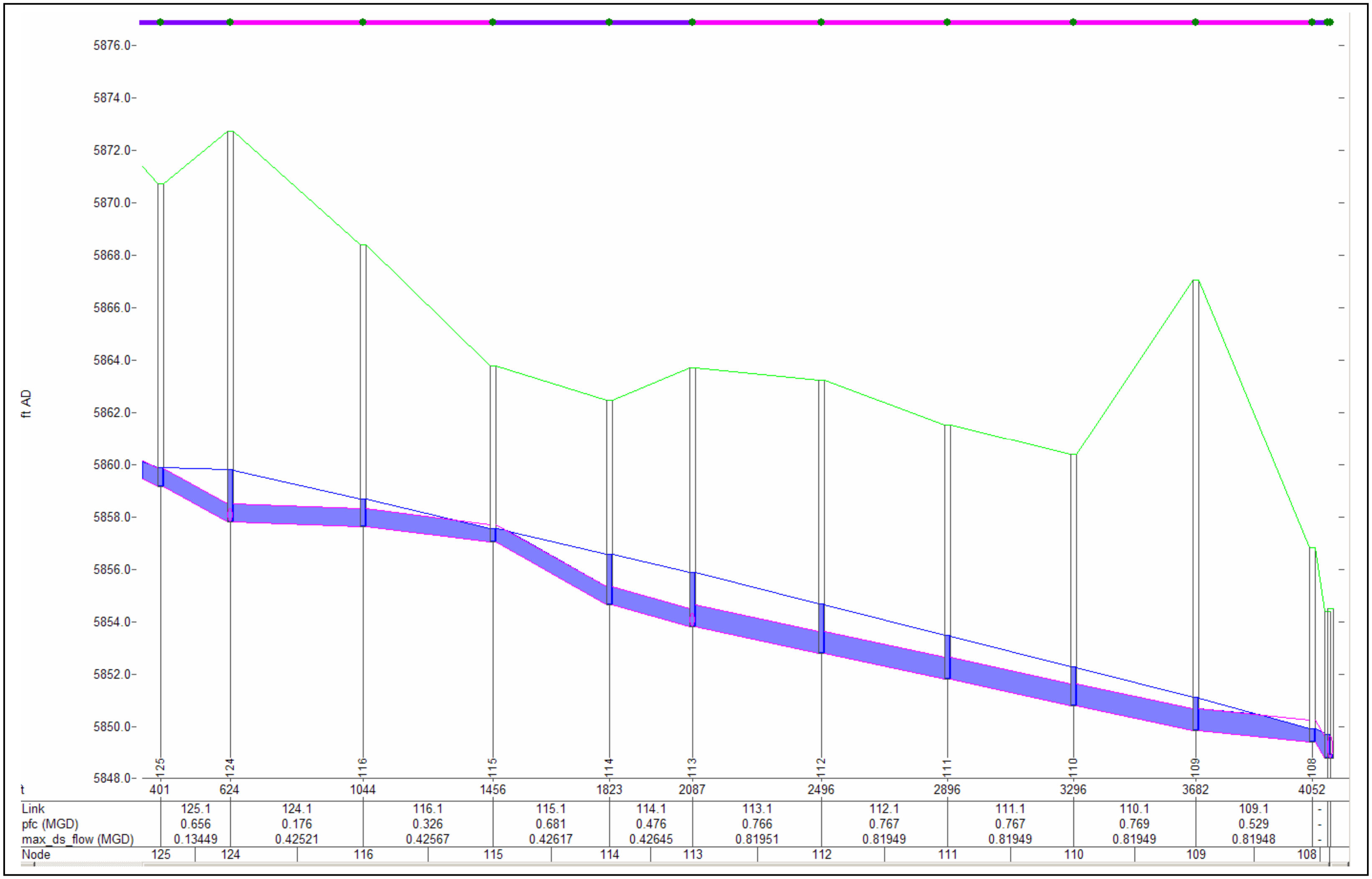


Figure 4-7
Northstar Capacity Analysis - Profile of Pipelines from Manhole 125 and 107
25 Year-24 Hour Storm with Full Buildout of Highlands Development

Section 5

Conclusions and Recommendations

This section summarizes the results of the hydraulic analysis of the Northstar Community sewer system using the *InfoWorks* hydraulic model and provides recommendations based on potential objectives of the Northstar CSD. Capacity analysis was focused on the sewer lines affected by Phase 1 and buildout of the Highlands Development and Sawmill Heights employee housing. However, since the entire system was modeled, an initial assessment of other areas of the community was also performed.

SUMMARY

The sewer system capacity analysis was performed at peak flow conditions caused by a 25 year-6 hour design storm. Design storms of 10 year-6 hour and 25 year-24 hour were also simulated to characterize system response at other design storm conditions. Peak flow conditions caused by design storms were coincided with peak wastewater flowrates. Occupancy was assumed to be at 100%; infiltration due to snowmelt was assumed to be high; and the peak rainfall dependent infiltration and inflow (RDII) occurring from the design storm was coincided with the peak diurnal sanitary flow. These parameters simulate an extreme storm occurring on a weekend/holiday period during winter or spring months when temperatures are above freezing and, thus, snowmelt is occurring. Thus, the modeling effort produced a conservative estimate of wastewater flow and potential surcharging should be judged accordingly.

Modeling simulations indicate that the sewerlines affected by the Highlands and Sawmill Heights Developments have sufficient capacity to handle the current wastewater flow without surcharging during a 10 year-6 hour, 25 year-6 hour, and 25 year-24 hour design storm.

After construction of Phase 1 of the Highlands Development, modeling simulations indicate that the sewerlines affected by the development have sufficient capacity to handle the wastewater flow without surcharging during a 10 year-6 hour and a 25 year-6 hour design storm. At a 25 year-24 hour design storm, model simulations predict full pipe conditions occurring along several sections of pipeline and slight manhole surcharging from manholes 113 to 107. However, significant manhole surcharging is not predicted to occur.

After full buildout of the Highlands Development, modeling simulations indicate that several sewerlines affected by the development experience full pipe conditions at the 25 year-6 hour design storm flows and significant manhole surcharging exists at the 25 year-24 hour design storm conditions. Although this surcharging does not cause sewer overflows, several manholes are predicted to have surcharging between three and four and a half feet above the manhole inverts. This surcharging is predicted to raise the hydraulic gradeline of the wastewater to between three and a half and four feet of the ground surface.

In addition to the sewerlines affected by the Highlands Development, full pipe conditions are predicted to occur at existing conditions during a 25 year-6 hour design storm and significant surcharging with manhole overflows are predicted to occur during a 25 year-24 hour design storm within pipelines along Martis Landing (as shown in Figures 4-4 and 4-5).

CONCLUSIONS AND RECOMMENDATIONS

The Northstar sewer system has sufficient capacity to handle a 10 year-6 hour design storm at full buildout of the Highlands Development and Sawmill Heights employee housing. However, if the objective of the Northstar CSD is to provide protection from full pipe conditions and/or sewer overflows at full buildout of the Highlands Development during a larger design storm, the capacity of some sewerlines downstream of the Highlands Development will need to be increased. A description of the recommended solution based on possible objectives is provided in Table 5-1. Potentially critical conditions are highlighted in bold.

Table 5-1
Northstar Sewer Analysis Recommendations Based on Potential Objectives

Objective	Modeling Prediction [a]	Recommendation
At a **25 Year-6 Hou**r Design Storm AND **full buildout** of the Highlands Development		
To provide protection from:		
- Full Pipe Conditions	**Insufficient capacity**	**Pipe upsizing or parallel pipes** [b]
- Manhole Surcharging	Sufficient capacity exists to prevent condition	No change
- Sewer Overflows	Sufficient capacity exists to prevent condition	No change
At a **25 Year-6 Hour** Design Storm AND buildout of **Phase One Only** of the Highlands Development		
To provide protection from:		
- Full Pipe Conditions	Sufficient capacity exists to prevent condition	No change
- Manhole Surcharging	Sufficient capacity exists to prevent condition	No change
- Sewer Overflows	Sufficient capacity exists to prevent condition	No change
At a **25 Year-24 Hour Design Storm** AND **full buildout** of the Highlands Development		
To provide protection from:		
- Full Pipe Conditions	**Insufficient capacity**	**Pipe upsizing or parallel pipes** [c]
- Manhole Surcharging	**Insufficient capacity**	**Pipe upsizing or parallel pipes** [c]
- Sewer Overflows	Sufficient capacity exists to prevent condition	No change
At a **25 Year-24 Hour** Design Storm AND buildout of **Phase One Only** of the Highlands Development		
To provide protection from:		
- Full Pipe Conditions	**Insufficient capacity**	**Pipe upsizing or parallel pipes** [d]
- Manhole Surcharging	**Insufficient capacity**	**Pipe upsizing or parallel pipes** [e]
- Sewer Overflows	Sufficient capacity exists to prevent condition	No change

[a] Modeling predictions only refer to sections of pipelines affected by the Highlands Development.
[b] Manholes 338 to 248 as shown in Figure 4-5.
[c] Manholes 338 to 248 as shown in Figure 4-6; Manholes 25 to 107 and Manholes 125 to 107 as shown in Figure 4-7.
[d] Manholes 338 to 248.
[e] Very slight surcharging; Manholes 113 to 107 and 125 to 113.

RECOMMENDATIONS

To provide sufficient capacity in the Northstar sewer system during design storm conditions, the following steps are recommended:

1. Determine minimum design service protection objective. A design service objective of protection from a 25 year-6 hour storm is recommended. However, a design service objective of protection from a 25 year-24 hour storm would be more conservative and assure protection of the sewer system at a more extreme event.

2. Determine acceptable surcharge conditions. Sewers can generally accommodate some degree of surcharging during peak flow conditions for short periods of time without severe consequences. However, acceptable levels of surcharging vary by community. It is recommended that full pipe conditions be considered acceptable surcharge conditions, with manhole surcharging being unacceptable.

3. With the above recommendation of full pipe conditions being an acceptable degree of surcharging during peak flow conditions, the only design storm condition that causes unacceptable levels of surcharging in the pipelines affected by the Highlands Development is the 25 year-24 hour design storm at full buildout of the Highlands Development. If a conservative level of protection is desired for the Northstar sewers, an increase in capacity will be needed for the sections of pipelines where severe surcharging exists. Two sections of pipeline were identified as potential concerns, pipelines from manholes 337 to 247 and pipelines from 113 to 107. A preliminary planning level construction cost estimate for parallel pipelines from manhole 337 to 335 and from manhole 333 to 247 is approximately $315,000 based on 1,250 feet of 12 inch diameter pipe at $143 per foot. This estimate includes the cost of installing new manholes, lateral connections, asphalt replacement, and traffic control, where needed. Total project cost, including engineering, planning, and administration at 30%, is estimated at $410,000. A preliminary planning level construction cost estimate for parallel pipelines from manhole 113 to 107 is approximately $412,000 based on 2,025 feet of 12 inch diameter pipe at $143 per foot. This estimate also includes the cost of installing new manholes. Lateral connections, asphalt replacement, and traffic control are not needed in this area. Total project cost, including engineering, planning, and administration at 30%, is estimated at $535,000. Total project cost for both areas is estimated at $945,000. A detailed cost estimate of each area is provided in Appendix B.

4. Regardless of the above recommendations on the sections of pipeline affected by the Highlands Development, the sewerlines along Martis Landing from manholes 191 to 177 are predicted to experience severe manhole surcharging at the 25 year-6 hour design storm and sewer overflows at 25 year-24 hour design storm conditions. It is recommended that the inverts of the manholes from 188 to 177 be field verified. If field surveys indicate that manhole inverts are correct, increasing the capacity by pipe upsizing or parallel pipes is recommended for this section of pipeline. A preliminary planning

level construction cost estimate for parallel pipelines from manhole 186 to 177 is approximately $218,000 based on 1,065 feet of 10 inch diameter pipe at $143 per foot. This estimate also includes the cost of installing new manholes and lateral connections. Asphalt replacement and traffic control are not needed in this area. Total project cost, including engineering, planning, and administration at 30%, is estimated at $285,000. A detailed cost estimate is provided in Appendix B.

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
1	384	6	1.78	0.000	0.000	0.000
10	12	8	1.88	0.000	0.000	0.000
100	101	6	0.39	0.000	0.000	0.000
101	102	6	0.39	0.064	0.069	0.122
102	130	6	0.69	0.064	0.069	0.122
103	104	6	0.56	0.000	0.000	0.000
104	119	6	0.58	0.000	0.000	0.000
105	106	6	0.10	0.000	0.000	0.000
106	128	6	1.15	0.000	0.000	0.000
107	XXXX00030	8	0.86	0.368	0.396	0.674
108	107	10	1.74	0.368	0.396	0.674
109	108	10	0.53	0.368	0.396	0.674
11	5	8	2.12	0.000	0.000	0.000
110	109	10	0.77	0.368	0.396	0.674
111	110	10	0.77	0.368	0.396	0.675
112	111	10	0.77	0.368	0.396	0.675
113	112	10	0.77	0.368	0.396	0.676
114	113	8	0.48	0.230	0.248	0.425
115	114	8	0.68	0.230	0.248	0.425
116	115	8	0.33	0.230	0.248	0.425
117	120	6	1.21	0.000	0.000	0.000
118	129	6	1.00	0.000	0.000	0.000
119	122	6	0.79	0.000	0.000	0.000
12	11	8	1.49	0.000	0.000	0.000
120	121	6	0.59	0.064	0.069	0.122
121	123	6	1.10	0.064	0.069	0.122
122	123	6	0.28	0.000	0.000	0.000
123	124	6	1.02	0.064	0.069	0.122
124	116	8	0.18	0.230	0.248	0.425
125	124	8	0.66	0.072	0.078	0.134
127	125	8	0.61	0.072	0.078	0.134
128	127	8	0.41	0.072	0.078	0.134
129	130	6	1.15	0.000	0.000	0.000
13	12	8	1.83	0.000	0.000	0.000
130	120	6	0.84	0.064	0.069	0.122
131	118	6	1.07	0.000	0.000	0.000
132	148	6	0.68	0.000	0.000	0.000
133	147	6	0.74	0.000	0.000	0.000
134	152	6	0.77	0.000	0.000	0.000
135	151	6	0.42	0.000	0.000	0.000
136	135	6	1.13	0.000	0.000	0.000
137	153	6	0.82	0.000	0.000	0.000
138	139	6	0.90	0.000	0.000	0.000
139	154	6	0.91	0.000	0.000	0.000
14	13	8	2.80	0.000	0.000	0.000

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
140	141	6	0.72	0.000	0.000	0.000
141	142	6	0.90	0.000	0.000	0.000
142	153	6	1.13	0.000	0.000	0.000
143	128	8	0.76	0.072	0.078	0.134
144	143	6	0.37	0.000	0.000	0.000
145	144	6	1.40	0.000	0.000	0.000
146	144	6	0.32	0.000	0.000	0.000
147	149	6	0.57	0.000	0.000	0.000
148	149	6	0.95	0.000	0.000	0.000
149	151	6	0.37	0.000	0.000	0.000
15	14	8	2.33	0.000	0.000	0.000
150	146	6	0.31	0.000	0.000	0.000
151	152	6	2.02	0.000	0.000	0.000
152	150	6	0.28	0.000	0.000	0.000
153	148	6	1.17	0.000	0.000	0.000
154	142	6	1.47	0.000	0.000	0.000
156	XXXX00035x	6	0.96	0.302	0.323	0.467
157	156	6	0.61	0.303	0.323	0.480
158	157	6	1.06	0.255	0.271	0.376
159	158	6	1.29	0.255	0.271	0.376
16	17	6	1.50	0.008	0.009	0.018
160	157	6	2.28	-0.004	0.000	0.015
161	160	6	1.43	0.000	0.000	0.000
162	165	6	0.74	0.000	0.000	0.000
163	162	6	1.36	0.000	0.000	0.000
164	166	6	0.31	0.000	0.000	0.000
165	170	6	1.31	0.000	0.000	0.000
166	167	6	1.12	0.000	0.000	0.000
167	168	6	1.05	0.000	0.000	0.000
168	169	6	1.15	0.000	0.000	0.000
169	170	6	1.21	0.000	0.000	0.000
17	379	6	0.82	0.008	0.009	0.018
170	171	6	1.59	0.000	0.000	0.000
171	172	6	2.22	0.000	0.000	0.000
172	173	6	1.17	0.000	0.000	0.000
173	161	6	1.27	0.000	0.000	0.000
174	173	6	0.71	0.000	0.000	0.000
175	174	6	0.84	0.000	0.000	0.000
176	175	6	0.87	0.000	0.000	0.000
177	159	6	1.06	0.255	0.271	0.376
178	177	6	0.11	0.255	0.271	0.376
179	181	6	0.85	0.000	0.000	0.000
180	176	6	0.67	0.000	0.000	0.000
181	183	6	0.64	0.000	0.000	0.000
182	178	6	0.13	0.255	0.271	0.376

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
183	184	6	2.43	0.000	0.000	0.002
184	182	6	0.27	0.256	0.271	0.376
185	187	6	0.97	0.000	0.000	0.000
186	184	6	0.14	0.249	0.264	0.376
187	188	6	1.54	0.185	0.196	0.299
188	186	6	0.70	0.249	0.264	0.377
189	188	6	0.16	0.000	0.000	0.043
19	23	6	1.06	0.000	0.000	0.000
190	187	6	0.96	0.185	0.196	0.299
191	189	6	0.45	0.000	0.000	0.016
192	191	6	1.29	0.000	0.000	0.001
193	190	6	1.11	0.185	0.196	0.299
194	192	6	0.87	0.000	0.000	0.000
195	193	6	0.73	0.185	0.196	0.299
196	194	6	0.47	0.000	0.000	0.000
197	195	6	0.09	0.185	0.196	0.299
198	197	6	0.80	0.185	0.196	0.299
199	198	6	1.18	0.185	0.196	0.299
2	3	6	0.63	0.000	0.000	0.000
20	19	6	0.67	0.000	0.000	0.000
200	199	6	0.79	0.159	0.168	0.260
201	199	6	0.73	0.027	0.028	0.039
202	201	6	0.61	0.027	0.028	0.039
203	202	6	-0.35	0.027	0.028	0.039
204	203	6	1.73	0.027	0.028	0.039
205	204	6	1.10	0.027	0.028	0.039
206	205	6	1.19	0.000	0.000	0.000
21	22	6	-0.24	0.000	0.000	0.000
215	216	6	0.77	0.081	0.084	0.115
216	218	6	1.29	0.081	0.084	0.115
217	200	6	0.69	0.081	0.084	0.115
218	217	6	1.12	0.081	0.084	0.115
219	218	6	0.97	0.000	0.000	0.000
22	25	6	1.98	0.000	0.000	0.000
220	219	6	0.94	0.000	0.000	0.000
221	222	8	3.00	0.000	0.000	0.000
222	223	8	3.50	0.000	0.000	0.000
223	224	8	1.52	0.000	0.000	0.000
224	225	8	1.23	0.000	0.000	0.000
225	256	8	0.80	0.000	0.000	0.000
226	225	6	1.87	0.000	0.000	0.000
227	221	6	1.22	0.000	0.000	0.000
228	221	6	0.55	0.000	0.000	0.000
229	230	6	1.02	0.000	0.000	0.000
23	24	6	1.10	0.000	0.000	0.000

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
230	232	6	1.10	0.000	0.000	0.000
231	200	6	1.08	0.000	0.000	0.000
232	231	6	1.05	0.000	0.000	0.000
233	232	6	1.16	0.000	0.000	0.000
234	XXXX00010	12	5.23	0.712	0.754	1.164
235	238	6	0.59	0.000	0.000	0.000
236	234	12	6.16	0.705	0.747	1.153
237	236	12	4.79	0.705	0.747	1.152
238	239	6	0.17	0.000	0.000	0.000
239	240	6	0.93	0.000	0.000	0.000
24	26	6	-0.19	0.000	0.000	0.000
240	237	12	8.03	0.705	0.747	1.153
241	240	12	5.51	0.656	0.694	1.060
242	241	12	7.48	0.554	0.588	0.929
243	242	12	7.52	0.554	0.588	0.929
244	250	8	1.42	0.082	0.084	0.102
245	244	8	4.15	0.005	0.006	0.010
246	245	8	1.66	0.005	0.006	0.010
247	243	12	9.10	0.554	0.588	0.929
248	247	12	-1.29	0.293	0.311	0.479
249	247	10	6.01	0.257	0.274	0.445
25	113	6	0.76	0.138	0.148	0.251
250	249	10	7.53	0.257	0.274	0.445
251	250	10	7.45	0.176	0.190	0.348
252	251	10	5.86	0.169	0.183	0.339
253	246	6	1.20	0.005	0.006	0.010
254	252	10	6.98	0.169	0.183	0.339
255	245	8	3.03	0.000	0.000	0.000
256	255	8	-0.60	0.000	0.000	0.000
257	254	10	1.74	0.169	0.183	0.339
258	253	6	0.79	0.005	0.006	0.010
259	233	6	1.09	0.000	0.000	0.000
26	21	6	0.64	0.000	0.000	0.000
260	259	6	0.77	0.000	0.000	0.000
261	257	10	1.71	0.169	0.183	0.339
262	261	8	0.98	0.169	0.183	0.339
263	262	8	1.32	0.169	0.183	0.339
264	263	8	2.26	0.169	0.183	0.339
265	266	6	0.49	0.000	0.000	0.000
266	270	6	0.67	0.000	0.000	0.000
267	264	8	1.86	0.169	0.183	0.339
268	267	8	2.39	0.169	0.183	0.339
269	268	6	1.38	0.000	0.000	0.000
27	28	6	0.83	0.050	0.053	0.091
270	269	6	2.28	0.000	0.000	0.000

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
271	268	8	0.88	0.126	0.136	0.258
272	270	6	-0.15	0.000	0.000	0.000
273	271	8	0.61	0.126	0.136	0.258
274	272	6	0.78	0.000	0.000	0.000
275	273	8	0.88	0.126	0.136	0.258
276	275	8	-0.50	0.000	0.000	0.000
277	265	6	0.22	0.000	0.000	0.000
278	277	6	-0.18	0.000	0.000	0.000
279	280	6	0.77	0.000	0.000	0.000
28	29	6	0.97	0.050	0.053	0.091
280	316	6	0.39	0.000	0.000	0.000
281	315	6	1.27	0.000	0.000	0.000
282	283	6	0.66	0.000	0.000	0.000
283	284	6	1.11	0.000	0.000	0.000
284	274	6	0.87	0.000	0.000	0.000
285	287	6	1.19	0.000	0.000	0.000
286	276	8	2.81	0.000	0.000	0.000
287	286	8	1.66	0.000	0.000	0.000
288	289	6	1.21	0.000	0.000	0.000
289	287	8	3.44	0.000	0.000	0.000
29	31	6	0.88	0.050	0.053	0.091
290	289	8	3.40	0.000	0.000	0.000
291	290	8	1.81	0.000	0.000	0.000
292	289	6	0.43	0.000	0.000	0.000
293	291	6	0.73	0.000	0.000	0.000
294	292	6	-0.22	0.000	0.000	0.000
295	294	6	0.33	0.000	0.000	0.000
296	305	6	0.65	0.000	0.000	0.000
297	295	6	0.36	0.000	0.000	0.000
298	301	8	3.61	0.000	0.000	0.000
299	301	6	0.39	0.000	0.000	0.000
3	4	6	1.78	0.000	0.000	0.000
30	25	6	0.61	0.050	0.053	0.091
300	298	6	0.67	0.000	0.000	0.000
301	302	6	0.10	0.000	0.000	0.000
302	306	6	0.16	0.000	0.000	0.000
303	298	6	0.79	0.000	0.000	0.000
304	311	8	3.58	0.000	0.000	0.000
305	297	6	1.52	0.000	0.000	0.000
306	312	6	0.16	0.000	0.000	0.000
307	291	8	2.71	0.000	0.000	0.000
308	307	8	2.07	0.000	0.000	0.000
309	308	8	3.43	0.000	0.000	0.000
31	30	6	0.77	0.050	0.053	0.091
310	311	6	1.12	0.000	0.000	0.000

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
311	309	8	2.07	0.000	0.000	0.000
312	311	6	0.41	0.000	0.000	0.000
313	304	6	1.00	0.000	0.000	0.000
314	304	6	0.78	0.000	0.000	0.000
315	317	6	0.71	0.000	0.000	0.000
316	318	6	1.05	0.000	0.000	0.000
317	322	6	0.27	0.000	0.000	0.000
318	319	6	0.67	0.000	0.000	0.000
319	320	6	-0.52	0.000	0.000	0.000
32	33	6	0.53	0.000	0.000	0.000
320	357	6	0.43	0.000	0.000	0.000
321	356	6	0.63	0.000	0.000	0.000
322	319	6	1.82	0.000	0.000	0.000
323	322	6	1.11	0.000	0.000	0.000
324	323	6	0.84	0.000	0.000	0.000
325	324	6	0.91	0.000	0.000	0.000
326	355	6	0.64	0.000	0.000	0.000
327	323	6	1.13	0.000	0.000	0.000
328	327	6	0.83	0.000	0.000	0.000
329	328	6	0.97	0.000	0.000	0.000
33	31	6	1.98	0.000	0.000	0.000
330	326	6	1.65	0.000	0.000	0.000
331	248	12	2.16	0.293	0.311	0.479
332	331	12	1.46	0.293	0.311	0.479
333	332	12	3.15	0.293	0.311	0.479
334	333	10	4.01	0.262	0.278	0.437
335	334	10	4.05	0.262	0.278	0.438
336	335	10	1.48	0.262	0.278	0.438
337	336	10	2.32	0.262	0.278	0.438
338	337	10	4.99	0.262	0.278	0.438
339	340	8	1.36	0.141	0.152	0.266
34	33	6	0.83	0.000	0.000	0.000
340	341	10	2.52	0.141	0.152	0.266
341	338	10	3.66	0.262	0.278	0.438
342	343	10	4.56	0.122	0.127	0.173
343	344	10	4.16	0.122	0.127	0.173
344	341	10	3.43	0.122	0.127	0.173
345	344	6	0.86	0.000	0.000	0.000
346	347	6	0.52	0.023	0.024	0.034
347	348	6	0.74	0.023	0.024	0.034
348	339	8	1.75	0.141	0.153	0.266
349	348	8	1.93	0.119	0.129	0.233
35	34	6	0.23	0.000	0.000	0.000
350	349	8	2.05	0.119	0.129	0.233
351	350	8	0.91	0.119	0.129	0.233

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
352	351	8	1.50	0.119	0.129	0.233
353	361	6	0.28	0.000	0.000	0.000
354	363	6	0.14	0.000	0.000	0.000
355	362	6	0.68	0.000	0.000	0.000
356	353	6	0.58	0.000	0.000	0.000
357	360	6	0.54	0.000	0.000	0.000
358	352	8	3.31	0.119	0.129	0.233
359	358	8	1.92	0.119	0.129	0.233
36	27	6	0.62	0.050	0.053	0.091
360	359	8	2.53	0.000	0.000	0.000
361	360	8	3.00	0.000	0.000	0.000
362	364	6	0.28	0.000	0.000	0.000
363	365	6	0.59	0.000	0.000	0.000
364	361	8	3.92	0.000	0.000	0.000
365	364	6	2.02	0.000	0.000	0.000
366	364	8	2.34	0.000	0.000	0.000
367	342	10	4.45	0.117	0.122	0.166
368	367	10	4.65	0.011	0.012	0.022
369	368	8	2.55	0.011	0.012	0.022
37	36	6	1.00	0.050	0.053	0.091
370	369	8	2.59	0.011	0.012	0.022
371	370	8	2.75	0.011	0.012	0.022
372	371	8	2.79	0.011	0.012	0.022
373	372	8	2.52	0.011	0.012	0.022
374	373	8	3.03	0.011	0.012	0.022
375	374	8	2.88	0.011	0.012	0.022
376	375	8	2.58	0.011	0.012	0.022
377	376	8	2.99	0.011	0.012	0.022
378	377	8	3.09	0.011	0.012	0.022
379	378	8	2.52	0.011	0.012	0.022
38	37	6	0.60	0.050	0.053	0.091
380	379	8	3.27	0.003	0.003	0.005
381	380	8	3.27	0.003	0.003	0.005
382	383	6	0.47	0.000	0.000	0.000
383	304	6	1.72	0.000	0.000	0.000
384	383	6	1.12	0.000	0.000	0.000
385	386	6	0.92	0.000	0.000	0.000
386	387	6	0.37	0.000	0.000	0.000
387	384	6	0.70	0.000	0.000	0.000
388	1	6	0.78	0.000	0.000	0.000
389	382	6	1.49	0.000	0.000	0.000
39	35	6	0.98	0.000	0.000	0.000
4	367	6	1.35	0.000	0.000	0.000
40	42	6	0.75	0.000	0.000	0.000
41	39	6	0.70	0.000	0.000	0.000

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
42	41	6	0.79	0.000	0.000	0.000
43	40	6	0.66	0.000	0.000	0.000
44	38	6	0.75	0.050	0.053	0.091
45	43	6	0.87	0.000	0.000	0.000
46	44	6	0.92	0.050	0.053	0.091
47	46	6	0.57	0.050	0.053	0.091
48	47	6	0.93	0.050	0.054	0.091
49	45	6	1.01	0.000	0.000	0.000
5	6	8	1.97	0.000	0.000	0.000
50	49	6	0.67	0.000	0.000	0.000
51	234	6	0.16	0.000	0.000	0.000
52	51	6	1.37	0.000	0.000	0.000
53	54	6	0.97	0.000	0.000	0.000
54	55	6	1.01	0.000	0.000	0.000
55	56	6	0.99	0.000	0.000	0.000
56	67	6	1.09	0.000	0.000	0.000
57	65	6	1.20	0.000	0.000	0.000
58	59	6	1.09	0.000	0.000	0.000
59	57	6	0.57	0.000	0.000	0.000
6	241	8	1.51	0.000	0.000	0.000
61	62	6	1.01	0.000	0.000	0.000
62	63	6	0.37	0.000	0.000	0.000
63	64	6	1.12	0.000	0.000	0.000
64	66	6	1.03	0.000	0.000	0.000
65	66	6	1.10	0.000	0.000	0.000
66	48	6	0.72	0.000	0.000	0.000
67	66	6	0.52	0.000	0.000	0.000
68	74	6	0.90	0.000	0.000	0.000
69	70	6	0.99	0.000	0.000	0.000
7	6	8	1.58	0.000	0.000	0.000
70	71	6	1.09	0.000	0.000	0.000
71	72	6	0.94	0.000	0.000	0.000
72	79	6	0.96	0.000	0.000	0.000
73	76	6	0.80	0.000	0.000	0.000
74	75	6	0.83	0.000	0.000	0.000
75	73	6	1.04	0.000	0.000	0.000
76	77	6	1.25	0.000	0.000	0.000
77	80	6	0.33	0.000	0.000	0.000
78	98	6	1.37	0.000	0.000	0.000
79	80	6	1.19	0.000	0.000	0.000
8	10	8	1.62	0.000	0.000	0.000
80	83	6	0.22	0.000	0.000	0.000
81	83	6	1.19	0.000	0.000	0.000
82	98	6	1.03	0.000	0.000	0.000
83	82	6	0.93	0.000	0.000	0.000

APPENDIX A-1
Existing Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
84	238	6	-0.77	0.000	0.000	0.000
85	87	6	1.94	0.000	0.000	0.000
86	87	6	0.81	0.000	0.000	0.000
87	84	6	0.75	0.000	0.000	0.000
88	86	6	1.12	0.000	0.000	0.000
89	85	6	0.80	0.000	0.000	0.000
9	10	8	2.68	0.000	0.000	0.000
90	89	6	0.71	0.000	0.000	0.000
91	96	6	0.67	0.000	0.000	0.000
92	95	6	0.48	0.000	0.000	0.000
93	92	6	1.06	0.000	0.000	0.000
94	93	6	0.29	0.000	0.000	0.000
95	96	6	0.72	0.000	0.000	0.000
96	235	6	0.76	0.000	0.000	0.000
97	100	6	0.99	0.000	0.000	0.000
98	99	6	0.97	0.064	0.069	0.122
99	101	6	1.11	0.064	0.069	0.122
XXXX00010	XXXX00058	12	7.85	0.427	0.452	0.699
XXXX00010	XXXX00056	12	5.22	0.285	0.301	0.466
XXXX00030	Added_2	10	15.24	0.163	0.175	0.304
XXXX00030	Added_1	10	20.43	0.205	0.221	0.370
XXXX00035x	Added_1	8	1.57	0.588	0.623	0.923
XXXX00056	XXXX00035x	8	1.58	0.284	0.301	0.466
XXXX00058	Added_2	12	4.63	0.426	0.452	0.699

[a] Note: Some pipelines appear to have no flow during design storm conditions. This occurred during model simulation because flow from the subcatchment was applied to the furthest downstream manhole. Flow may actually occur through these pipelines.

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
1	384	6	1.78	0.000	0.000	0.000
10	12	8	1.88	0.000	0.000	0.000
100	101	6	0.39	0.000	0.000	0.000
101	102	6	0.39	0.064	0.069	0.122
102	130	6	0.69	0.064	0.069	0.122
103	104	6	0.56	0.000	0.000	0.000
104	119	6	0.58	0.000	0.000	0.000
105	106	6	0.10	0.000	0.000	0.000
106	128	6	1.15	0.000	0.000	0.000
107	XXXX00030	8	0.86	0.430	0.460	0.747
108	107	10	1.74	0.430	0.460	0.747
109	108	10	0.53	0.430	0.460	0.747
11	5	8	2.12	0.000	0.000	0.000
110	109	10	0.77	0.431	0.460	0.747
111	110	10	0.77	0.431	0.460	0.747
112	111	10	0.77	0.431	0.460	0.747
113	112	10	0.77	0.431	0.460	0.747
114	113	8	0.48	0.231	0.248	0.426
115	114	8	0.68	0.231	0.248	0.425
116	115	8	0.33	0.231	0.248	0.425
117	120	6	1.21	0.000	0.000	0.000
118	129	6	1.00	0.000	0.000	0.000
119	122	6	0.79	0.000	0.000	0.000
12	11	8	1.49	0.000	0.000	0.000
120	121	6	0.59	0.064	0.069	0.122
121	123	6	1.10	0.064	0.069	0.122
122	123	6	0.28	0.000	0.000	0.000
123	124	6	1.02	0.064	0.069	0.122
124	116	8	0.18	0.231	0.248	0.425
125	124	8	0.66	0.072	0.078	0.134
127	125	8	0.61	0.072	0.078	0.134
128	127	8	0.41	0.072	0.078	0.134
129	130	6	1.15	0.000	0.000	0.000
13	12	8	1.83	0.000	0.000	0.000
130	120	6	0.84	0.064	0.069	0.122
131	118	6	1.07	0.000	0.000	0.000
132	148	6	0.68	0.000	0.000	0.000
133	147	6	0.74	0.000	0.000	0.000
134	152	6	0.77	0.000	0.000	0.000
135	151	6	0.42	0.000	0.000	0.000
136	135	6	1.13	0.000	0.000	0.000
137	153	6	0.82	0.000	0.000	0.000
138	139	6	0.90	0.000	0.000	0.000
139	154	6	0.91	0.000	0.000	0.000
14	13	8	2.80	0.000	0.000	0.000

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
140	141	6	0.72	0.000	0.000	0.000
141	142	6	0.90	0.000	0.000	0.000
142	153	6	1.13	0.000	0.000	0.000
143	128	8	0.76	0.072	0.078	0.134
144	143	6	0.37	0.000	0.000	0.000
145	144	6	1.40	0.000	0.000	0.000
146	144	6	0.32	0.000	0.000	0.000
147	149	6	0.57	0.000	0.000	0.000
148	149	6	0.95	0.000	0.000	0.000
149	151	6	0.37	0.000	0.000	0.000
15	14	8	2.33	0.000	0.000	0.000
150	146	6	0.31	0.000	0.000	0.000
151	152	6	2.02	0.000	0.000	0.000
152	150	6	0.28	0.000	0.000	0.000
153	148	6	1.17	0.000	0.000	0.000
154	142	6	1.47	0.000	0.000	0.000
156	XXXX00035x	6	0.96	0.303	0.323	0.458
157	156	6	0.61	0.303	0.323	0.535
158	157	6	1.06	0.255	0.271	0.376
159	158	6	1.29	0.255	0.271	0.376
16	17	6	1.50	0.008	0.009	0.018
160	157	6	2.28	0.001	0.000	0.003
161	160	6	1.43	0.000	0.000	0.000
162	165	6	0.74	0.000	0.000	0.000
163	162	6	1.36	0.000	0.000	0.000
164	166	6	0.31	0.000	0.000	0.000
165	170	6	1.31	0.000	0.000	0.000
166	167	6	1.12	0.000	0.000	0.000
167	168	6	1.05	0.000	0.000	0.000
168	169	6	1.15	0.000	0.000	0.000
169	170	6	1.21	0.000	0.000	0.000
17	379	6	0.82	0.052	0.059	0.127
170	171	6	1.59	0.000	0.000	0.000
171	172	6	2.22	0.000	0.000	0.000
172	173	6	1.17	0.000	0.000	0.000
173	161	6	1.27	0.000	0.000	0.000
174	173	6	0.71	0.000	0.000	0.000
175	174	6	0.84	0.000	0.000	0.000
176	175	6	0.87	0.000	0.000	0.000
177	159	6	1.06	0.255	0.271	0.376
178	177	6	0.11	0.255	0.271	0.376
179	181	6	0.85	0.000	0.000	0.000
180	176	6	0.67	0.000	0.000	0.000
181	183	6	0.64	0.000	0.000	0.000
182	178	6	0.13	0.255	0.271	0.376

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
183	184	6	2.43	0.000	0.000	0.004
184	182	6	0.27	0.256	0.271	0.376
185	187	6	0.97	0.000	0.000	0.000
186	184	6	0.14	0.249	0.264	0.376
187	188	6	1.54	0.185	0.196	0.299
188	186	6	0.70	0.249	0.265	0.377
189	188	6	0.16	0.000	0.000	0.033
19	23	6	1.06	0.000	0.000	0.000
190	187	6	0.96	0.185	0.196	0.299
191	189	6	0.45	0.000	0.000	0.026
192	191	6	1.29	0.000	0.000	-0.001
193	190	6	1.11	0.185	0.196	0.299
194	192	6	0.87	0.000	0.000	0.000
195	193	6	0.73	0.185	0.196	0.299
196	194	6	0.47	0.000	0.000	0.000
197	195	6	0.09	0.185	0.196	0.299
198	197	6	0.80	0.185	0.196	0.299
199	198	6	1.18	0.185	0.196	0.299
2	3	6	0.63	0.000	0.000	0.000
20	19	6	0.67	0.000	0.000	0.000
200	199	6	0.79	0.159	0.168	0.260
201	199	6	0.73	0.027	0.028	0.039
202	201	6	0.61	0.027	0.028	0.039
203	202	6	-0.35	0.027	0.028	0.039
204	203	6	1.73	0.027	0.028	0.039
205	204	6	1.10	0.027	0.028	0.039
206	205	6	1.19	0.000	0.000	0.000
21	22	6	-0.24	0.000	0.000	0.000
215	216	6	0.77	0.081	0.084	0.115
216	218	6	1.29	0.081	0.084	0.115
217	200	6	0.69	0.081	0.084	0.115
218	217	6	1.12	0.081	0.084	0.115
219	218	6	0.97	0.000	0.000	0.000
22	25	6	1.98	0.000	0.000	0.000
220	219	6	0.94	0.000	0.000	0.000
221	222	8	3.00	0.000	0.000	0.000
222	223	8	3.50	0.000	0.000	0.000
223	224	8	1.52	0.000	0.000	0.000
224	225	8	1.23	0.000	0.000	0.000
225	256	8	0.80	0.000	0.000	0.000
226	225	6	1.87	0.000	0.000	0.000
227	221	6	1.22	0.000	0.000	0.000
228	221	6	0.55	0.000	0.000	0.000
229	230	6	1.02	0.000	0.000	0.000
23	24	6	1.10	0.000	0.000	0.000

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
230	232	6	1.10	0.000	0.000	0.000
231	200	6	1.08	0.000	0.000	0.000
232	231	6	1.05	0.000	0.000	0.000
233	232	6	1.16	0.000	0.000	0.000
234	XXXX00010	12	5.23	1.347	1.461	2.755
235	238	6	0.59	0.000	0.000	0.000
236	234	12	6.16	1.341	1.454	2.621
237	236	12	4.79	1.341	1.454	2.567
238	239	6	0.17	0.000	0.000	0.000
239	240	6	0.93	0.000	0.000	0.000
24	26	6	-0.19	0.000	0.000	0.000
240	237	12	8.03	1.342	1.455	2.567
241	240	12	5.51	1.291	1.400	2.474
242	241	12	7.48	1.192	1.297	2.342
243	242	12	7.52	1.192	1.298	2.342
244	250	8	1.42	0.082	0.084	0.102
245	244	8	4.15	0.005	0.006	0.010
246	245	8	1.66	0.005	0.006	0.010
247	243	12	9.10	1.192	1.298	2.342
248	247	12	-1.29	0.936	1.026	1.892
249	247	10	6.01	0.258	0.274	0.445
25	113	6	0.76	0.201	0.213	0.323
250	249	10	7.53	0.258	0.274	0.445
251	250	10	7.45	0.176	0.190	0.347
252	251	10	5.86	0.169	0.183	0.339
253	246	6	1.20	0.005	0.006	0.010
254	252	10	6.98	0.169	0.183	0.339
255	245	8	3.03	0.000	0.000	0.000
256	255	8	-0.60	0.000	0.000	0.000
257	254	10	1.74	0.169	0.183	0.339
258	253	6	0.79	0.005	0.006	0.010
259	233	6	1.09	0.000	0.000	0.000
26	21	6	0.64	0.000	0.000	0.000
260	259	6	0.77	0.000	0.000	0.000
261	257	10	1.71	0.169	0.183	0.339
262	261	8	0.98	0.169	0.183	0.339
263	262	8	1.32	0.169	0.183	0.339
264	263	8	2.26	0.169	0.183	0.339
265	266	6	0.49	0.000	0.000	0.000
266	270	6	0.67	0.000	0.000	0.000
267	264	8	1.86	0.169	0.183	0.339
268	267	8	2.39	0.169	0.183	0.339
269	268	6	1.38	0.000	0.000	0.000
27	28	6	0.83	0.112	0.118	0.165
270	269	6	2.28	0.000	0.000	0.000

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
271	268	8	0.88	0.126	0.136	0.258
272	270	6	-0.15	0.000	0.000	0.000
273	271	8	0.61	0.126	0.136	0.258
274	272	6	0.78	0.000	0.000	0.000
275	273	8	0.88	0.126	0.136	0.258
276	275	8	-0.50	0.000	0.000	0.000
277	265	6	0.22	0.000	0.000	0.000
278	277	6	-0.18	0.000	0.000	0.000
279	280	6	0.77	0.000	0.000	0.000
28	29	6	0.97	0.112	0.117	0.165
280	316	6	0.39	0.000	0.000	0.000
281	315	6	1.27	0.000	0.000	0.000
282	283	6	0.66	0.000	0.000	0.000
283	284	6	1.11	0.000	0.000	0.000
284	274	6	0.87	0.000	0.000	0.000
285	287	6	1.19	0.000	0.000	0.000
286	276	8	2.81	0.000	0.000	0.000
287	286	8	1.66	0.000	0.000	0.000
288	289	6	1.21	0.000	0.000	0.000
289	287	8	3.44	0.000	0.000	0.000
29	31	6	0.88	0.112	0.117	0.165
290	289	8	3.40	0.000	0.000	0.000
291	290	8	1.81	0.000	0.000	0.000
292	289	6	0.43	0.000	0.000	0.000
293	291	6	0.73	0.000	0.000	0.000
294	292	6	-0.22	0.000	0.000	0.000
295	294	6	0.33	0.000	0.000	0.000
296	305	6	0.65	0.000	0.000	0.000
297	295	6	0.36	0.000	0.000	0.000
298	301	8	3.61	0.000	0.000	0.000
299	301	6	0.39	0.000	0.000	0.000
3	4	6	1.78	0.000	0.000	0.000
30	25	6	0.61	0.112	0.117	0.165
300	298	6	0.67	0.000	0.000	0.000
301	302	6	0.10	0.000	0.000	0.000
302	306	6	0.16	0.000	0.000	0.000
303	298	6	0.79	0.000	0.000	0.000
304	311	8	3.58	0.000	0.000	0.000
305	297	6	1.52	0.000	0.000	0.000
306	312	6	0.16	0.000	0.000	0.000
307	291	8	2.71	0.000	0.000	0.000
308	307	8	2.07	0.000	0.000	0.000
309	308	8	3.43	0.000	0.000	0.000
31	30	6	0.77	0.112	0.117	0.165
310	311	6	1.12	0.000	0.000	0.000

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) (a)		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
311	309	8	2.07	0.000	0.000	0.000
312	311	6	0.41	0.000	0.000	0.000
313	304	6	1.00	0.000	0.000	0.000
314	304	6	0.78	0.000	0.000	0.000
315	317	6	0.71	0.000	0.000	0.000
316	318	6	1.05	0.000	0.000	0.000
317	322	6	0.27	0.000	0.000	0.000
318	319	6	0.67	0.000	0.000	0.000
319	320	6	-0.52	0.000	0.000	0.000
32	33	6	0.53	0.000	0.000	0.000
320	357	6	0.43	0.000	0.000	0.000
321	356	6	0.63	0.000	0.000	0.000
322	319	6	1.82	0.000	0.000	0.000
323	322	6	1.11	0.000	0.000	0.000
324	323	6	0.84	0.000	0.000	0.000
325	324	6	0.91	0.000	0.000	0.000
326	355	6	0.64	0.000	0.000	0.000
327	323	6	1.13	0.000	0.000	0.000
328	327	6	0.83	0.000	0.000	0.000
329	328	6	0.97	0.000	0.000	0.000
33	31	6	1.98	0.000	0.000	0.000
330	326	6	1.65	0.000	0.000	0.000
331	248	12	2.16	0.936	1.026	1.892
332	331	12	1.46	0.937	1.026	1.892
333	332	12	3.15	0.937	1.026	1.892
334	333	10	4.01	0.906	0.995	1.850
335	334	10	4.05	0.906	0.995	1.850
336	335	10	1.48	0.906	0.995	1.850
337	336	10	2.32	0.906	0.995	1.850
338	337	10	4.99	0.906	0.995	1.851
339	340	8	1.36	0.374	0.412	0.785
34	33	6	0.83	0.000	0.000	0.000
340	341	10	2.52	0.374	0.412	0.796
341	338	10	3.66	0.906	0.995	1.855
342	343	10	4.56	0.533	0.583	1.068
343	344	10	4.16	0.533	0.583	1.068
344	341	10	3.43	0.533	0.583	1.078
345	344	6	0.86	0.000	0.000	0.000
346	347	6	0.52	0.023	0.024	0.034
347	348	6	0.74	0.023	0.024	0.034
348	339	8	1.75	0.374	0.412	0.785
349	348	8	1.93	0.352	0.389	0.751
35	34	6	0.23	0.000	0.000	0.000
350	349	8	2.05	0.352	0.389	0.751
351	350	8	0.91	0.352	0.389	0.751

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
352	351	8	1.50	0.352	0.389	0.751
353	361	6	0.28	0.000	0.000	0.000
354	363	6	0.14	0.000	0.000	0.000
355	362	6	0.68	0.000	0.000	0.000
356	353	6	0.58	0.000	0.000	0.000
357	360	6	0.54	0.000	0.000	0.000
358	352	8	3.31	0.352	0.389	0.751
359	358	8	1.92	0.352	0.389	0.751
36	27	6	0.62	0.112	0.118	0.165
360	359	8	2.53	0.235	0.261	0.519
361	360	8	3.00	0.235	0.262	0.519
362	364	6	0.28	0.000	0.000	0.000
363	365	6	0.59	0.000	0.000	0.000
364	361	8	3.92	0.235	0.262	0.519
365	364	6	2.02	0.000	0.000	0.000
366	364	8	2.34	0.235	0.262	0.519
367	342	10	4.45	0.528	0.578	1.061
368	367	10	4.65	0.428	0.474	0.918
369	368	8	2.55	0.428	0.474	0.918
37	36	6	1.00	0.112	0.118	0.165
370	369	8	2.59	0.428	0.475	0.918
371	370	8	2.75	0.344	0.382	0.747
372	371	8	2.79	0.344	0.383	0.747
373	372	8	2.52	0.344	0.383	0.747
374	373	8	3.03	0.344	0.383	0.747
375	374	8	2.88	0.344	0.383	0.747
376	375	8	2.58	0.344	0.383	0.747
377	376	8	2.99	0.305	0.340	0.668
378	377	8	3.09	0.305	0.340	0.668
379	378	8	2.52	0.305	0.340	0.668
38	37	6	0.60	0.112	0.118	0.165
380	379	8	3.27	0.253	0.281	0.543
381	380	8	3.27	0.253	0.281	0.543
382	383	6	0.47	0.000	0.000	0.000
383	304	6	1.72	0.000	0.000	0.000
384	383	6	1.12	0.000	0.000	0.000
385	386	6	0.92	0.000	0.000	0.000
386	387	6	0.37	0.000	0.000	0.000
387	384	6	0.70	0.000	0.000	0.000
388	1	6	0.78	0.000	0.000	0.000
389	382	6	1.49	0.000	0.000	0.000
39	35	6	0.98	0.000	0.000	0.000
4	367	6	1.35	0.000	0.000	0.000
40	42	6	0.75	0.000	0.000	0.000
41	39	6	0.70	0.000	0.000	0.000

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
42	41	6	0.79	0.000	0.000	0.000
43	40	6	0.66	0.000	0.000	0.000
44	38	6	0.75	0.112	0.118	0.165
45	43	6	0.87	0.000	0.000	0.000
46	44	6	0.92	0.113	0.118	0.165
47	46	6	0.57	0.113	0.118	0.165
48	47	6	0.93	0.113	0.118	0.165
49	45	6	1.01	0.000	0.000	0.000
5	6	8	1.97	0.000	0.000	0.000
50	49	6	0.67	0.000	0.000	0.000
51	234	6	0.16	0.000	-0.001	0.138
52	51	6	1.37	0.000	0.000	-0.014
53	54	6	0.97	0.000	0.000	0.000
54	55	6	1.01	0.000	0.000	0.000
55	56	6	0.99	0.000	0.000	0.000
56	67	6	1.09	0.000	0.000	0.000
57	65	6	1.20	0.064	0.065	0.075
58	59	6	1.09	0.064	0.065	0.075
59	57	6	0.57	0.064	0.065	0.075
6	241	8	1.51	0.000	0.000	0.000
61	62	6	1.01	0.000	0.000	0.000
62	63	6	0.37	0.000	0.000	0.000
63	64	6	1.12	0.000	0.000	0.000
64	66	6	1.03	0.000	0.000	0.000
65	66	6	1.10	0.064	0.065	0.075
66	48	6	0.72	0.064	0.065	0.075
67	66	6	0.52	0.000	0.000	0.000
68	74	6	0.90	0.000	0.000	0.000
69	70	6	0.99	0.000	0.000	0.000
7	6	8	1.58	0.000	0.000	0.000
70	71	6	1.09	0.000	0.000	0.000
71	72	6	0.94	0.000	0.000	0.000
72	79	6	0.96	0.000	0.000	0.000
73	76	6	0.80	0.000	0.000	0.000
74	75	6	0.83	0.000	0.000	0.000
75	73	6	1.04	0.000	0.000	0.000
76	77	6	1.25	0.000	0.000	0.000
77	80	6	0.33	0.000	0.000	0.000
78	98	6	1.37	0.000	0.000	0.000
79	80	6	1.19	0.000	0.000	0.000
8	10	8	1.62	0.000	0.000	0.000
80	83	6	0.22	0.000	0.000	0.000
81	83	6	1.19	0.000	0.000	0.000
82	98	6	1.03	0.000	0.000	0.000
83	82	6	0.93	0.000	0.000	0.000

APPENDIX A-2
Highlands Development - PHASE 1 Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
84	238	6	-0.77	0.000	0.000	0.000
85	87	6	1.94	0.000	0.000	0.000
86	87	6	0.81	0.000	0.000	0.000
87	84	6	0.75	0.000	0.000	0.000
88	86	6	1.12	0.000	0.000	0.000
89	85	6	0.80	0.000	0.000	0.000
9	10	8	2.68	0.000	0.000	0.000
90	89	6	0.71	0.000	0.000	0.000
91	96	6	0.67	0.000	0.000	0.000
92	95	6	0.48	0.000	0.000	0.000
93	92	6	1.06	0.000	0.000	0.000
94	93	6	0.29	0.000	0.000	0.000
95	96	6	0.72	0.000	0.000	0.000
96	235	6	0.76	0.000	0.000	0.000
97	100	6	0.99	0.000	0.000	0.000
98	99	6	0.97	0.064	0.069	0.122
99	101	6	1.11	0.064	0.069	0.122
XXXX00010	XXXX00058	12	7.85	0.809	0.877	1.635
XXXX00010	XXXX00056	12	5.22	0.539	0.584	1.073
XXXX00030	Added_2	10	15.24	0.191	0.205	0.339
XXXX00030	Added_1	10	20.43	0.239	0.255	0.408
XXXX00035x	Added_1	8	1.57	0.839	0.900	1.481
XXXX00056	XXXX00035x	8	1.58	0.538	0.584	1.025
XXXX00058	Added_2	12	4.63	0.807	0.876	1.553

[a] Note: Some pipelines appear to have no flow during design storm conditions. This occurred during model simulation because flow from the subcatchment was applied to the furthest downstream manhole. Flow may actually occur through these pipelines.

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) (a)		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
1	384	6	1.78	0.000	0.000	0.000
10	12	8	1.88	0.000	0.000	0.000
100	101	6	0.39	0.000	0.000	0.000
101	102	6	0.39	0.064	0.069	0.122
102	130	6	0.69	0.064	0.069	0.122
103	104	6	0.56	0.000	0.000	0.000
104	119	6	0.58	0.000	0.000	0.000
105	106	6	0.10	0.000	0.000	0.000
106	128	6	1.15	0.000	0.000	0.000
107	XXXX00030	8	0.86	0.523	0.551	0.819
108	107	10	1.74	0.523	0.551	0.819
109	108	10	0.53	0.523	0.551	0.819
11	5	8	2.12	0.000	0.000	0.000
110	109	10	0.77	0.523	0.552	0.819
111	110	10	0.77	0.523	0.552	0.819
112	111	10	0.77	0.523	0.552	0.819
113	112	10	0.77	0.523	0.553	0.820
114	113	8	0.48	0.230	0.248	0.426
115	114	8	0.68	0.230	0.248	0.426
116	115	8	0.33	0.230	0.248	0.426
117	120	6	1.21	0.000	0.000	0.000
118	129	6	1.00	0.000	0.000	0.000
119	122	6	0.79	0.000	0.000	0.000
12	11	8	1.49	0.000	0.000	0.000
120	121	6	0.59	0.064	0.069	0.122
121	123	6	1.10	0.064	0.069	0.122
122	123	6	0.28	0.000	0.000	0.000
123	124	6	1.02	0.064	0.069	0.122
124	116	8	0.18	0.230	0.248	0.425
125	124	8	0.66	0.072	0.078	0.134
127	125	8	0.61	0.072	0.078	0.134
128	127	8	0.41	0.072	0.078	0.134
129	130	6	1.15	0.000	0.000	0.000
13	12	8	1.83	0.000	0.000	0.000
130	120	6	0.84	0.064	0.069	0.122
131	118	6	1.07	0.000	0.000	0.000
132	148	6	0.68	0.000	0.000	0.000
133	147	6	0.74	0.000	0.000	0.000
134	152	6	0.77	0.000	0.000	0.000
135	151	6	0.42	0.000	0.000	0.000
136	135	6	1.13	0.000	0.000	0.000
137	153	6	0.82	0.000	0.000	0.000
138	139	6	0.90	0.000	0.000	0.000
139	154	6	0.91	0.000	0.000	0.000
14	13	8	2.80	0.000	0.000	0.000

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
140	141	6	0.72	0.000	0.000	0.000
141	142	6	0.90	0.000	0.000	0.000
142	153	6	1.13	0.000	0.000	0.000
143	128	8	0.76	0.072	0.078	0.134
144	143	6	0.37	0.000	0.000	0.000
145	144	6	1.40	0.000	0.000	0.000
146	144	6	0.32	0.000	0.000	0.000
147	149	6	0.57	0.000	0.000	0.000
148	149	6	0.95	0.000	0.000	0.000
149	151	6	0.37	0.000	0.000	0.000
15	14	8	2.33	0.000	0.000	0.000
150	146	6	0.31	0.000	0.000	0.000
151	152	6	2.02	0.000	0.000	0.000
152	150	6	0.28	0.000	0.000	0.000
153	148	6	1.17	0.000	0.000	0.000
154	142	6	1.47	0.000	0.000	0.000
156	XXXX00035x	6	0.96	0.303	0.322	0.463
157	156	6	0.61	0.306	0.322	0.464
158	157	6	1.06	0.255	0.271	0.377
159	158	6	1.29	0.255	0.271	0.377
16	17	6	1.50	0.008	0.009	0.018
160	157	6	2.28	0.003	-0.016	0.040
161	160	6	1.43	0.000	0.000	0.000
162	165	6	0.74	0.000	0.000	0.000
163	162	6	1.36	0.000	0.000	0.000
164	166	6	0.31	0.000	0.000	0.000
165	170	6	1.31	0.000	0.000	0.000
166	167	6	1.12	0.000	0.000	0.000
167	168	6	1.05	0.000	0.000	0.000
168	169	6	1.15	0.000	0.000	0.000
169	170	6	1.21	0.000	0.000	0.000
17	379	6	0.82	0.162	0.168	0.218
170	171	6	1.59	0.000	0.000	0.000
171	172	6	2.22	0.000	0.000	0.000
172	173	6	1.17	0.000	0.000	0.000
173	161	6	1.27	0.000	0.000	0.000
174	173	6	0.71	0.000	0.000	0.000
175	174	6	0.84	0.000	0.000	0.000
176	175	6	0.87	0.000	0.000	0.000
177	159	6	1.06	0.255	0.271	0.377
178	177	6	0.11	0.255	0.271	0.377
179	181	6	0.85	0.000	0.000	0.000
180	176	6	0.67	0.000	0.000	0.000
181	183	6	0.64	0.000	0.000	0.000
182	178	6	0.13	0.255	0.271	0.377

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	Maximum Downstream Flow (mgd) [a] 10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
183	184	6	2.43	0.000	0.000	0.003
184	182	6	0.27	0.256	0.271	0.377
185	187	6	0.97	0.000	0.000	0.000
186	184	6	0.14	0.249	0.264	0.376
187	188	6	1.54	0.185	0.196	0.299
188	186	6	0.70	0.249	0.264	0.377
189	188	6	0.16	0.000	0.000	0.051
19	23	6	1.06	0.000	0.000	0.000
190	187	6	0.96	0.185	0.196	0.299
191	189	6	0.45	0.000	0.000	0.017
192	191	6	1.29	0.000	0.000	0.005
193	190	6	1.11	0.185	0.196	0.299
194	192	6	0.87	0.000	0.000	0.000
195	193	6	0.73	0.185	0.196	0.299
196	194	6	0.47	0.000	0.000	0.000
197	195	6	0.09	0.185	0.196	0.299
198	197	6	0.80	0.185	0.196	0.299
199	198	6	1.18	0.185	0.196	0.299
2	3	6	0.63	0.000	0.000	0.000
20	19	6	0.67	0.000	0.000	0.000
200	199	6	0.79	0.158	0.168	0.260
201	199	6	0.73	0.027	0.028	0.039
202	201	6	0.61	0.027	0.028	0.039
203	202	6	-0.35	0.027	0.028	0.039
204	203	6	1.73	0.027	0.028	0.039
205	204	6	1.10	0.027	0.028	0.039
206	205	6	1.19	0.000	0.000	0.000
21	22	6	-0.24	0.000	0.000	0.000
215	216	6	0.77	0.081	0.084	0.115
216	218	6	1.29	0.081	0.084	0.115
217	200	6	0.69	0.081	0.084	0.115
218	217	6	1.12	0.081	0.084	0.115
219	218	6	0.97	0.000	0.000	0.000
22	25	6	1.98	0.000	0.000	-0.049
220	219	6	0.94	0.000	0.000	0.000
221	222	8	3.00	0.000	0.000	0.000
222	223	8	3.50	0.000	0.000	0.000
223	224	8	1.52	0.000	0.000	0.000
224	225	8	1.23	0.000	0.000	0.000
225	256	8	0.80	0.000	0.000	0.000
226	225	6	1.87	0.000	0.000	0.000
227	221	6	1.22	0.000	0.000	0.000
228	221	6	0.55	0.000	0.000	0.000
229	230	6	1.02	0.000	0.000	0.000
23	24	6	1.10	0.000	0.000	0.000

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
230	232	6	1.10	0.000	0.000	0.000
231	200	6	1.08	0.000	0.000	0.000
232	231	6	1.05	0.000	0.000	0.000
233	232	6	1.16	0.000	0.000	0.000
234	XXXX00010	12	5.23	1.992	2.100	3.117
235	238	6	0.59	0.000	0.000	0.000
236	234	12	6.16	1.985	2.093	3.107
237	236	12	4.79	1.986	2.093	3.104
238	239	6	0.17	0.000	0.000	0.000
239	240	6	0.93	0.000	0.000	0.000
24	26	6	-0.19	0.000	0.000	0.000
240	237	12	8.03	1.986	2.093	3.105
241	240	12	5.51	1.936	2.040	3.013
242	241	12	7.48	1.835	1.934	2.879
243	242	12	7.52	1.835	1.934	2.879
244	250	8	1.42	0.082	0.084	0.102
245	244	8	4.15	0.005	0.006	0.010
246	245	8	1.66	0.005	0.006	0.010
247	243	12	9.10	1.835	1.934	2.879
248	247	12	-1.29	1.574	1.657	2.442
249	247	10	6.01	0.257	0.274	0.445
25	113	6	0.76	0.295	0.305	0.401
250	249	10	7.53	0.257	0.274	0.445
251	250	10	7.45	0.176	0.190	0.348
252	251	10	5.86	0.169	0.183	0.339
253	246	6	1.20	0.005	0.006	0.010
254	252	10	6.98	0.169	0.183	0.339
255	245	8	3.03	0.000	0.000	0.000
256	255	8	-0.60	0.000	0.000	0.000
257	254	10	1.74	0.169	0.183	0.339
258	253	6	0.79	0.005	0.006	0.010
259	233	6	1.09	0.000	0.000	0.000
26	21	6	0.64	0.000	0.000	0.000
260	259	6	0.77	0.000	0.000	0.000
261	257	10	1.71	0.169	0.183	0.339
262	261	8	0.98	0.169	0.183	0.339
263	262	8	1.32	0.169	0.183	0.339
264	263	8	2.26	0.169	0.183	0.339
265	266	6	0.49	0.000	0.000	0.000
266	270	6	0.67	0.000	0.000	0.000
267	264	8	1.86	0.169	0.183	0.339
268	267	8	2.39	0.169	0.183	0.339
269	268	6	1.38	0.000	0.000	0.000
27	28	6	0.83	0.207	0.212	0.247
270	269	6	2.28	0.000	0.000	0.000

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
271	268	8	0.88	0.126	0.136	0.258
272	270	6	-0.15	0.000	0.000	0.000
273	271	8	0.61	0.126	0.136	0.258
274	272	6	0.78	0.000	0.000	0.000
275	273	8	0.88	0.126	0.136	0.258
276	275	8	-0.50	0.000	0.000	0.000
277	265	6	0.22	0.000	0.000	0.000
278	277	6	-0.18	0.000	0.000	0.000
279	280	6	0.77	0.000	0.000	0.000
28	29	6	0.97	0.207	0.212	0.247
280	316	6	0.39	0.000	0.000	0.000
281	315	6	1.27	0.000	0.000	0.000
282	283	6	0.66	0.000	0.000	0.000
283	284	6	1.11	0.000	0.000	0.000
284	274	6	0.87	0.000	0.000	0.000
285	287	6	1.19	0.000	0.000	0.000
286	276	8	2.81	0.000	0.000	0.000
287	286	8	1.66	0.000	0.000	0.000
288	289	6	1.21	0.000	0.000	0.000
289	287	8	3.44	0.000	0.000	0.000
29	31	6	0.88	0.207	0.212	0.247
290	289	8	3.40	0.000	0.000	0.000
291	290	8	1.81	0.000	0.000	0.000
292	289	6	0.43	0.000	0.000	0.000
293	291	6	0.73	0.000	0.000	0.000
294	292	6	-0.22	0.000	0.000	0.000
295	294	6	0.33	0.000	0.000	0.000
296	305	6	0.65	0.000	0.000	0.000
297	295	6	0.36	0.000	0.000	0.000
298	301	8	3.61	0.000	0.000	0.000
299	301	6	0.39	0.000	0.000	0.000
3	4	6	1.78	0.000	0.000	0.000
30	25	6	0.61	0.207	0.212	0.285
300	298	6	0.67	0.000	0.000	0.000
301	302	6	0.10	0.000	0.000	0.000
302	306	6	0.16	0.000	0.000	0.000
303	298	6	0.79	0.000	0.000	0.000
304	311	8	3.58	0.000	0.000	0.000
305	297	6	1.52	0.000	0.000	0.000
306	312	6	0.16	0.000	0.000	0.000
307	291	8	2.71	0.000	0.000	0.000
308	307	8	2.07	0.000	0.000	0.000
309	308	8	3.43	0.000	0.000	0.000
31	30	6	0.77	0.207	0.212	0.247
310	311	6	1.12	0.000	0.000	0.000

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
311	309	8	2.07	0.000	0.000	0.000
312	311	6	0.41	0.000	0.000	0.000
313	304	6	1.00	0.000	0.000	0.000
314	304	6	0.78	0.000	0.000	0.000
315	317	6	0.71	0.000	0.000	0.000
316	318	6	1.05	0.000	0.000	0.000
317	322	6	0.27	0.000	0.000	0.000
318	319	6	0.67	0.000	0.000	0.000
319	320	6	-0.52	0.000	0.000	0.000
32	33	6	0.53	0.000	0.000	0.000
320	357	6	0.43	0.000	0.000	0.000
321	356	6	0.63	0.000	0.000	0.000
322	319	6	1.82	0.000	0.000	0.000
323	322	6	1.11	0.000	0.000	0.000
324	323	6	0.84	0.000	0.000	0.000
325	324	6	0.91	0.000	0.000	0.000
326	355	6	0.64	0.000	0.000	0.000
327	323	6	1.13	0.000	0.000	0.000
328	327	6	0.83	0.000	0.000	0.000
329	328	6	0.97	0.000	0.000	0.000
33	31	6	1.98	0.000	0.000	0.000
330	326	6	1.65	0.000	0.000	0.000
331	248	12	2.16	1.574	1.657	2.443
332	331	12	1.46	1.575	1.657	2.445
333	332	12	3.15	1.575	1.657	2.455
334	333	10	4.01	1.544	1.624	2.430
335	334	10	4.05	1.544	1.624	2.462
336	335	10	1.48	1.544	1.624	2.440
337	336	10	2.32	1.545	1.624	2.459
338	337	10	4.99	1.545	1.624	2.546
339	340	8	1.36	0.753	0.761	1.296
34	33	6	0.83	0.000	0.000	0.000
340	341	10	2.52	0.726	0.761	1.465
341	338	10	3.66	1.545	1.624	2.690
342	343	10	4.56	0.819	0.863	1.313
343	344	10	4.16	0.819	0.863	1.313
344	341	10	3.43	0.819	0.863	1.464
345	344	6	0.86	0.000	0.000	0.000
346	347	6	0.52	0.023	0.024	0.034
347	348	6	0.74	0.023	0.024	0.170
348	339	8	1.75	0.729	0.760	1.390
349	348	8	1.93	0.703	0.736	1.165
35	34	6	0.23	0.000	0.000	0.000
350	349	8	2.05	0.704	0.736	1.201
351	350	8	0.91	0.704	0.736	1.045

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
352	351	8	1.50	0.704	0.736	1.046
353	361	6	0.28	0.000	0.000	0.000
354	363	6	0.14	0.000	0.000	0.000
355	362	6	0.68	0.000	0.000	0.000
356	353	6	0.58	0.000	0.000	0.000
357	360	6	0.54	0.000	0.000	0.000
358	352	8	3.31	0.704	0.736	1.051
359	358	8	1.92	0.704	0.736	1.057
36	27	6	0.62	0.207	0.212	0.247
360	359	8	2.53	0.587	0.610	0.876
361	360	8	3.00	0.587	0.610	0.816
362	364	6	0.28	0.000	0.000	0.000
363	365	6	0.59	0.000	0.000	0.000
364	361	8	3.92	0.587	0.610	0.816
365	364	6	2.02	0.000	0.000	0.000
366	364	8	2.34	0.587	0.610	0.816
367	342	10	4.45	0.814	0.858	1.306
368	367	10	4.65	0.707	0.747	1.162
369	368	8	2.55	0.707	0.747	1.162
37	36	6	1.00	0.207	0.212	0.247
370	369	8	2.59	0.707	0.747	1.162
371	370	8	2.75	0.531	0.566	0.914
372	371	8	2.79	0.531	0.566	0.914
373	372	8	2.52	0.531	0.566	0.914
374	373	8	3.03	0.531	0.566	0.914
375	374	8	2.88	0.531	0.567	0.914
376	375	8	2.58	0.531	0.567	0.914
377	376	8	2.99	0.450	0.482	0.799
378	377	8	3.09	0.450	0.482	0.799
379	378	8	2.52	0.450	0.482	0.799
38	37	6	0.60	0.207	0.212	0.247
380	379	8	3.27	0.293	0.321	0.582
381	380	8	3.27	0.293	0.321	0.582
382	383	6	0.47	0.000	0.000	0.000
383	304	6	1.72	0.000	0.000	0.000
384	383	6	1.12	0.000	0.000	0.000
385	386	6	0.92	0.000	0.000	0.000
386	387	6	0.37	0.000	0.000	0.000
387	384	6	0.70	0.000	0.000	0.000
388	1	6	0.78	0.000	0.000	0.000
389	382	6	1.49	0.000	0.000	0.000
39	35	6	0.98	0.000	0.000	0.000
4	367	6	1.35	0.000	0.000	0.000
40	42	6	0.75	0.000	0.000	0.000
41	39	6	0.70	0.000	0.000	0.000

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [(a)]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
42	41	6	0.79	0.000	0.000	0.000
43	40	6	0.66	0.000	0.000	0.000
44	38	6	0.75	0.207	0.212	0.247
45	43	6	0.87	0.000	0.000	0.000
46	44	6	0.92	0.207	0.212	0.247
47	46	6	0.57	0.207	0.212	0.247
48	47	6	0.93	0.207	0.212	0.247
49	45	6	1.01	0.000	0.000	0.000
5	6	8	1.97	0.000	0.000	0.000
50	49	6	0.67	0.000	0.000	0.000
51	234	6	0.16	-0.002	-0.002	0.168
52	51	6	1.37	0.000	0.000	-0.025
53	54	6	0.97	0.000	0.000	0.000
54	55	6	1.01	0.000	0.000	0.000
55	56	6	0.99	0.000	0.000	0.000
56	67	6	1.09	0.000	0.000	0.000
57	65	6	1.20	0.159	0.160	0.169
58	59	6	1.09	0.159	0.160	0.169
59	57	6	0.57	0.159	0.160	0.169
6	241	8	1.51	0.000	0.000	0.001
61	62	6	1.01	0.000	0.000	0.000
62	63	6	0.37	0.000	0.000	0.000
63	64	6	1.12	0.000	0.000	0.000
64	66	6	1.03	0.000	0.000	0.000
65	66	6	1.10	0.159	0.160	0.169
66	48	6	0.72	0.159	0.160	0.169
67	66	6	0.52	0.000	0.000	0.000
68	74	6	0.90	0.000	0.000	0.000
69	70	6	0.99	0.000	0.000	0.000
7	6	8	1.58	0.000	0.000	0.000
70	71	6	1.09	0.000	0.000	0.000
71	72	6	0.94	0.000	0.000	0.000
72	79	6	0.96	0.000	0.000	0.000
73	76	6	0.80	0.000	0.000	0.000
74	75	6	0.83	0.000	0.000	0.000
75	73	6	1.04	0.000	0.000	0.000
76	77	6	1.25	0.000	0.000	0.000
77	80	6	0.33	0.000	0.000	0.000
78	98	6	1.37	0.000	0.000	0.000
79	80	6	1.19	0.000	0.000	0.000
8	10	8	1.62	0.000	0.000	0.000
80	83	6	0.22	0.000	0.000	0.000
81	83	6	1.19	0.000	0.000	0.000
82	98	6	1.03	0.000	0.000	0.000
83	82	6	0.93	0.000	0.000	0.000

APPENDIX A-3
Highlands Development - BUILDOUT Conditions - Maximum Downstream Flow per Pipeline at Design Storm Conditions

				Maximum Downstream Flow (mgd) [a]		
Upstream Node ID	Downstream Node ID	Diameter (in)	Pipe Full Capacity (mgd)	10 year- 6 hour Design Storm Conditions	25 year-6 hour Design Storm Conditions	25 year-24 hour Design Storm Conditions
84	238	6	-0.77	0.000	0.000	0.000
85	87	6	1.94	0.000	0.000	0.000
86	87	6	0.81	0.000	0.000	0.000
87	84	6	0.75	0.000	0.000	0.000
88	86	6	1.12	0.000	0.000	0.000
89	85	6	0.80	0.000	0.000	0.000
9	10	8	2.68	0.000	0.000	0.000
90	89	6	0.71	0.000	0.000	0.000
91	96	6	0.67	0.000	0.000	0.000
92	95	6	0.48	0.000	0.000	0.000
93	92	6	1.06	0.000	0.000	0.000
94	93	6	0.29	0.000	0.000	0.000
95	96	6	0.72	0.000	0.000	0.000
96	235	6	0.76	0.000	0.000	0.000
97	100	6	0.99	0.000	0.000	0.000
98	99	6	0.97	0.064	0.069	0.122
99	101	6	1.11	0.064	0.069	0.122
XXXX00010	XXXX00058	12	7.85	1.196	1.261	1.882
XXXX00010	XXXX00056	12	5.22	0.796	0.839	1.235
XXXX00030	Added_2	10	15.24	0.234	0.247	0.372
XXXX00030	Added_1	10	20.43	0.290	0.305	0.447
XXXX00035x	Added_1	8	1.57	1.097	1.161	1.654
XXXX00056	XXXX00035x	8	1.58	0.796	0.838	1.210
XXXX00058	Added_2	12	4.63	1.194	1.259	1.878

[a] Note: Some pipelines appear to have no flow during design storm conditions. This occurred during model simulation because flow from the subcatchment was applied to the furthest downstream manhole. Flow may actually occur through these pipelines.

APPENDIX B
Planning Level Installed Sewer Pipeline Costs
Capacity Increase along Northstar Drive from Manholes 337 to 335 and Manholes 333 to 247

Current ENR (Feb 2005)	7,298	ENR Increase Factor
Pipe Cost ENR	5,860	1.245
Other Costs ENR	6,640	1.099

PIPE COSTS	Diameter (In.)	Average Depth (ft)	Length (ft)	Pipe Unit Cost ($/LF)	Total Cost ($)
	12	8.5	316	$115.00	$36,300
	12	8.0	935	$115.00	$107,500
			1,251	Subtotal	$143,800
				Adjust for Current ENR	$179,100

MANHOLES	Number of Manholes	Cost per Manhole ($)	Total Cost ($)
	8	$6,600 at current ENR	$52,800

LATERAL CONNECTIONS	Number of Connections	Cost per Connection ($)	Total Cost ($)
	5	$2,200 at current ENR	$11,000

ASPHALT REPLACEMENT	Total SF	Cost per sf ($)	Total Cost ($)
	2,821	$5.50 at current ENR	$15,500

TRAFFIC CONTROL	Total miles	Cost per sf ($)	Total Cost ($)
	0.26	$16,500 at current ENR	$4,200

Total Construction Cost	$262,600
Estimating Contingency (20%)	$52,600
Total Construction Cost	$315,200
Engineering/Permitting/Administration (30%)	$94,600
Total Capital Cost	**$410,000**

APPENDIX B
Planning Level Installed Sewer Pipeline Costs
Capacity Increase from Manholes 113 to 107

Current ENR (Feb 2005)	7,298	ENR Increase Factor
Pipe Cost ENR	5,860	1.245
Other Costs ENR	6,640	1.099

PIPE COSTS	**Diameter (In.)**	**Average Depth (ft)**	**Length (ft)**	**Pipe Unit Cost ($/LF)**	**Total Cost ($)**
	12	13.5	2,025	$115.00	$232,900
			2,025	Subtotal	$232,900
				Adjust for Current ENR	$290,100

MANHOLES	**Number of Manholes**	**Cost per Manhole ($)**	**Total Cost ($)**
	8	$6,600 at current ENR	$52,800

LATERAL CONNECTIONS	**Number of Connections**	**Cost per Connection ($)**	**Total Cost ($)**
	0	$2,200 at current ENR	$0

ASPHALT REPLACEMENT	**Total SF**	**Cost per sf ($)**	**Total Cost ($)**
	-	$5.50 at current ENR	$0

TRAFFIC CONTROL	**Total miles**	**Cost per sf ($)**	**Total Cost ($)**
	-	$16,500 at current ENR	$0

Total Construction Cost	$342,900
Estimating Contingency (20%)	$68,600
Total Construction Cost	$411,500
Engineering/Permitting/Administration (30%)	$123,500
Total Capital Cost	**$535,000**

APPENDIX B
Planning Level Installed Sewer Pipeline Costs
Capacity Increase along Martis Landing from Manholes 186 to 177

Current ENR (Feb 2005)	7,298	ENR Increase Factor
Pipe Cost ENR	5,860	1.245
Other Costs ENR	6,640	1.099

PIPE COSTS	Diameter (In.)	Average Depth (ft)	Length (ft)	Pipe Unit Cost ($/LF)	Total Cost ($)
	10	6.5	1,065	$115.00	$122,500
			1,065	Subtotal	$122,500
				Adjust for ENR	$152,600

MANHOLES	Number of Manholes	Cost per Manhole ($)	Total Cost ($)
	4	$6,600 at current ENR	$26,400

LATERAL CONNECTIONS	Number of Connections	Cost per Connection ($)	Total Cost ($)
	1	$2,200 at current ENR	$2,200

ASPHALT REPLACEMENT	Total SF	Cost per sf ($)	Total Cost ($)
	-	$5.50 at current ENR	$0

TRAFFIC CONTROL	Total miles	Cost per sf ($)	Total Cost ($)
	-	$16,500 at current ENR	$0

Total Construction Cost	$181,200
Estimating Contingency (20%)	$36,300
Total Construction Cost	$217,500
Engineering/Permitting/Administration (30%)	$65,300
Total Capital Cost	**$283,000**

FINAL

FARR WEST
ENGINEERING

TECHNICAL MEMORANDUM

Project: **Northstar Community Services District**
Sewer Capacity Analysis – Martis Valley West

Prepared For: Eric Martin, P.E.
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Northstar Community Services District

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2/20/15

Date: February 20, 2015

1. PURPOSE

This memorandum presents an evaluation of hydraulic capacity of the Northstar Community Services District's (District) wastewater collection system, and will serve as the basis for understanding the Martis Valley West (MVW) project impacts as well as other projected buildout level development impacts on the collection system. The evaluation was performed using an updated version the District's hydraulic model and includes the following scenarios:

- Existing sewer collection system (2008 development level)
- Buildout development level
- Buildout development level + MVW

The MVW modeling scenarios will evaluate alternative connections to the existing collection system at the 12-inch sewer line at manhole 237 near Beaver Pond Road and Northstar Drive and at the existing siphon lines near the sewer lift station at Highway 267.

The evaluation will define any deficiencies based on the capacity requirements defined in the District's sewer code.

2. SUMMARY

This sewer system capacity analysis was performed to assess effects of projected buildout development and the addition of MVW sewer flows to the existing District sewer collection system. Model simulations assessed capacity at both peak average dry weather flow (ADWF) conditions (peak hour base sanitary flow at maximum occupancy) and peak wet weather flow (PWWF) using a 10-year 24-hour design storm event. Peak flow conditions caused by the design storm event were superimposed with the existing peak hour base sanitary flows to represent a highest possible flow condition. Projected wastewater flows included a peaking factor of 2.6 to account for inflow associated with storm events in undeveloped areas. These parameters simulate an extreme storm occurring during a holiday period associated with peak occupancy times for ski season. Thus, the modeling effort produced a conservative, yet realistic, estimate of wastewater flow within the District's collection system.

The calibrated collection system model from the 2008 Wastewater Collection System Master Plan was used to represent existing conditions within the District sewer service boundary. Modeling simulations were performed for four scenarios: 2008 development level (existing conditions), buildout development level, and buildout development with the addition of MVW sewer flows discharging to manhole 237 near Beaver Pond and Northstar Drive and to the siphon lines downstream of the 267 Lift Station. Figure 1 shows existing District sewer collection system and facilities. Figure 2 shows the MVW project boundary as well as the modeled options for the sewer collection system.

The 2008 Master Plan identified a couple areas of limited capacity. Under both the 2008 and buildout development levels, a few sections of sewer main along Martis Landing showed limited capacity; mainly due to very mild slopes. With the addition of the Highlands development, the buildout development level flows showed additional capacity restrictions along Aspen Grove north to Northstar Drive and the fire station. *None of these conditions are affected by the addition of the MVW flows.*

The potential additional capacity related issues associated with the MVW flow will be seen in the siphon lines within the golf course and between the 267 Lift Station and the Truckee Sanitation District (TSD) outfall. Table 1 and Table 2 highlight the modeling results of each scenario on the siphon lines. The siphon system includes parallel 8-inch and 12-inch pipelines running from the inlet structure within the golf course to Highway 267 (Golf Course Siphon) and continuing on from Highway 267 near the lift station to the TSD outfall near Airport Road (267-TSD Siphon). The 267 Lift station pumps sewage from the lower portions of the District's service area into the siphon lines. The lift station includes two 225 gpm pumps. The capacity of each siphon line section depends on the number of pumps operating at the lift station.

Under current flow conditions the District is able to operate either the 8-inch or 12- inch siphon lines to satisfy system capacity. The PWWF simulation under buildout development conditions requires the use of both siphon lines run in parallel. The development condition also shows the need for operating both pumps at the lift station for short periods of time. *With the addition of the MVW development and flow contribution to manhole 237, the Golf Course Siphon section is not able to meet the capacity requirements under PWWF conditions. Also, with the addition of MVW flows, the 267-TSD siphon line section is at 100% capacity.*

Under Scenario 3 (loading at MH 237) the addition of the MVW sewer flows would require the upsizing the existing 8-inch siphon line through the golf course with approximately 6,450 linear feet of 16-inch pipeline, as well as upsizing the existing 8-inch siphon line from the 267 Lift Station to the TSD outfall with approximately 11,500 linear feet of 16-inch pipeline. Under Scenario 4 (loading downstream of the 267 Lift Station), the addition of the MVW sewer flows would require the upsizing the existing 8-inch siphon line between the 267 Lift Station and the TSD outfall with approximately 11,500 linear feet of 16-inch pipeline.

Table 1 – Golf Course Siphon Model Results

Golf Course Siphon			Siphon Requirements		
	GDP	gpm	# of Pumps	Siphon Lines	Capacity
Scenario 1 and 1a – 2008 Development Level					
Peak Hour ADWF	609,120	423	1 pump	8"	475 gpm
PWWF	820,800	570	1 pump	12"	1,625 gpm
Scenario 2 and 2a – Buildout Development Level					
Peak Hour ADWF	1,658,880	1,152	1 pump	12"	1,625 gpm
PWWF	2,386,080	1,657	2 pumps	8"+12"	2,100 gpm
Scenario 3 and 3a - Buildout + MVW Development Level Loading at MH 237					
Peak Hour ADWF	1,909,440	1,326	1 pump	12"	1,625 gpm
PWWF	3,149,280	2,187	2 pumps	***Exceeds capacity of 8"+12"***	2,100 gpm
Scenario 4 and 4a - Buildout + MVW Development Level Loading at 267 Siphon					
Peak Hour ADWF	1,658,880	1,152	1 pump	12"	1,625 gpm
PWWF	2,387,520	1,658	2 pumps	8"+12"	2,100 gpm

Table 2 – 267 to TSD Siphon Model Results

267 to TSD Siphon			Siphon Requirements		
	GDP	gpm	# of Pumps	Siphon Lines	Capacity
Scenario 1 and 1 – 2008 Development Level					
Peak Hour ADWF	933,120	648	1 pump	8"	700 gpm
PWWF	1,144,800	795	1 pump	12"	1,850 gpm
Scenario 2 and 2a – Buildout Development Level					
Peak Hour ADWF	1,982,880	1,377	1 pump	12"	1,850 gpm
PWWF	2,815,200	1,955	2 pumps	8"+12"	2,550 gpm
Scenario 3 and 3a - Buildout + MVW Development Level Loading at MH 237					
Peak Hour ADWF	2,232,000	1,550	1 pump	12"	1,850 gpm
PWWF	3,568,320	2,478	2 pumps	8"+12"	2,550 gpm
Scenario 4 and 4a - Buildout + MVW Development Level Loading at 267 Siphon					
Peak Hour ADWF	2,229,120	1,548	1 pump	12"	1,850 gpm
PWWF	3,559,680	2,472	2 pumps	8"+12"	2,550 gpm

The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by Farr West Engineering as to the sufficiency or accuracy of the data.

N

1 " = 1,400 '

Northstar Community Services District
Sewer Capacity Analysis – Martis Valley West
Figure 1 – Existing Sewer Collection System

FARR WEST
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5442 Longley Lane
Reno, NV 89511
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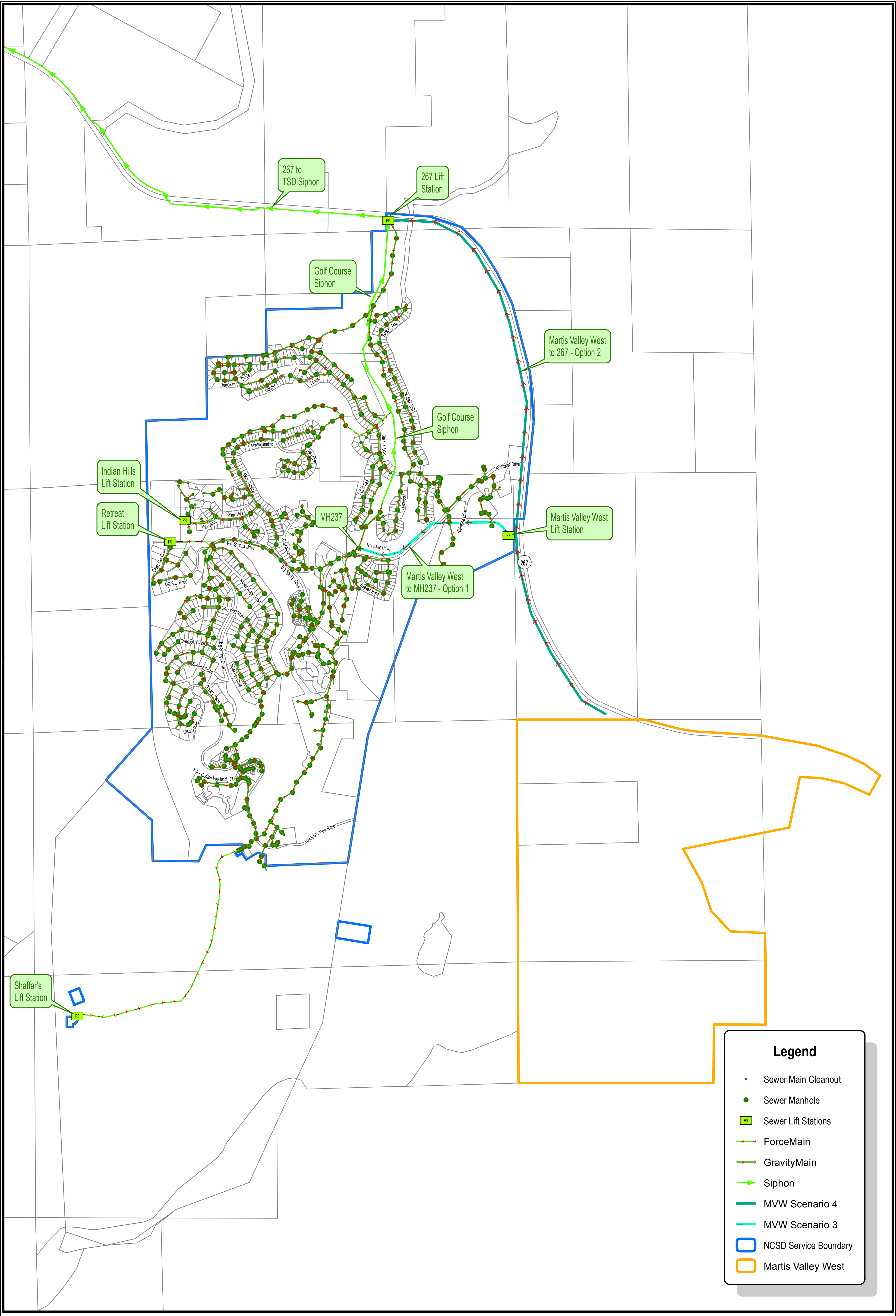
P:\Client Projects\Northstar Community Services District 134\0745 Northstar Sewer Modeling\GIS_from_NCSD\Maps\NorthstarCSD_SewerSystem_11X17.mxd, Editor: michael, Printed: 9/29/2014



The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by Farr West Engineering as to the sufficiency or accuracy of the data.

N

1 " = 1,942 '

Northstar Community Services District
Sewer Capacity Analysis – Martis Valley West
Figure 2 – Martis Valley West Sewer Collection Options

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3. BACKGROUND

3.1. 2005 Sewer Capacity Analysis

The District commissioned ECO:LOGIC to perform an evaluation of the sewer system capacity and the effects of construction of the Highlands Development project and the Sawmill Heights employee housing (NCSD Sewer Capacity Analysis, March 2005). The analysis included developing a hydraulic model using Innovyze's InfoSewer program.

Current wastewater flow rates were established based on the two flow monitors in the system; the Fire Station flow monitor and the 267 flow monitor. Sanitary flows were determined from daily and hourly flow data from 2004 and diurnal flow patterns were developed for both weekday and weekend periods. To develop peak occupancy wastewater flows, data from over the Christmas holiday in 2004 was used as this period represents a busy holiday period during ski season.

Groundwater infiltration and rainfall dependent infiltration and inflow were incorporated into the model to assess peak wet weather flow. The evaluation included analyzing peak sanitary flows with the addition of rain events. This study used 25-year 6-hour, 10-year-6-hour, and 25-year 24-hour storm events to assess capacity.

The model was created using the then current District GIS data. The model was calibrated for the base sanitary flow for the high occupancy period of December 31, 2004 through January 2. 2005. Wet weather calibration was completed based on a February 17, 2004 storm event.

The model scenarios included PWWF for existing development, and existing development + the projected Highlands Development and Sawmill Heights employee housing. The analysis was performed at peak flow conditions with the design storm events coinciding with peak sanitary flows. This represents a large storm occurring on a weekend/holiday period during the ski season (rain on snow event). Modeling simulations showed that the existing collection system had sufficient capacity to handle the current base sanitary flow without surcharging during the 25-year 6-hour, 10-year-6-hour, and 25-year 24-hour storm events. At full buildout of the projected development flows, the modeling showed that a number of sewer lines would experience full pipe conditions at the 25-year 6-hour storm flow and significant manhole surcharging at the 25-year 24-hour storm event.

The capacity analysis concluded that the existing system has sufficient capacity to handle a 10-year 6-hour storm event at full buildout of the projected development, but that improvements to the existing system would be necessary if the District desired to provide protection from surcharging for a larger storm event.

3.2. 2008 Wastewater Collection System Master Plan

The District's sewer system master plan (Wastewater Collection System Master Plan DRAFT), May 2008, ECO:LOGIC) was completed to further assess the collection and conveyance of both current and future anticipated wastewater flows. This report is attached in Appendix A.

As part of this project, V&A Engineers completed a sanitary sewer flow monitoring program at five sites. The study was conducted over a 14-week period from March 9, 2007 to June 14, 2007. The idea for this time period was to be able to track a range of sewer flows, from maximum occupancy peak sanitary flows, to storm events that produce a marked effect on the RDII of the system. Unfortunately during this time period, no large storm events occurred; with rainfall totals only 36% of average over the study period. Average unit wastewater generation rates were established for new development based on an analysis of approximate occupancy, water demands, and the sewer flow data from the V&A study. This provided wastewater generation rates that were used to estimate future wastewater flows. Table 3 shows the recommended average and peak unit flow factors for each land use. A peaking factor was developed to account for peaks resulting from inflow during storm events and diurnal fluctuations. The PWWF:ADWF peaking factor of 2.6 was based on a comparison of PWWF during the December 31, 2005 storm event and the ADWF on the days preceding that storm event.

Table 3 – Unit Wastewater Generation Rates

Land Use	ADWF (gpd/unit)	PWWF, gpd/unit
Residential		
Single Family	389	1,011
Condominium	339	881
Townhouse	339	881
Other		
Hotel/Motel	339	881
Commercial	0.37 gpd/ft^2	0.96 gpd/ft^2

The Master Plan identified anticipated development as determined from a water model prepared by Auerbach Engineering. The projected development schedule provided a conservative estimate of the potential buildout within the District's service area with buildout anticipated for 2016. Table 4 provides a summary of the phased development as well as the estimated wastewater flows. Wastewater flows were estimated based on the unit wastewater generation rates presented in Table 3.

Table 4 – Anticipated Future Development and Wastewater Flows 2016 Development Level

Development	# of Units	Sq. Ft.	ADWF, GPD	PWWF, GPD
2009				
All currently vacant SFR	115		44,735	116,311
SFR parcels at Retreat	12		4,668	12,137
North Village Condos	114		38,646	100,480
Ten Village Walk Condos	10		3,390	8,814
Ten Trailside Condos	10		3,390	8,814
Ritz Hotel and Commercial	196	6,500	68,849	179,007
Ritz 14,000 sq. ft. restaurants		14,000	5,180	13,468
		Subtotal	**168,858**	**439,031**
2012				
Porcupine SFR	12		4,668	12,137
22 Village Walk Townhomes	22		7,458	19,391
Ten Highland Condos	10		3,390	8,814
Ritz Club	78		26,442	68,749
Tritz Residences	61		20,679	53,765
Highlands FS		7,000	2,590	6,734
NCSD Admin Bldg		13,725	5,078	13,203
14,000 Sq. Ft. Restaurant		14,000	5,180	13,468
		Subtotal	**75,485**	**196,262**
2016				
Highlands Parcel 1	354		120,006	312,016
Highlands Parcel 2	178		60,342	156,889
Highlands Parcel 4	61		20,679	53,765
Highlands Parcel 9	196		66,444	172,754
Highlands Parcel 10	448		151,872	394,867
Highlands Lodge	60		20,340	52,884
Ritz Commercial		4,459	1,650	4,290
Highlands Commercial		49,150	18,186	47,282
Employee Housing	74		28,786	74,844
14,000 Sq. Ft. Restaurant		14,000	5,180	13,468
		Subtotal	**493,484**	**1,283,059**
		Total	**737,828**	**1,918,352**

The Master Plan included an update of the collection system hydraulic model prepared for the 2005 Sewer Capacity Analysis. The update included the addition of current GIS data, infrastructure for anticipated development, and dry and wet weather calibration using current flow data. The model update also included field verification of rim and invert elevations of more than 90 manholes. The selected design storm for the capacity analysis was a 10-year 24-hour event with a peak rainfall of 1.8 inches/hour and a total 24-hour rainfall of 4.78 inches of rain.

Dry and wet weather calibration was performed around an extreme rain on snow event on December 31, 2005. The dry period just prior to the storm event, December 29, 2005, was used for dry weather calibration. This time frame represented peak occupancy and one of the most extensive storm events for the region in the recent time frame.

The capacity evaluation included simulations for ADWF and PWWF for the existing system, and PWWF conditions for 2009, 2012, and 2016 development levels. Chapter 6 of the Master Plan explains the results in detail. The existing system ADWF included a flow of 0.7 million gallons per day (MGD) at the system outfall at Highway 267. This flow represents the peak hour flow based on the diurnal flow patterns. It did not take into account the Highway 267 lift station operating at 225 gallons per minute (gpm), which would increase the instantaneous peaks seen when the lift station is operating. The results indicated the system was able to handle the flow without capacity issues, except for some pipe segments along Martis Landing with very mild slopes. This area of the system receives peak slug flows from the Indian Hills lift station, which pumps at 200 gpm. PWWF scenarios were modeled using the 10-year 24-hours storm event and included:

- Existing system PWWF = 1.1 MGD
- Development through 2009 PWWF = 1.5 MGD
- Development through 2012 PWWF = 1.7 MGD
- Development through 2016 PWWF = 3.0 MGD

Through the 2012 development level, model simulations indicated capacity issues similar to the existing conditions (Martis Landing). With the addition of the 2016 development, mainly the Highlands parcels, additional capacity restrictions were seen along Aspen Grove north to Northstar Drive and the fire station.

4. SEWER CAPACITY ANALYSIS

4.1. 2014 Sewer Model Update

As part of this sewer capacity analysis, the model was further updated to include current buildout projections and to allow for modeling the effects of the proposed MVW development. The update specifically included converting the previous InfoSewer model to Bentley's SewerGems. Farr West received the initial InfoSewer model electronically from the 2005 Capacity Analysis (Stantec/ECO:LOGIC). The electronic version of the model used for the 2008 Master Plan was not made available. Because of this, the 2005 model was re-calibrated to match the scenarios and results of the 2008 model.

This conversion incorporated all of the appropriate scenarios, diurnal flow patterns, storm data, etc. for the 2008 development level. The resulting model included ADWF and PWWF scenarios for the 2008 development level. This model and its flow scenarios was chosen for a number of reasons, including:

- Extended 14-week flow monitoring study performed by V&A for 5 sub-basins provided extensive data for calibration and calculation of wastewater generation factors; and
- Model was dry and wet weather calibrated to a major rain on snow storm event in December 2005.

Farr West further updated the model to include the peak flows associated with the Indian Hills and 267 Lift Stations. The Indian Hills Lift Station includes two pumps each with 200 gpm capacity. The 267 Lift Station includes two pumps with capacities of 225 gpm each.

4.2. Updated Northstar Unit Count and Buildout Projections and Sewer Flows

The District provided Farr West with updated unit counts and buildout projections for this analysis (January 2015). These projections and associated sewer flows are presented in Table 5. The ADWF and PWWF sewer flows were calculated using the sewer generation rates presented in Table 3. The sewer flows associated with the updated development schedule are only slightly higher than those presented previously for the 2016 development level. Incorporation of these updated sewer flows did not change the results of the previous modeling presented in Section 3.2.

Projected buildout sewer flows were added to the manhole nearest the identified developable parcel in the model.

Table 5 – Northstar Unit County and Buildout Projections

Region	Development	Existing (Pre-2008)	Remaining	Buildout	ADWF, GPD	PWWF. GPD
SFR Summary						
	Remainder Program Level	0	400	400	155,600	404,560
Highlands I	Trailside	0	16	16	6,224	16,182
Highlands II	Home Run Townhomes	0	16	16	6,224	16,182
Highlands II	Lot 9A	0	6	6	2,334	6,068
Highlands II	Lot 9C	0	10	10	3,890	10,114
Highlands II	Lot 9E	0	6	6	2,334	6,068
Highlands II	Lot 10-A2	0	4	4	1,556	4,046
Highlands II	Lot 10C	0	11	11	4,279	11,125
Highlands II	Lot 10G	0	10	10	3,890	10,114
Highlands III	Martis 25 (The Glades)	0	25	25	9,725	25,285
Northside	Village Walk Townhomes	0	34	34	13,226	34,388
Old Northstar	Basque	346	9	355	31,509	81,923
Old Northstar	Beaver Pond	39	0	39	Total 81 Vacant SFR Non-Highlands/Retreat	
Old Northstar	Big Springs	140	60	200		
Old Northstar	Martis	182	12	194		
Old Northstar	Porcupine SFR	0	12	12	4,668	12,137
Retreat	Retreat	0	18	18	7,002	18,205
	Total SFR	**707**	**649**	**1,356**	**252,461**	**656,399**
Condo Summary						
Region	**Development**	**Existing (Pre-2008)**	**Remaining**	**Buildout**	**ADWF, GPD**	**PWWF. GPD**
Employee Housing	Sawmill Heights and Future	96	174	270	58,986	153,364
Highlands	Remainder Program Level	0	401	401	135,939	353,441
Highlands I	Ritz Hotel - Condo Units	0	23	23	7,797	20,272
Highlands I	Ritz Hotel - Hotel Units	0	170	170	57,630	149,838
Highlands I	Ritz Club	0	78	78	26,442	68,749
Highlands I	Ritz Residences	0	61	61	20,679	53,765
Highlands II	Lot 2B	0	67	67	22,713	59,054
Highlands II	Lot2C	0	111	111	37,629	97,835
Highlands II	Lot 4	0	32	32	10,848	28,205
Highlands II	Lot 8A	0	32	32	10,848	28,205
Highlands II	Lot 9D	0	33	33	11,187	29,086
Highlands II	Lot 9F	0	36	36	12,204	31,730
Highlands II	Lot 10-A1	0	36	36	12,204	31,730
Highlands II	Lot 10E	0	36	36	12,204	31,730
Northside	North Village Condos/Hyatt/Welk Resort	0	114	114	38,646	100,480
Old Northstar	Indian Hills, Gold Bend, Ski Trails, Aspen Grove, Silver Strike	592	0	592	0	0
Old Northstar	Old Village - Building B	62	0	62	0	0
Old Northstar	Northstar Club	18	0	18	0	0
Village	New Village	213	0	213	0	0
	Total Condo	**981**	**1,404**	**2,385**	**475,956**	**1,237,486**
Commercial Summary						
Region	**Development**	**Existing (Pre-2008)**	**Remaining**	**Buildout**	**ADWF, GPD**	**PWWF. GPD**
NCSD	NCSD Admin Building	0	13,725	13,725	5,078	13,203
NCSD	Highlands Fire Station	0	7,000	7,000	2,590	6,734
Ritz	Ritz Restaurant and Commercial	0	52,959	52,959	19,595	50,947
Highlands	Highlands Commercial	0	49,150	49,150	18,186	47,282
	Total Commercial	**0**	**122,834**	**122,834**	**45,449**	**118,166**
				TOTAL	**773,866**	**2,012,051**

4.3. Martis Valley West Sewer Flow Projection

Land use planning associated with the MVW project was taken from the May 2014 Martis Valley West Parcel Specific Plan Preliminary Draft. The Specific Plan calls out for up to 760 residential units to be constructed as a combination of single family residential, townhomes/multiplexes, cabins, and condominiums. The plan also includes 34,500 square feet of commercial space. The type of commercial development is currently not defined. Table 3-3 from the Specific Plan provides a look into the possible land use mix. For the purpose of this capacity analysis, the "Probable Mix" was used to estimate number and type of units as well as sewer flow generation. Table 6 provides a summary of this information.

Table 6 –MVW "Probable Mix" Unit and Flow Summary

Land Use	Units	ADWF	Peak Hour ADWF	PWWF
SFR	375	145,875	218,813	379,275
Townhomes	265	89,835	134,753	233,571
Cabins	120	40,680	61,020	105,768
Commercial, ft^2	34,500	12,765	19,148	33,189
Total, gpd		**289,155**	**433,733**	**751,803**

Wastewater generation was calculated using the wastewater generation factors from Table 3. Peak Hour ADWF was calculated using a peaking factor of 1.5*ADWF and PWWF using a peaking factor of 2.6*ADWF. These flows were added to either Manhole 237 (Scenarios 3 and 3a) or to the siphon line just downstream of the 267 Lift Station (Scenarios 4 and 4a). Flow from MVW was modeled using a diurnal flow pattern similar to the Fire Station flow meter. This represents a mix of residential and commercial type development.

After completion of the modeling effort for this evaluation, Mountainside Partners, in their comment letter dated January 21, 2015, indicated there would be an additional 22,000 square feet of recreational commercial space associated with the project. This additional commercial floor area was provided after the modeling was complete. It is not likely that the additional wastewater generation associated with the 22,000 square feet will change the model results and the improvements to the siphon line(s) triggered by the MVW development. It is recommended that the effects of the additional commercial floor area be verified with future modeling efforts during the design phase of the improvements.

4.4. Scenarios

Four base model scenarios were developed to assess the sewer collection system capacity impacts associated with the proposed MVW project as well as a projected buildout level development in the District service territory. Each of these base scenarios included simulations for ADWF and PWWF. The 2008 development level included a 10-year 24-hour storm event. Projected wastewater flows included a peaking factor of 2.6 to account for inflow associated with storm events in undeveloped areas.

The scenarios include:

1. ADWF @ 2008 Development Level (Existing sewer collection system);
1a. PWWF @ 2008 Development Level (Existing sewer collection system);
2. ADWF @ Buildout Development Level;
2a. PWWF @ Buildout Development Level;
3. ADWF with MVW to Manhole 237;
3a. PWWF with MVW to Manhole 237;
4. ADWF with MVW to Highway 267 Siphon; and
4a. PWWF with MVW to Highway 267 Siphon

The diurnal flow patterns and graphs associated with each scenario are provided in Section 4.6 Model Results.

4.5. Capacity Evaluation Criteria

District Sewer Ordinance

The District's Sewer Ordinance 22-05 Section A-6.2 requires that sewers be designed to handle peak flows running full but without surcharging the pipeline. Peak flows in this section are defined as the PWWF produced during a storm event.

Design Storm Event

The selection of a design storm event is based on a number of factors. The frequency of rainfall occurrence used for capacity analysis and design determines the degree of protection afforded by a given storm system. For storm sewers in primarily residential areas, 2 to 15 year frequencies are common. For sewers in high value commercial areas, 10 to 25 year storm frequencies are common. For flood protection purposes, design storms of 50 years or greater are used. Also, use of less frequent (>25 year) more intense rainfall storms are used when modeling and designing combined sewer systems (those that see both sanitary flows and storm flows from a storm drain system).

The design storm used for this analysis is a 10-year 24-hour storm event, applied to the existing condition scenario, with a storm total of 4.88 inches, and a peak rainfall of 1.8 inches/hour (NOAA National Climatic Data Center, Truckee area). In comparison, the December 30-31, 2005 rain event, for which the model was calibrated, produced a storm total of approximately 5 inches. As in the 2008 Master Plan, the peak rainfall was coincided with the peak diurnal sanitary flow to represent peak wet weather flow conditions.

In comparing the 10-year 24 hour event model results with the December 30-31, 2005 storm event model results, the simulated model results are similar. The December 2005 storm event was an extreme rain on snow event that produced local flooding, but no sanitary sewer overflows. It is for this reason that the 10-year 24-hour event was chosen as the design storm for this analysis.

Siphon Capacity

The effects of the addition of MVW sewer flows will be seen in the siphon line and will depend on the flow scenario. The existing siphon system consists of parallel 8-inch and 12-inch pipelines and there are two distinct segments associated with the siphon pipelines. For the purpose of this analysis, the portion of the siphon from the inlet structure through the golf course, ending at the 267 Lift Station, will be referred to as the Golf Course Siphon. The portion of the siphon from the 267 Lift Station to the TSD outlet manhole near Airport Road will be referred to as the 267 to TSD Siphon.

Under Scenarios 3 and 3a, flows from MVW will enter the existing collection system at Manhole 237, which will affect the capacity of the Golf Course Siphon section. Under Scenarios 4 and 4a, flows from MVW will discharge into the siphon lines downstream of the 267 Lift Station and affect the capacity of the 267 to TSD Siphon section. Each of these siphon segments has a specific capacity based on the number of pumps running at the 267 Lift Station (Operating Manual for Inverted Siphon and Pump Station, Wilsey & Ham, 1971). Table 7 summarizes the siphon line capacities.

Table 7 – Hydraulic Capacity of Inverted Siphon

		Golf Course Siphon		267 to TSD Siphon	
Condition		gpm	GPD	gpm	GPD
8"	No Pumps	600	864,000	600	864,000
	1 Pump	475	684,000	700	1,008,000
	2 Pumps	310	446,400	760	1,094,400
12"	No Pumps	1,800	2,592,000	1,800	2,592,000
	1 Pump	1,625	2,340,000	1,850	2,664,000
	2 Pumps	1,450	2,088,000	1,900	2,736,000
8" + 12"	No Pumps	2,400	3,456,000	2,400	3,456,000
	1 Pump	2,275	3,276,000	2,500	3,600,000
	2 Pumps	2,100	3,024,000	2,550	3,672,000

4.6. Model Results

The model results for the simulated scenarios are presented below. The collection system deficiencies for the 2008 and buildout development levels were previously defined in the 2008 Master Plan, and are supported by this evaluation as well. These existing system deficiencies include pipe segments along Martis Landing with very mild pipe slopes and additional capacity restrictions along Aspen Grove north to Northstar Drive and the fire station. The addition of flows from MVW will not affect these deficiencies based on the location of the flow entering the system for the two simulated options.

The segments affected by the MVW sewer flows are along the parallel siphon lines.

4.6.1. Scenario 1 and 1a – 2008 Development Level

Figures 3 and 4 present the diurnal flow patterns for the 2008 development level ADWF and PWWF scenarios. The figures show the influent diurnal pattern to the 267 Lift Station as well as the combined outlet flow, which is the total flow being delivered to TSD. The combined outlet flow takes into account the pumping cycles associated with the 267 Lift Station.

For the 267 to TSD siphon section, the simulation showed a peak hour ADWF of 648 gpm, or 933,120 GPD. The PWWF was simulated at 795 gpm, or 1,144,800 GPD. Under the peak hour ADWF scenario, the system is able to operate with only the 8-inch siphon line in service. Under PWWF conditions, the combined flow slightly exceeds the capacity of the 8-inch siphon line, and therefore this condition requires the 12-inch siphon line to be in service. Under both flow conditions, the 267 Lift Station operates with only one 225 gpm pump running, as the inflow to the lift station 120 gpm for ADWF and 187 gpm for PWWF.

For the Golf Course siphon section, the simulation showed a peak hour ADWF of 423 gpm, or 609,120 GPD. The PWWF was simulated at 570 gpm, or 820,800 GPD. The results are similar, with the 8-inch siphon line providing the necessary capacity under ADWF conditions and the 12-inch siphon line satisfying the PWWF conditions.

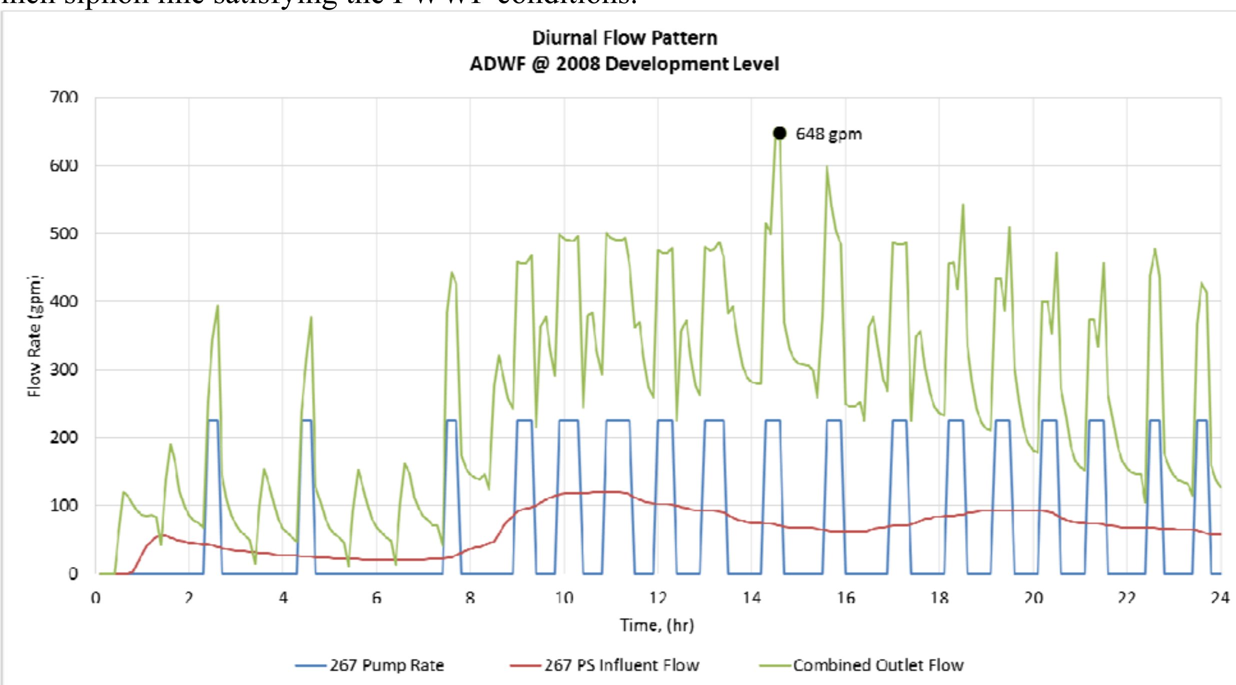

Figure 3 – Scenario 1 Diurnal Flow Pattern ADWF @ 2008 Development Level

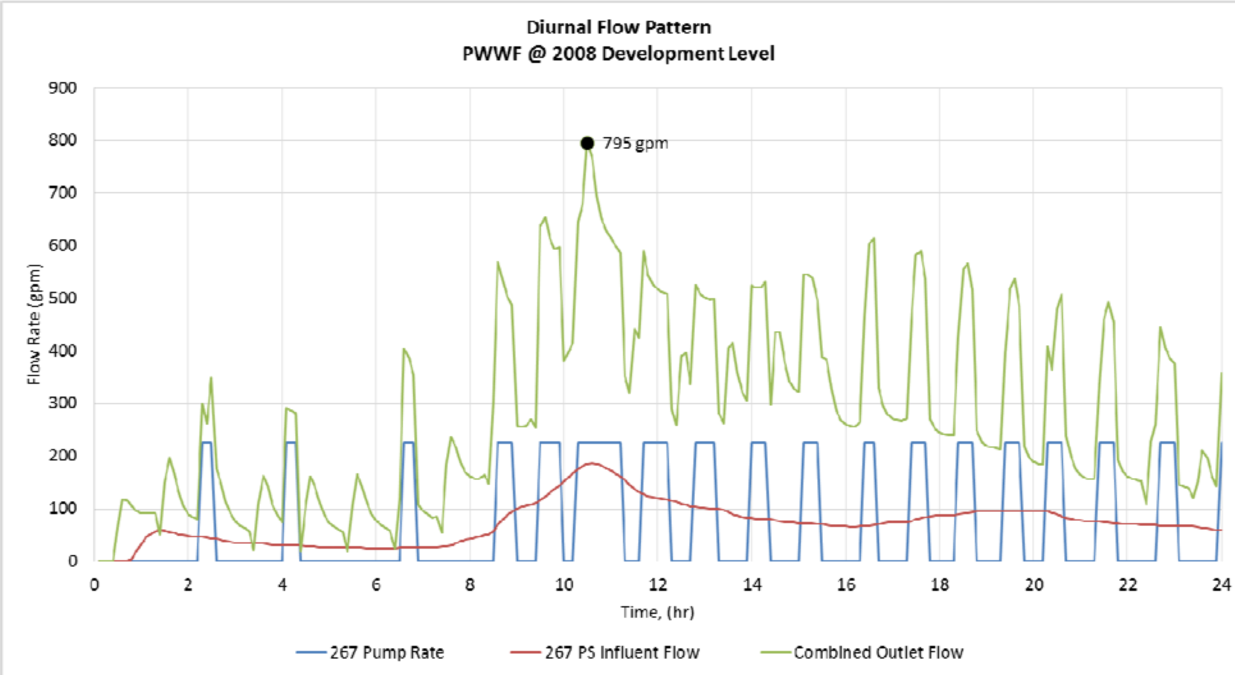

Figure 4 – Scenario 1a Diurnal Flow Pattern PWWF @ 2008 Development Level

4.6.2. Scenario 2 and 2a – Buildout Development Level

Figures 5 and 6 present the diurnal flow patterns for the buildout development level ADWF and PWWF scenarios. The figures show the influent diurnal pattern to the 267 Lift Station as well as the combined outlet flow which is the total flow being delivered to TSD. The combined outlet flow takes into account the pumping cycles associated with the 267 Lift Station.

For the 267 to TSD siphon section, the simulation showed a peak hour ADWF of 1,377 gpm, or approximately 2,000,000 GPD. The PWWF was simulated at 1,955 gpm, or approximately 2,800,000 GPD. Under the peak hour ADWF scenario, the system requires the 12-inch siphon line to carry the flow. Under PWWF conditions, the combined flow exceeds the capacity of the 12-inch siphon line, and therefore this condition requires the 8-inch and 12-inch siphon lines to both be in service. Under the ADWF conditions, the 267 Lift Station operates with only one 225 gpm pump running, as the peak inflow to the lift station is 190 gpm. The PWWF scenario has a peak inflow to the lift station of 293 gpm, therefore there are two occasions indicated in the diurnal pattern that require both pumps to operate (450 gpm) for a short periods of time.

For the Golf Course siphon section, the simulation showed a peak hour ADWF of 1,152 gpm, or approximately 1,700,000 GPD. The PWWF was simulated at 1,657 gpm, or 2,400,000 GPD. The results are similar, with the 12-inch siphon line providing the necessary capacity under ADWF conditions and the 8-inch and 12-inch siphon lines running in parallel satisfying the PWWF conditions.

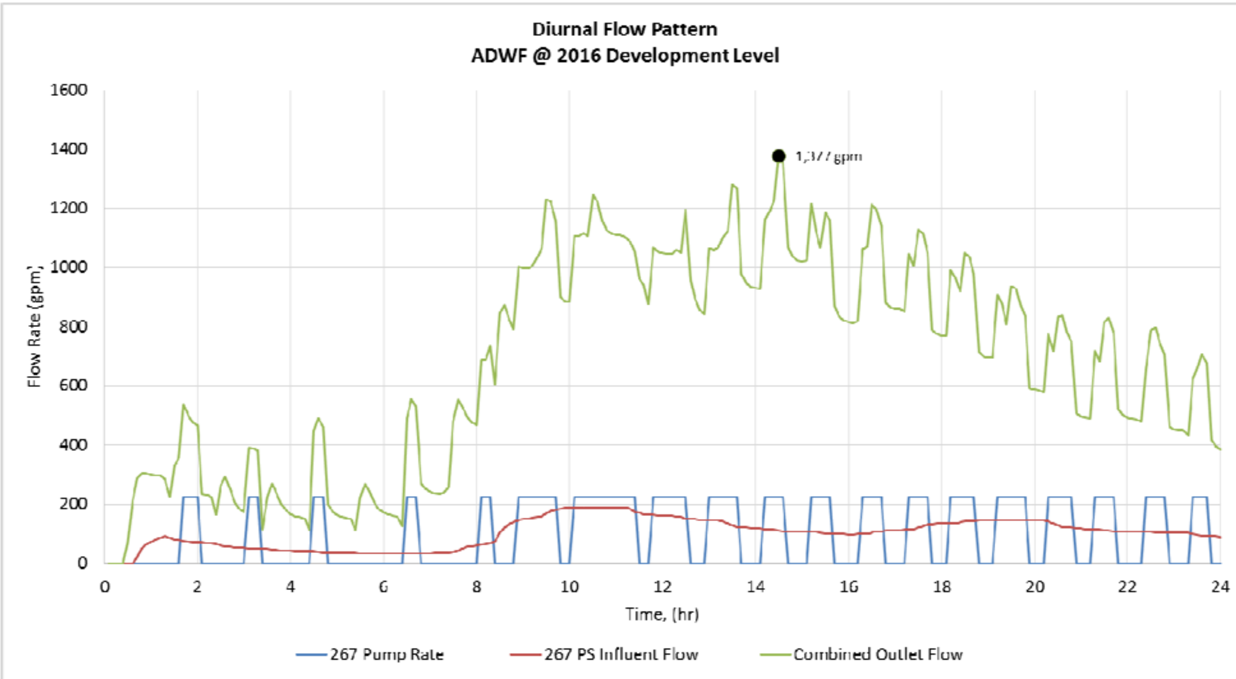

Figure 5 – Scenario 2 Diurnal Flow Pattern ADWF @ Buildout Development Level

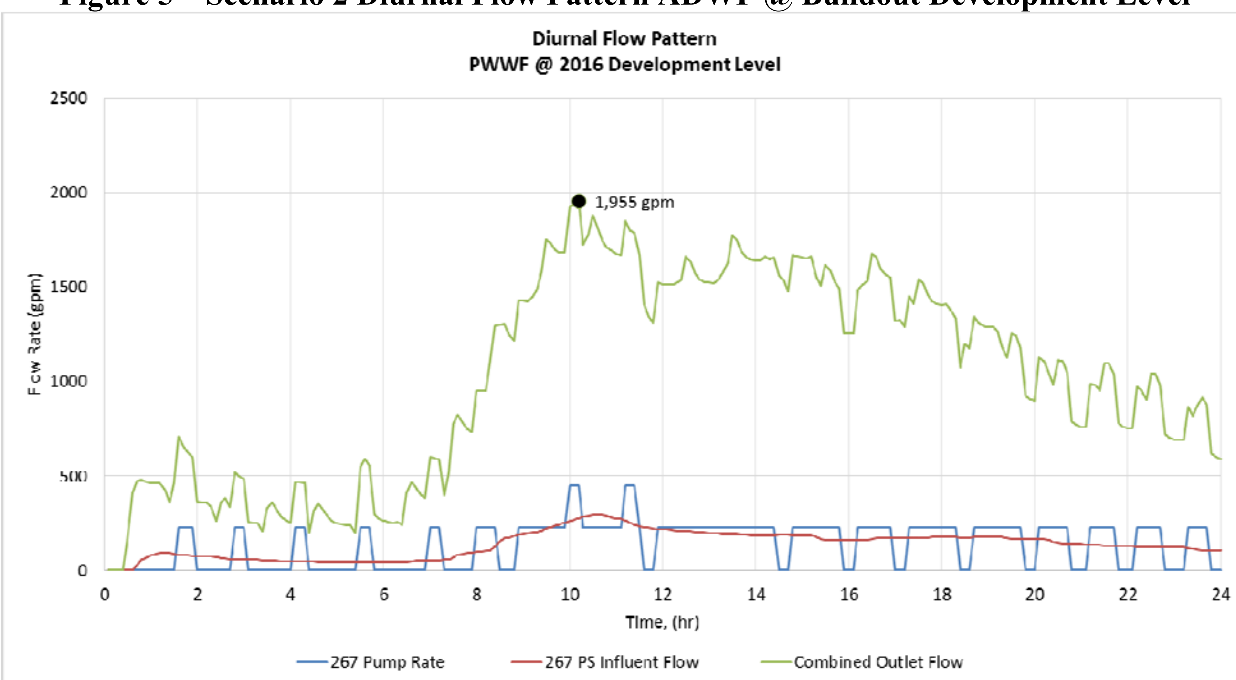

Figure 6 – Scenario 2a Diurnal Flow Pattern PWWF @ Buildout Development Level

4.6.3. Scenario 3 and 4 – Martis Valley West Development Level

Modeling for the MVW development includes 2 options. The first includes routing flow from the development down Highway 267 and across Northstar Drive to a connection point on the existing 12-inch sewer line at manhole 237. The second option includes a pipeline down Highway 267 to the siphon lines downstream of the lift station. Figure 2 shows both options.

4.6.3.1. MVW to Manhole 237

Figures 7 and 8 present the diurnal flow patterns for the buildout development level with the addition of MVW flows under ADWF and PWWF scenarios. Flow into this part of the existing collection system will have an effect on the existing 12-inch sewer line between manhole 237 downstream to the siphon inlet structure, as well as the both the Golf Course and 267 to TSD siphon line sections.

Table 8 shows the simulated peak flows as well as pipeline capacities from manhole 237 to the siphon inlet structure. Under both ADWF and PWWF simulations, these pipe sections have ample capacity to accept flow from the MVW development.

Table 8 – Flow and Capacity Manhole 237-Siphon Inlet (gpm)

Scenario 3 and 3a	237-236		236-234		234-Siphon Inlet	
Buildout + MVW Development Level Loading at MH 237	**Flow**	**Capacity**	**Flow**	**Capacity**	**Flow**	**Capacity**
Peak Hour ADWF	1,268	3,323	1,268	4,277	1,269	3,628
PWWF	1,950		1,950		1,954	

For the 267 to TSD siphon section, the simulation showed a peak hour ADWF of 1,550 gpm, or approximately 2,250,000 GPD. The PWWF was simulated at 2,478 gpm, or approximately 3,600,000 GPD. Under the peak hour ADWF scenario, the system requires the 12-inch siphon line to carry the flow. *Under PWWF conditions, the combined flow reaches the capacity of the parallel siphon lines, and therefore this condition requires upsizing approximately 11,500 linear feet of 8-inch siphon line to 16-inch.* Under the ADWF conditions, the 267 Lift Station operates with only one 225 gpm pump running, as the peak inflow to the lift station is 190 gpm. The PWWF scenario has a peak inflow to the lift station of 293 gpm, therefore there a two occasions indicated in the diurnal pattern that require both pumps to operate (450 gpm) for a short periods of time.

For the Golf Course siphon section, the simulation showed a peak hour ADWF of 1,326 gpm, or approximately 1,900,000 GPD. The PWWF was simulated at 2,187 gpm, or 3,150,000 GPD. Under peak ADWF conditions, the system is able to meet the capacity requirements using the 12-inch siphon line. *Under PWWF conditions, the flow rate of 2,187 gpm exceeds the capacity of both Golf Course siphon lines running in parallel (2,100 gpm), and therefore this condition requires upsizing the 8-inch siphon line to 16-inch.*

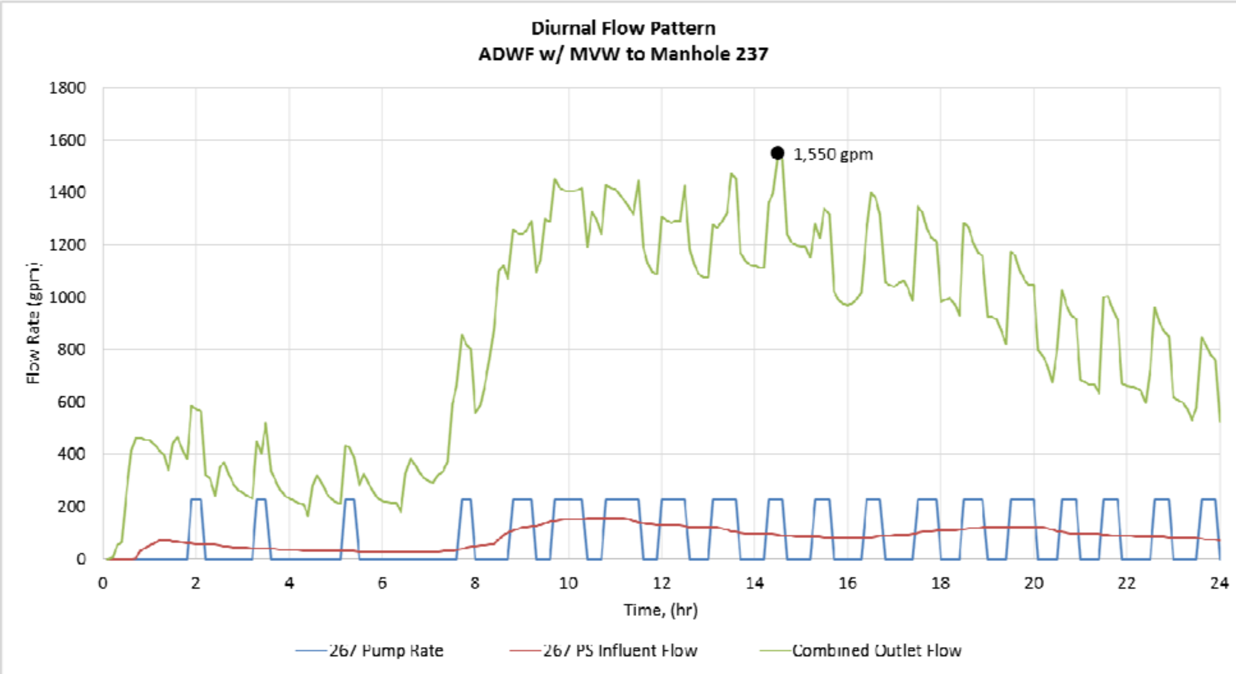

Figure 7 – Scenario 3 Diurnal Flow Pattern ADWF with MVW to Manhole 237

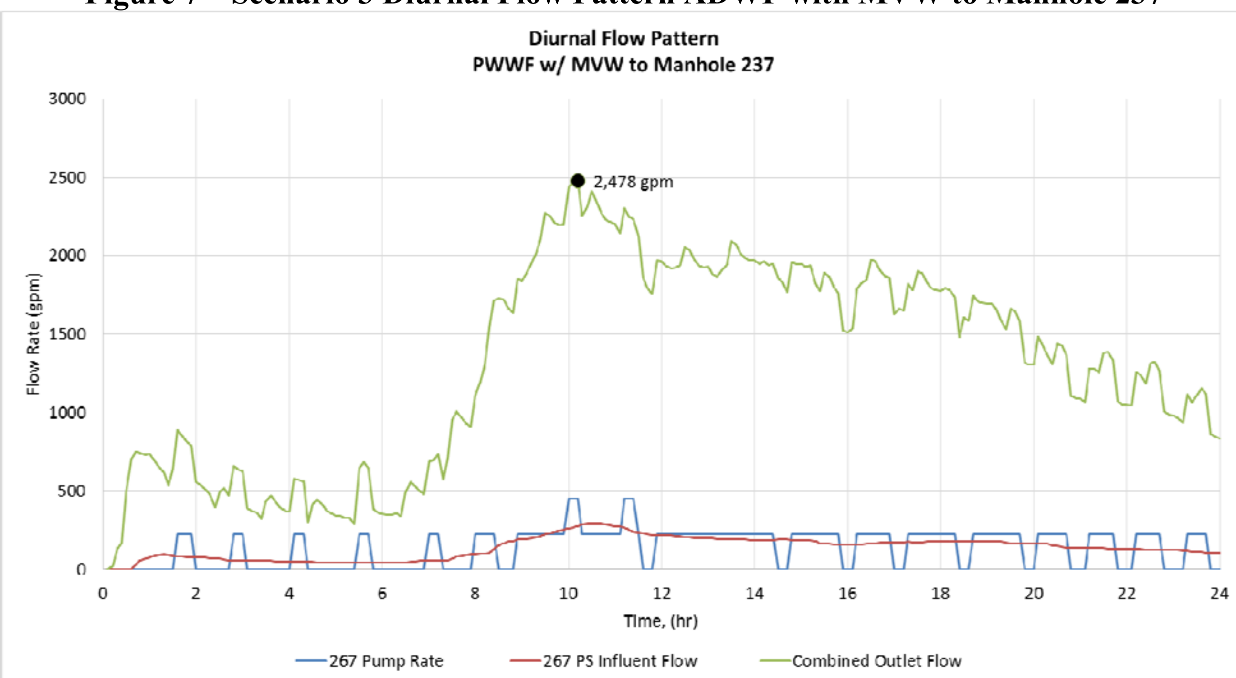

Figure 8 – Scenario 3a Diurnal Flow Pattern PWWF with MVW to Manhole 237

4.6.3.2. MVW to Highway 267 Siphon

Figures 9 and 10 present the diurnal flow patterns for the buildout development level with the addition of MVW flows under ADWF and PWWF scenarios. Flow into this part of the existing collection system will have an effect on the 267 to TSD siphon line section.

For the 267 to TSD siphon section, the simulation showed a peak hour ADWF of 1,548 gpm, or approximately 2,250,000 GPD. The PWWF was simulated at 2,472 gpm, or approximately 3,600,000 GPD. Under the peak hour ADWF scenario, the system requires the 12-inch siphon line to carry the flow. *Under PWWF conditions, the combined flow reaches the capacity of the parallel siphon lines, and therefore this condition requires upsizing the 8-inch siphon line to 16-inch.* Under the ADWF conditions, the 267 Lift Station operates with only one 225 gpm pump running, as the peak inflow to the lift station is 190 gpm. The PWWF scenario has a peak inflow to the lift station of 293 gpm, therefore there a two occasions indicated in the diurnal pattern that require both pumps to operate (450 gpm) for a short periods of time.

The Golf Course siphon section will show flows identical to the buildout development level (Scenario 2). Under peak ADWF conditions, the 12-inch siphon line will be operational and under PWWF conditions both the 8-inch and 12-inch siphon lines will need to be in service.

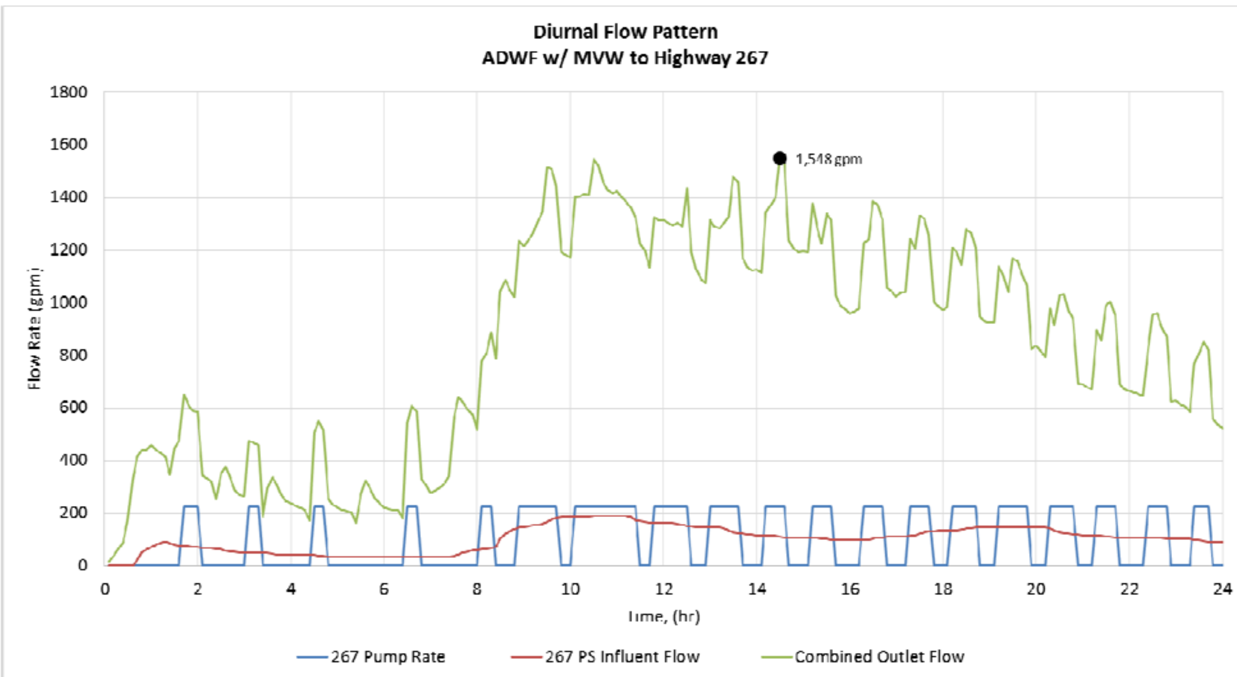

Figure 9 – Scenario 4 Diurnal Flow Pattern ADWF with MVW to Highway 267 Siphon

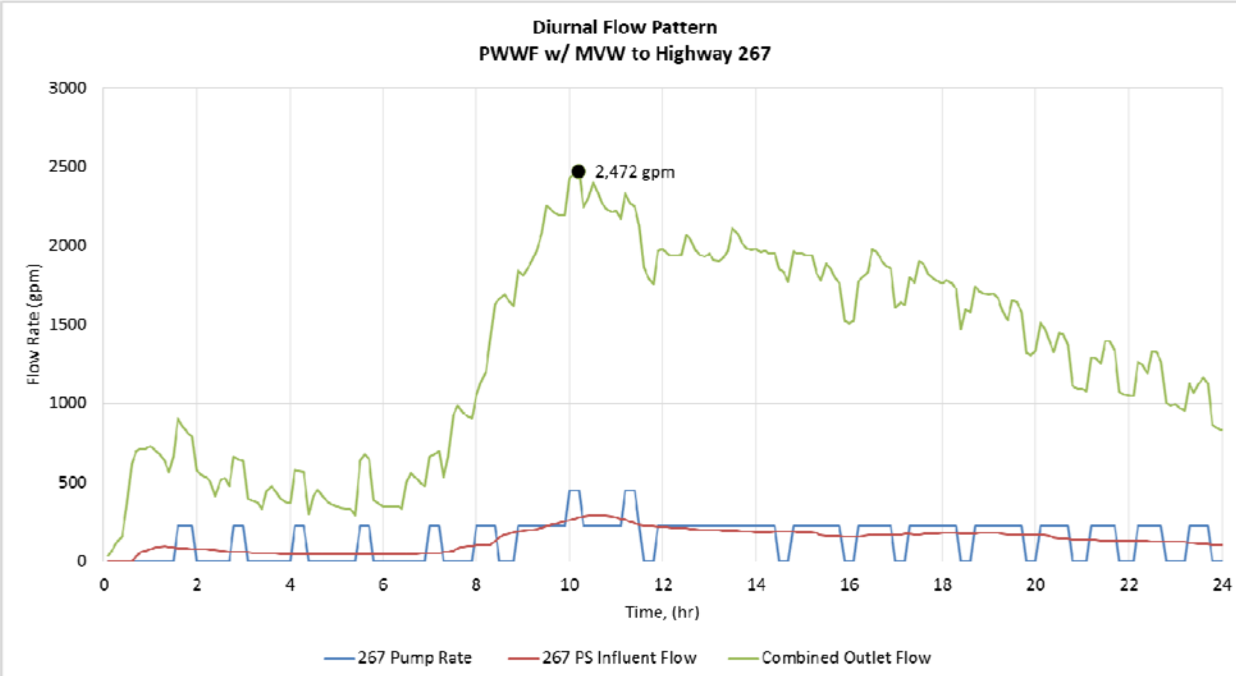

Figure 10 – Scenario 4a Diurnal Flow Pattern PWWF with MVW to Highway 267 Siphon

5. RECOMMENDATIONS

A vital portion of the District's sewer collection system is the parallel siphon lines, collecting sewer flows from the entire system. Under current flow conditions the District is able to operate either the 8-inch or 12- inch siphon lines to satisfy system capacity. The PWWF simulation under buildout development conditions requires the use of both siphon lines run in parallel. The buildout development condition also shows the need for operating both pumps at the lift station for short periods of time. With the addition of the MVW development and flow contribution to manhole 237 (Scenario 3), the Golf Course and 267-TSD sections are not able to meet the capacity requirements under PWWF conditions. With the addition of MVW flows downstream of the 267 Lift Station, the 267-TSD siphon line section is at 100% capacity under PWWF conditions.

To address capacity issues related to the addition of MVW sewer flows, the recommended system improvements include:

- Under Scenario 3 with MVW sewer contribution to manhole 237, upsize approximately 6,450 linear feet of the existing 8-inch siphon line through the Golf Course to 16-inch, and upsize approximately 11,500 linear feet of the existing 8-inch 267-TSD siphon line to 16-inch; and
- Under Scenario 4 with MVW sewer contribution downstream of the 267 Lift Station, upsize approximately 11,500 linear feet of the existing 8-inch 267-TSD siphon line to 16-inch.

The extents of these improvements are shown on Figure 11.

The data contained herein does not represent survey delineation and should not be construed as a replacement for the authoritative source. No liability is assumed by Farr West Engineering as to the sufficiency or accuracy of the data.

N

1 " = 1,200 '

Northstar Community Services District
Sewer Capacity Analysis - Martis Valley West
Figure 11 – Martis Valley West Required Improvements

FARR WEST ENGINEERING
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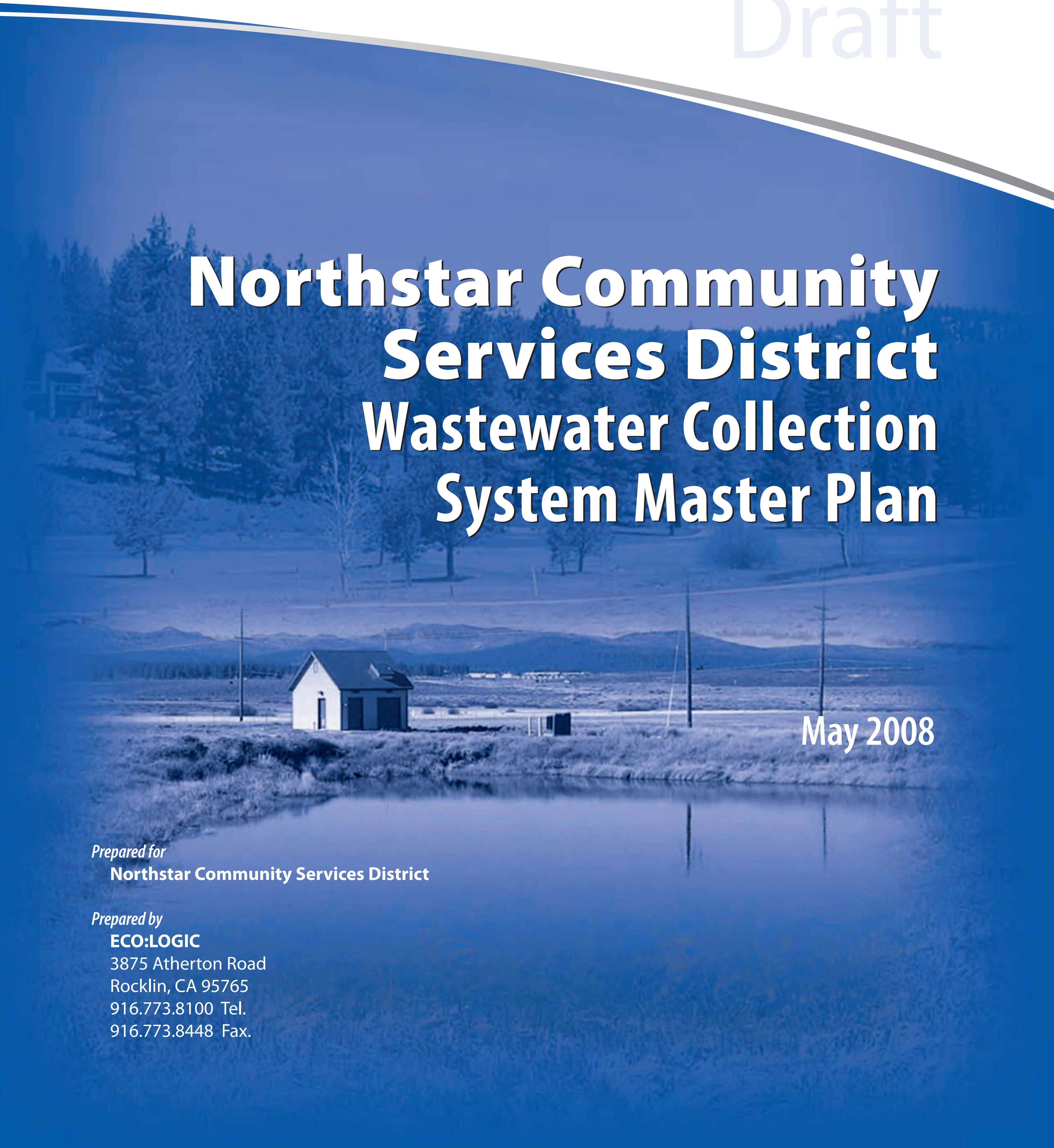
P:\Client Projects\Northstar Community Services District 134\0745 Northstar Sewer Modeling\GIS_from_NCSD\Maps\NorthstarCSD_Siphon_Figure11_11X17.mxd, Editor: MForrest, Printed: 2/11/2015

APPENDIX A

2008 WASTEWATER COLLECTION SYTEM MASTER PLAN

ECO:LOGIC
ENGINEERS · CONSULTANTS

Draft



Northstar Community Services District
Wastewater Collection System Master Plan

May 2008

Prepared for
Northstar Community Services District

Prepared by
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Chapter 2

Existing Wastewater Collection System

2.1 PURPOSE

The purpose of this chapter is to describe NCSD's existing wastewater collection system.

This chapter is divided into the following sections:

- Description of Existing Wastewater Collection System
- GIS Database
- Wastewater Flow Monitoring Program
- Existing Wastewater Flows

2.2 DESCRIPTION OF EXISTING WASTEWATER COLLECTION SYSTEM

NCSD is located on the northwest face of Mount Pluto. The collection system follows the sharp gradient of the terrain, flowing from south to north. An atlas of the system is included in Appendix A.

NCSD's existing wastewater collection system covers an area of approximately 1,840 acres and provides service to over 870 residential units and commercial spaces. The wastewater generated by these users is collected and conveyed via gravity pipeline, pump stations and siphon lines to the Tahoe-Truckee Sanitation Agency (T-TSA) interceptor which flows to the T-TSA treatment facilities. NCSD owns, operates, and maintains the collection system upstream of the interceptor line. NCSD's Collection System consists of approximately 33 miles of pipelines (ranging in size from four to 12 inches in diameter) and two pump stations.

2.2.1 SIPHONS

NCSD's system has two siphon lines. One is eight inches in diameter, while the other is 12 inches in diameter. The two lines run parallel to each other along West Martis Creek through the golf course. At the north end of the golf course, the lines cross over the West Martis Creek taking a northeasterly direction towards the pump station along Highway 267. From this pump station the siphon carries the flow over Martis Creek and under Highway 267 to the point of discharge into the T-TSA interceptor.

The two lines of the siphon are typically not used at the same time. Consequently there are valves at each siphon inlet for directing the flow into either line of the siphon. Pipes enter the two siphon lines at three places: 1) between Wolf Tree and Lodgepole near manhole 234, 2) between Basque Drive and Skidder Trail, east of manhole 98 and 3) at the pump station along Highway 267.

2.2.2 PUMP STATIONS

There are three pump stations in the NCSD service area, although only two of them are owned and operated by NCSD.

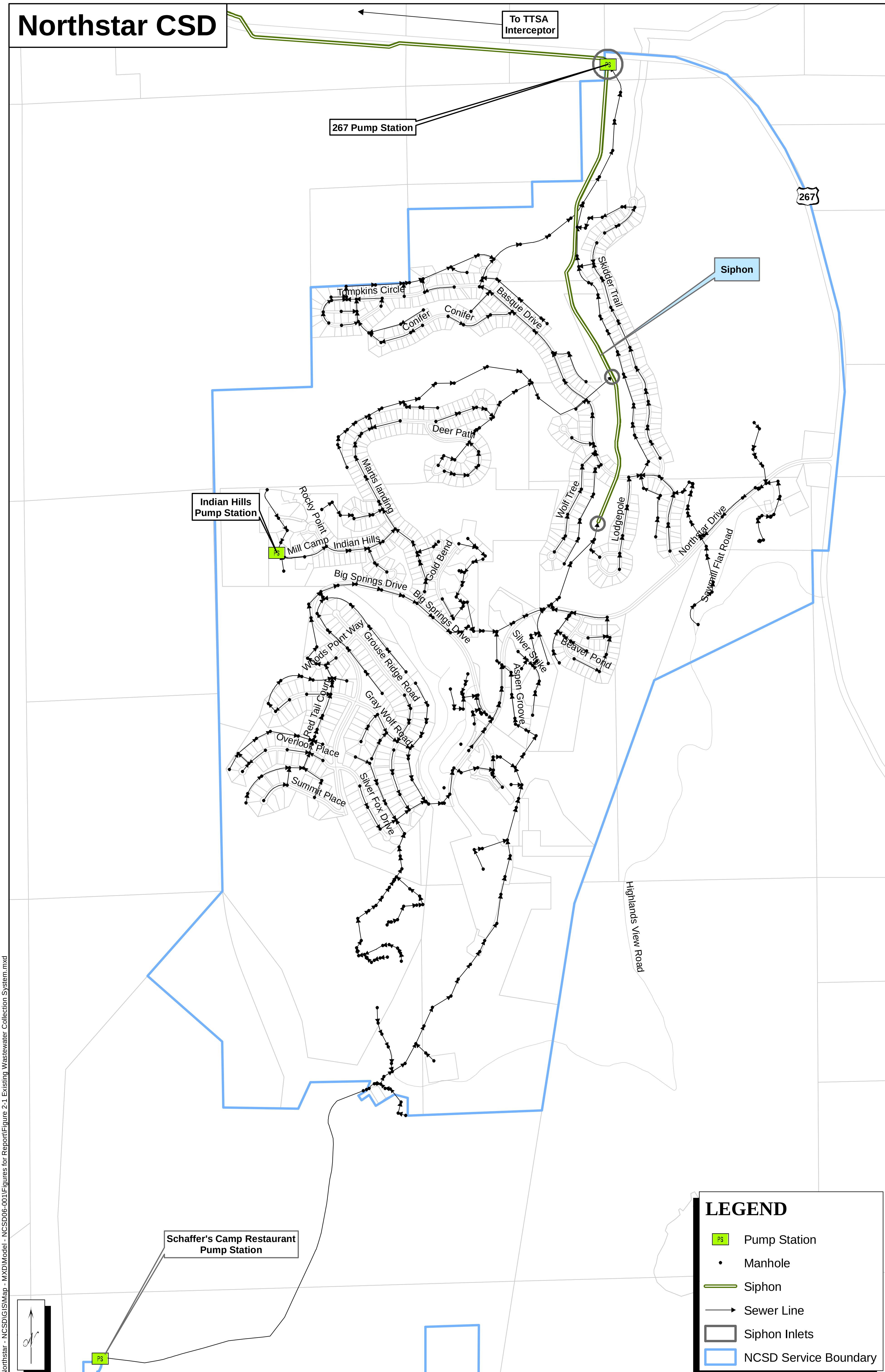
The pump station at Highway 267 serves to add total hydraulic head to the siphon lines so that they can carry the flow to the T-TSA interceptor and is operated by NCSD.

The second pump station operated by NCSD serves to lift wastewater flow from the Indian Hills Condominiums uphill to the nearby sewer lines on Indian Hills Road.

A third pump station is located at Schaffer's Camp Restaurant. Though NCSD does not own or operate this pump station or the force main, they have been included in this report as part of the system because they flow into the NCSD sewer system. It serves to pump wastewater generated by the restaurant down to the NCSD sewer system at the Big Springs Day Lodge. Information about the pumps at the three pump stations are shown in Table 2-1. NCSD's existing wastewater collection system and its significant attributes are shown in Figure 2-1.

Table 2-1
Northstar CSD
Pump Information

Pump Station	Number of Pumps	Pump Capacity (gpm)	Total Displaced Head (ft)	Horsepower
267	2	225	150	20
Indian Hills	2	200	76	10
Schaffer's Camp	2	45	10	2



M:\Northstar - NCSD\GIS\Map - MXD\Model - NCSD06-001\Figures for Report\Figure 2-1 Existing Wastewater Collection System.mxd

ECO:LOGIC Engineering - **DRAFT**
Northstar CSD Wastewater Collection System Master Plan

Figure 2-1
Significant Attributes of the Existing Wastewater Collection System

2.3 GIS DATABASE

Pipe and manhole data for wastewater collection system was provided by NCSD in Geographic Information System (GIS) format.

Pipe information included:

- Location
- Pipe size (diameter)
- Pipe slope
- Pipe material

Manhole information included:

- Location
- Rim elevations
- Invert elevations

Any data gaps (such as missing inverts or rims) or inconsistent slope information were completed through field surveys or interpolation of the nearest surrounding values.

2.4 WASTEWATER FLOW MONITORING PROGRAM

Wastewater flow was monitored by V&A Consulting Engineers (V&A) for fourteen weeks from March 8, 2007 to June 15, 2007. This time period captured flows during the ski season (when the area was highly populated by skiers), during snowmelt when groundwater can influence sewer flows, during several rainfall events when wet weather infiltration inflow can influence the sewer flow, and during low population and warmer, dry weather with no snow.

2.4.1 WASTEWATER FLOW MONITORING SITE LOCATIONS AND BASINS

V&A Flow Monitoring

In coordination with NCSD, ECO:LOGIC selected flow monitoring locations to isolate five distinct basins within the study area. The sewer basins are either defined by a combination of flow monitors, which measure the wastewater flow into and out of a basin, or by a single flow monitor (terminal basin). The flow monitor locations and basins are shown in Figure 2-2. A flow schematic showing the connectivity of the basins is included as Figure 2-3. The flow monitor combinations used to isolate flows from each basin in this study are shown in Table 2-1.

NCSD Flow Monitoring

NCSD maintains two permanent flow monitors in their collection system. The first is located at the pump station at Highway 267 (267 Pump Station) and receives flow from Skidder Trail and Basque Road (V&A flow monitoring basins 4 and 5). The second flow monitor is located in a manhole at the NCSD fire station (manhole 248). This monitor receives flow from residential properties on Silver Fox, Eagle Feather Court, and portions of Grouse Ridge. This flow monitor also receives commercial flows from the Village and the Big Spring Day Lodge, as well as condominium flows from the Aspen Grove and Ski Trails Condominiums. NCSD's two permanent flow monitors are also shown on Figure 2-2.

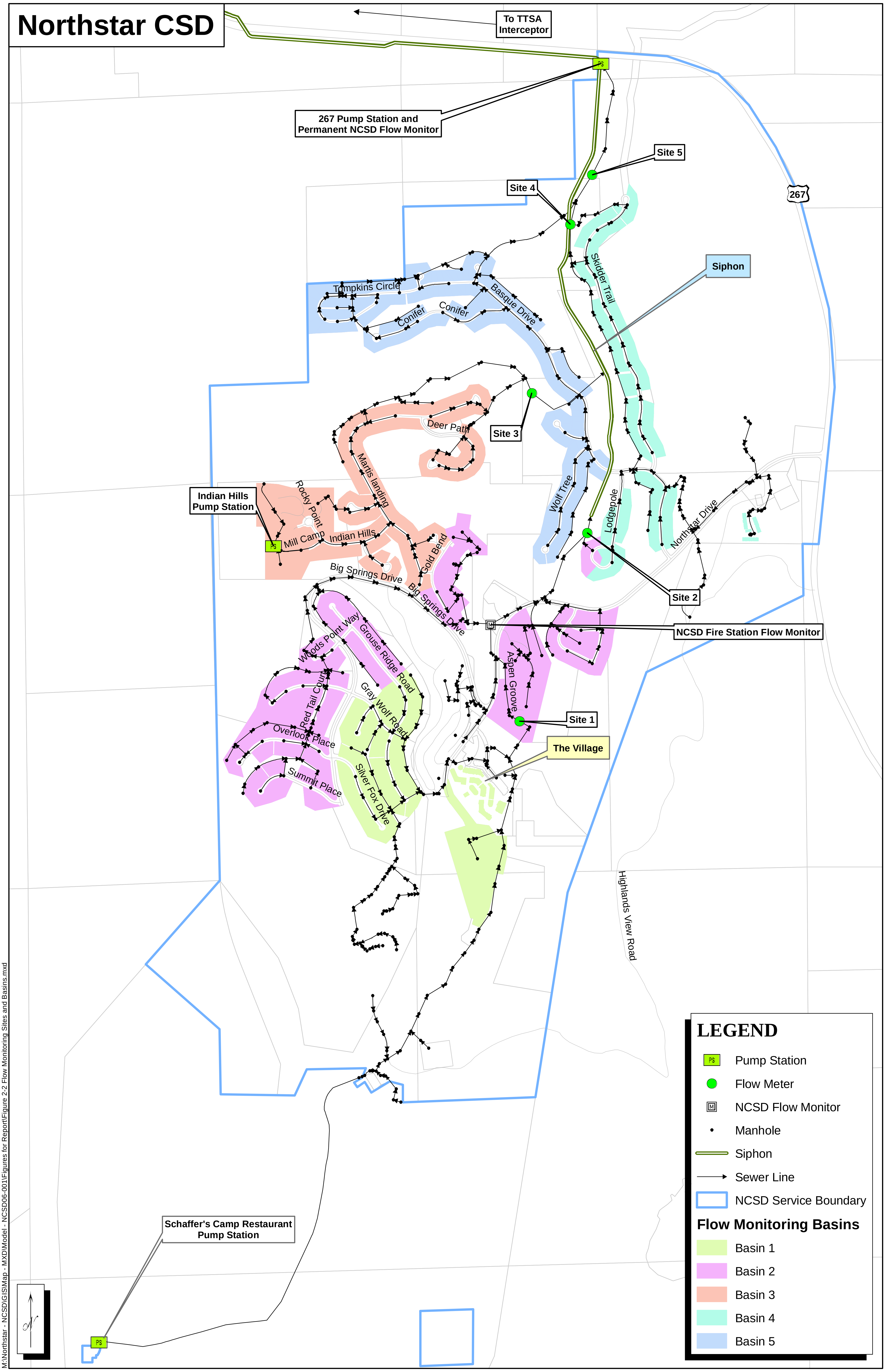


Figure 2-2
Flow Monitoring Sites and Basins

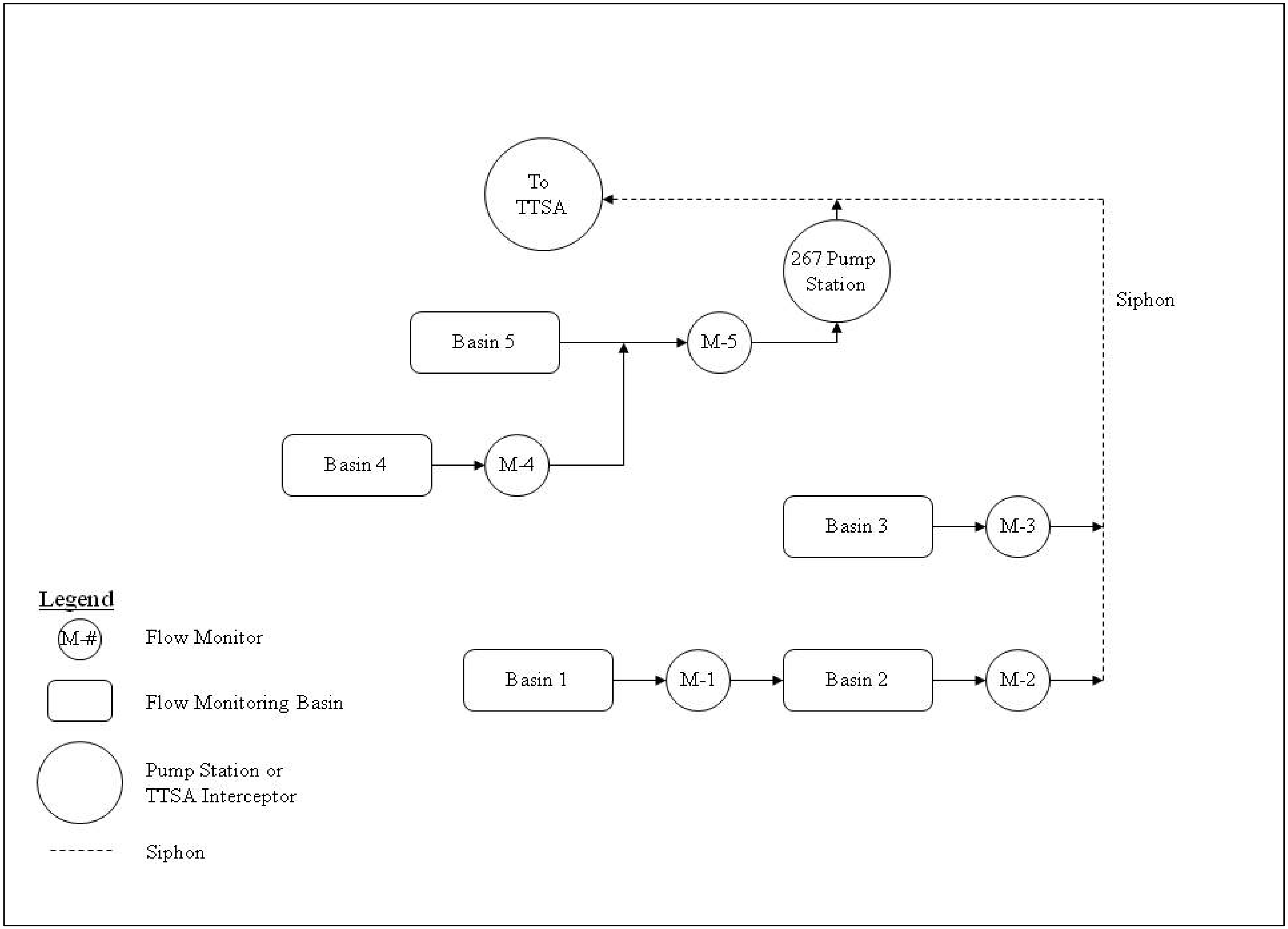


Figure 2-3
Northstar CSD Sewer Flow Monitoring Schematic

Table 2-1
Northstar CSD
Flow Monitoring Basins

Basin	Monitoring Site Equations (a)
1	FM 1
2	FM 2 – FM 1
3	FM 3
4	FM 4
5	FM 5 – FM 4

(a) FM represents flow monitoring sites used as shown in Figures2-2 and 2-3.

2.4.2 RAINFALL DATA

Rainfall data for the flow monitoring period was taken from the Martis Creek Reservoir Rain Gauge, operated by the California Department of Water Resources (CDWR), which is located approximately three miles north-northeast of NCSD. All rainfall events from the Martis Creek Reservoir Gauge that occurred during V&A's flow monitoring period are shown in Figure 2-4. The largest storm event, which occurred on March 26, 2007, had a duration of six hours and a return period of just over one year. The total rainfall depth during the time of flow monitoring was 2.45 inches, which is 36 percent of historical rainfall amounts.

For the purpose of the master plan, peak flows generated from a rainfall event with a duration of 24 hours and a return period of 10 years is being recommended as a level of service for the collection system (10-year/24-hour storm). This storm is being suggested because of precedents set in Sacramento County and the City of Folsom. Design storms are discussed in more detail in Chapter 5.

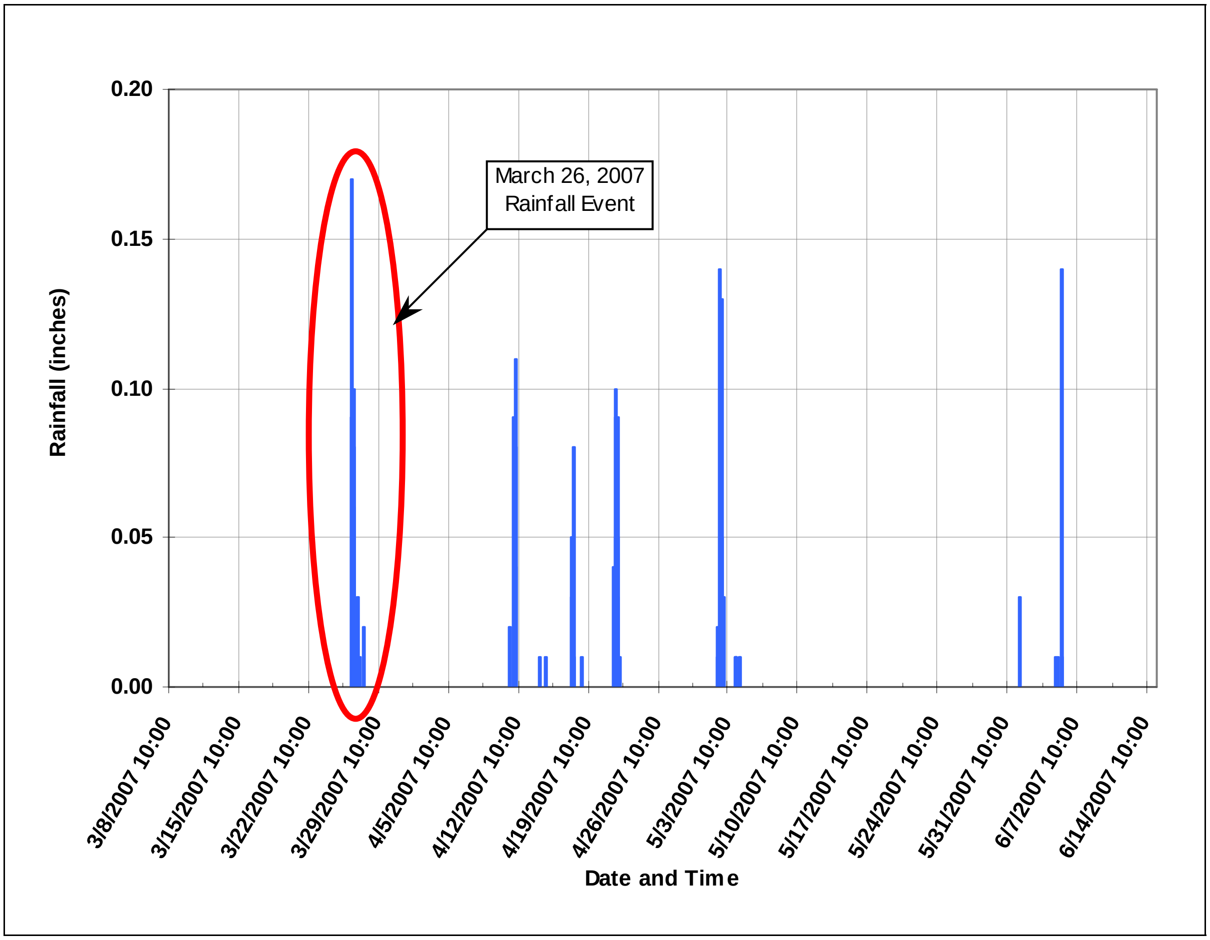


Figure 2-4
Martis Creek Reservoir Rain Gauge
Rainfall Data during the V&A Flow Monitoring Period

2.4.3 SNOWMELT

Snowpack depth during the flow monitoring period was taken from the CDWR Truckee 2 weather station located approximately four miles northwest of NCSD. A significant reduction in peak sewer flows, coinciding with the melting of the snowpack, was witnessed due to the end of the ski season. Melting of the snowpack can cause full saturation of the soil and high groundwater levels which can cause infiltration into the system. A graphical representation of the snowpack depth during the flow monitoring period is shown in Figure 2-5.

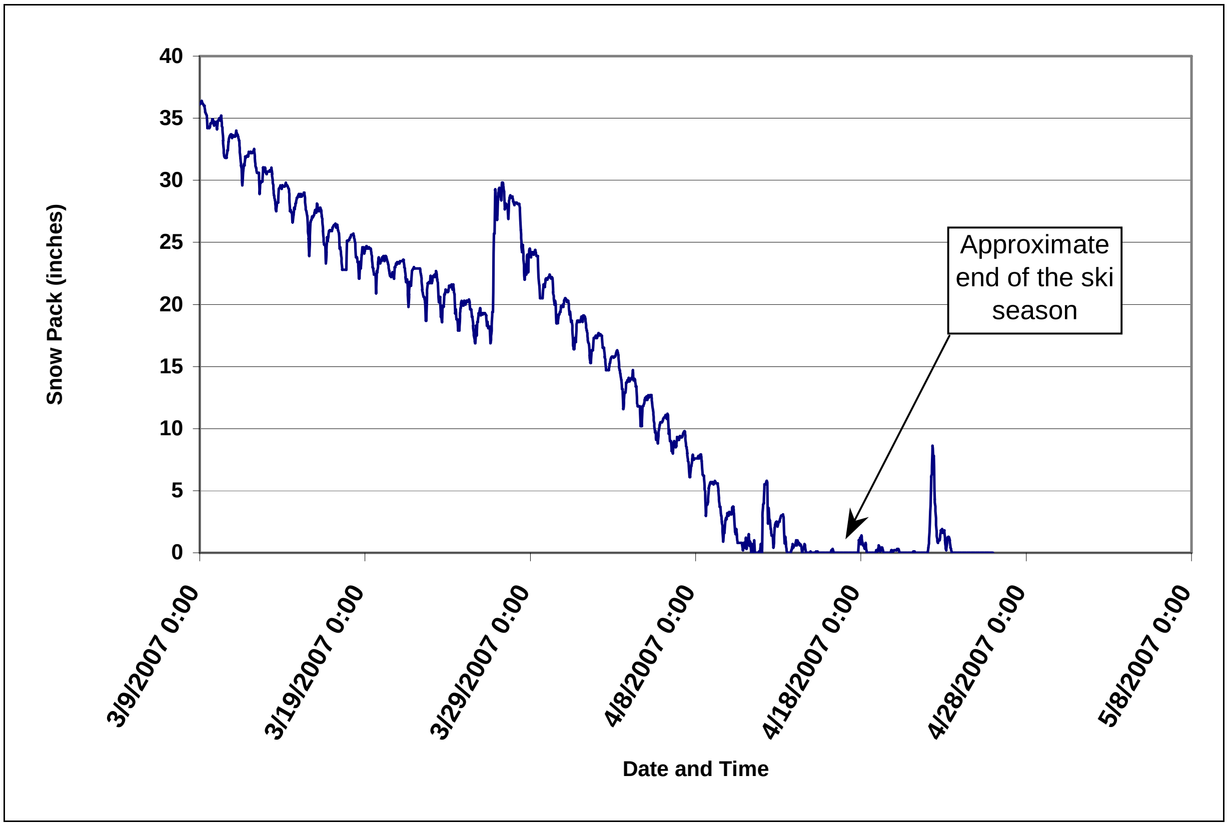


Figure 2-5
California Department of Water Resources Truckee 2 Weather Station Snow Pack Depth during the V&A Flow Monitoring Period

2.5 EXISTING WASTEWATER FLOW CHARACTERISTICS

Wastewater collection systems are designed to convey peak wet weather flows. Peak wet weather flows are generally comprised of three elements: base sanitary flow, rainfall-dependent infiltration and inflow (RDI/I), and groundwater infiltration (GWI). Each component is described in more detail below.

2.5.1 BASE FLOW

Base wastewater flow is wastewater that is generated by residences and businesses. It is highly affected by occupancy rates within the community. Northstar is a popular ski resort that experiences its highest base flows on winter weekends and during winter holidays, such as Christmas, New Years, and President's Day Weekend. During weekdays and the summer months, there is a significant drop in base wastewater generation due to the small number of permanent residents in the community.

2.5.2 Average Dry Weather Flow

Average dry weather flow was determined by V&A from the flow monitoring data recorded from April 28 to May 24, 2008.

Each basin within NCSD has its own unique diurnal pattern (the variation in flow occurring over a 24-hour period). Diurnal patterns are used in the model to simulate diurnal peaks in flow. A storm event that causes peak inflow during a diurnal peak is considered the most conservative situation that will occur in a sewer system. For calibration purposes, three different averages of hourly flows were generated from V&A's flow monitoring data for each basin: an average for weekdays only, an average for weekends only, and a weighted average for the entire week. Figures 2-6 through 2-8 show the average diurnal flows for each basin.

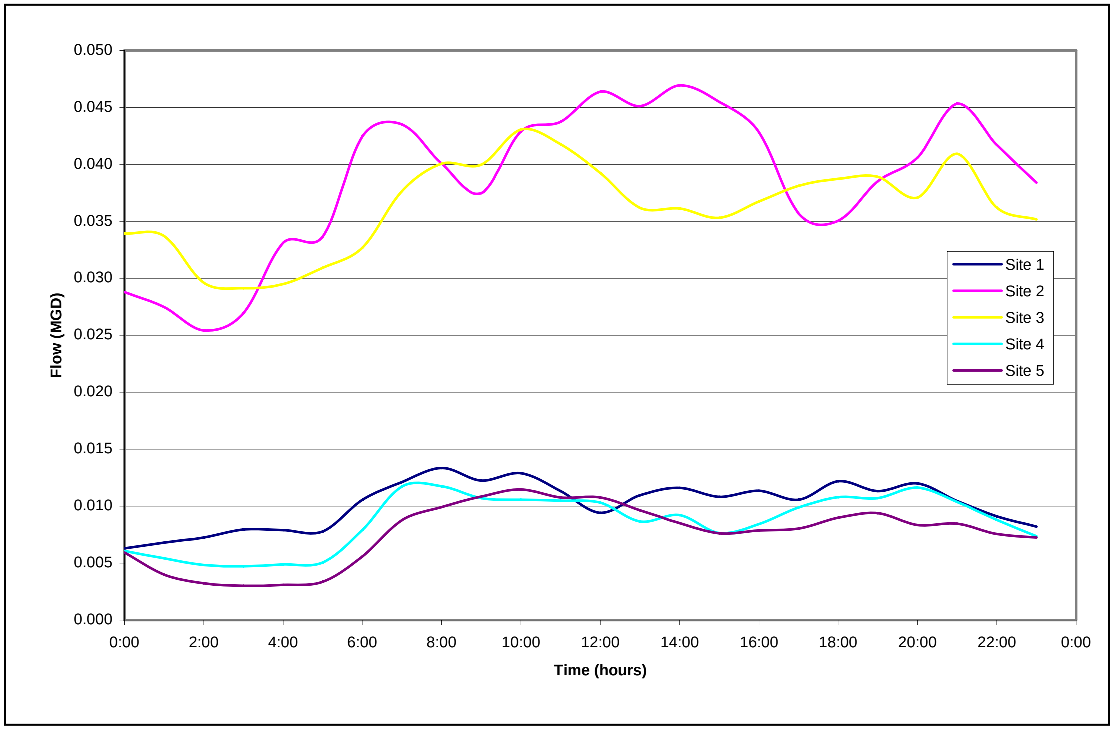


Figure 2-6
Northstar CSD
Weekday Diurnal Flow

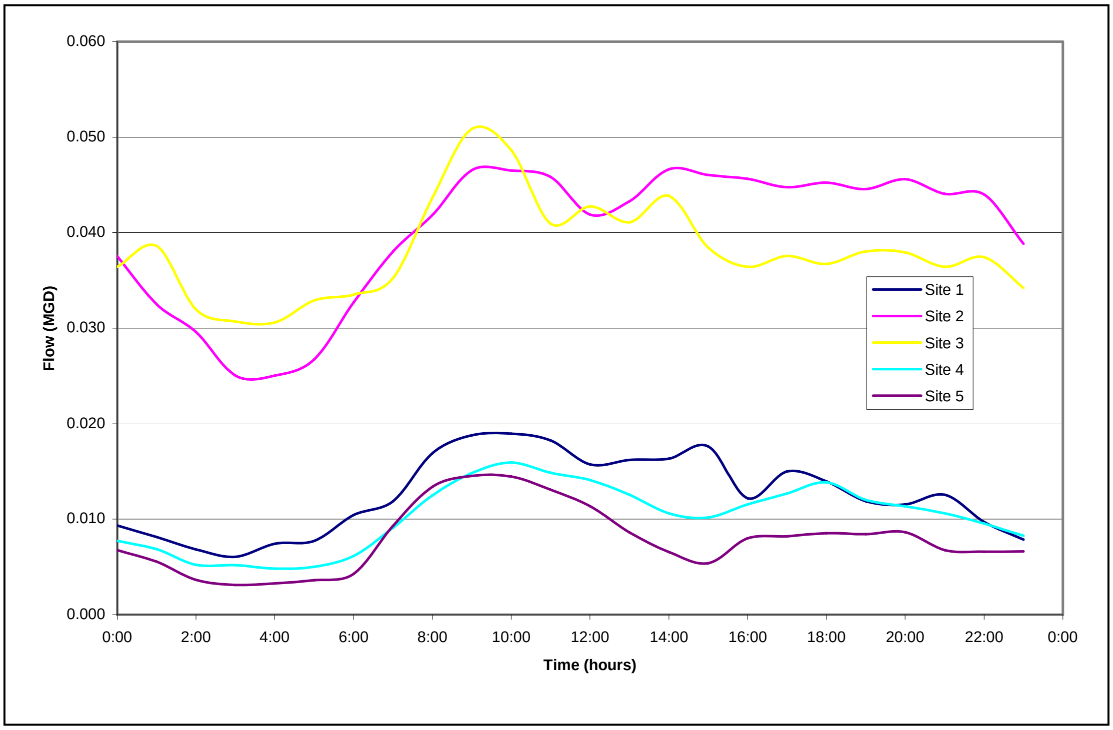


Figure 2-7
Northstar CSD
Weekend Diurnal Flow

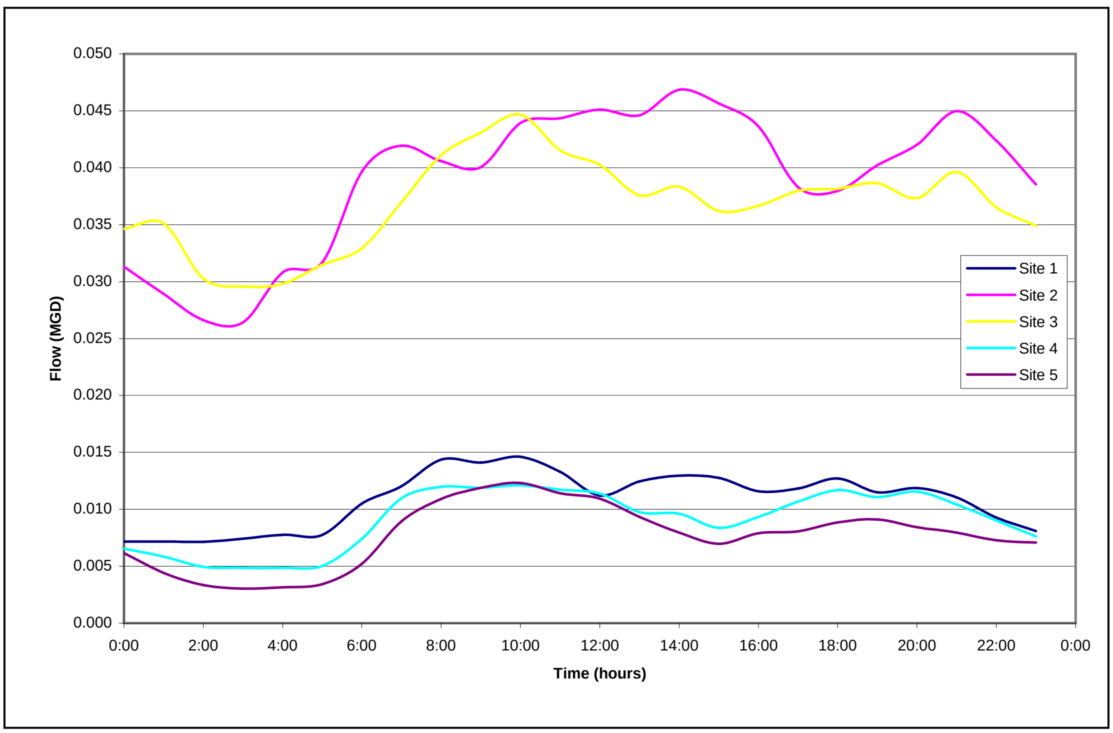


Figure 2-8
Northstar CSD
Weighted Average Weekly Diurnal Flow

2.5.3 RAINFALL DEPENDENT INFILTRATION AND INFLOW

Rainfall-dependent infiltration and inflow (RDI/I) is defined as stormwater that enters the wastewater collection system during and after a rainfall event. Infiltration and inflow enter the collection system through different mechanisms and, therefore, are quantified separately.

Inflow is caused by a direct connection to the sewer system, such as open cleanouts, leaky manholes lids, etc. Since it is a direct connection, inflow is usually seen in peak hourly wastewater flows.

Infiltration from rainfall is an indirect introduction of water into the sewer through leaky joints, pipe cracks, and damaged lateral connections or manhole walls. It depends on the size and duration of the storm event and is only sustained for a short period of time during and after the rain event.

The following sections contain the summarized results of V&A's report *Northstar-at-Tahoe Sanitary Sewer Flow Monitoring (July 2007),* as well as additional analyses performed by ECO:LOGIC.

Inflow Analysis

The effects of inflow can be seen on a hydrograph immediately after a rainfall event begins. Because of this quick response, inflow is typically quantified using peaking factors. A peaking factor is defined as the peak hourly wet weather flow divided by the average dry weather flow (ADWF). V&A's average and peak flow results and peaking factors from the March 26th storm event for the five flow monitoring sites are included in Table 2-2.

Table 2-2
Northstar CSD
Inflow Analysis Results – March 26, 2007 Storm Event

Flow Monitoring Site	ADWF (Mgal/d) (a)	Peak Flow (Mgal/d) (a)	Peaking Factor
1	0.011	0.31	28.4
2	0.039	0.56	14.3
3	0.037	0.43	11.7
4	0.009	0.11	12.4
5	0.008	0.09	11.6

(a) Mgal/d = Million Gallons per Day

All of these peaking factors significantly exceed the commonly used design criteria of 3.0. However, these peaking factors are deceptively high because the average dry weather flow was determined after the ski season. The peak flow, on the other hand, was taken during March, when the snow pack was still high and the ski season was still drawing large numbers of people to Northstar. Dry weather flows during the ski season near the March rain event were also analyzed. However, this analysis showed that this storm produced minimal peaks above dry weather flow. Therefore, it was concluded that inflow was not significant in the system during this storm event.

The May 2nd rainfall event was also analyzed for peak flows. This storm appeared to produce inflow into the system. However, after closer analysis of the rainfall and flow data, it was concluded that the significant peaks in the flow were most likely not resulting from rain. Rather they may have been resulting either from discharges of the wastewater holding tank at Schaffer's Camp Restaurant or from construction.

To find a rainfall event that produced significant peaks, NCSD's monitoring data at the wastewater pump station on Highway 267 and the data from the flow monitor near the NCSD fire station was analyzed. The December 30-31, 2005 event, which occurred during almost 100% occupancy was determined to be a 25 year / 24 hour event. As shown in Table 2-3, these sites both had peaking factors under 3.0 during this event. A peaking factor of 3.0 or less tends to indicate a system with minimal to moderate inflow.

Table 2-3
Northstar CSD
Inflow Analysis Results – December 30-31, 2005 Storm Event

Site	ADWF (Mgal/d) (a)	Peak Flow (Mgal/d) (a)	Peaking Factor
267 Pump Station	0.11	0.32	2.80
Fire Station	0.13	0.29	2.24

(a) ADWF = Average Dry Weather Flow; Mgal/d = Million Gallons per Day (December 29, 2005)

Rain-Dependent Infiltration Analysis

Analysis of flow monitoring results did not indicate the presence of any significant rain-dependent infiltration in the collection system during the storm events observed during the flow monitoring period.

In this case, it may be more useful to determine the impact of these peak flows on capacity by calculating a d/D ratio. The d/D ratio is the peak measured depth of flow divided by the pipe diameter. A d/D ratio of 1.0 means the pipe is completely full. None of the d/D ratios for the five flow monitoring sites during the March 26, 2007 storm event came close to full pipe capacity (Table 2-4). The d/D ratios for the fire station and the 267 pump station sites during the December 30-31, 2005 storm event also show levels well below full pipe capacity (Table 2-5).

Table 2-4
Northstar CSD
d/D Analysis Results – March 26, 2007 Storm Event

Site (a)	d/D Ratio
1	0.50
2	0.19
3	0.57
4	0.46
5	0.37

(a) Sites include flows from all basins tributary to them.

Table 2-5
Northstar CSD
d/D Analysis Results – December 30-31, 2005 Storm Event

Site (a)	d/D Ratio
267 Pump Station	0.31
Fire Station	0.38

(a) Sites include flows from all basins tributary to them.

2.5.4 GROUNDWATER INFILTRATION

Infiltration, as previously mentioned, is an indirect introduction of water into the sewer through leaky joints, pipe cracks, damaged lateral connection or manhole walls, etc. Groundwater infiltration (GWI) depends on the depth of the groundwater table in relation to the sewer pipes. Groundwater level tends to fluctuates seasonally and, in Northstar, is likely affected by snowmelt.

A dry weather groundwater infiltration analysis was performed by V&A using a ratio called the minimum-to-baseline ratio. The ratio was determined by dividing the minimum daily flow during the average dry weather flow period by the average dry weather flow. The ratio of peak daily flows to average dry weather flow was also taken, but was not used because minimum daily flows are more consistent than daily peak flows. The resulting values for each flow monitoring basin were compared to a typical minimum-to-baseline ratio established by the Water Pollution Control Federation (WPCF) in the WPCF Manual of Practice No. 9 *Design and Construction of Sanitary and Storm Sewers*.

A comparison of minimum-to-baseline ratios to typical ratios defined by the WPCF is shown in Figure 2-6.

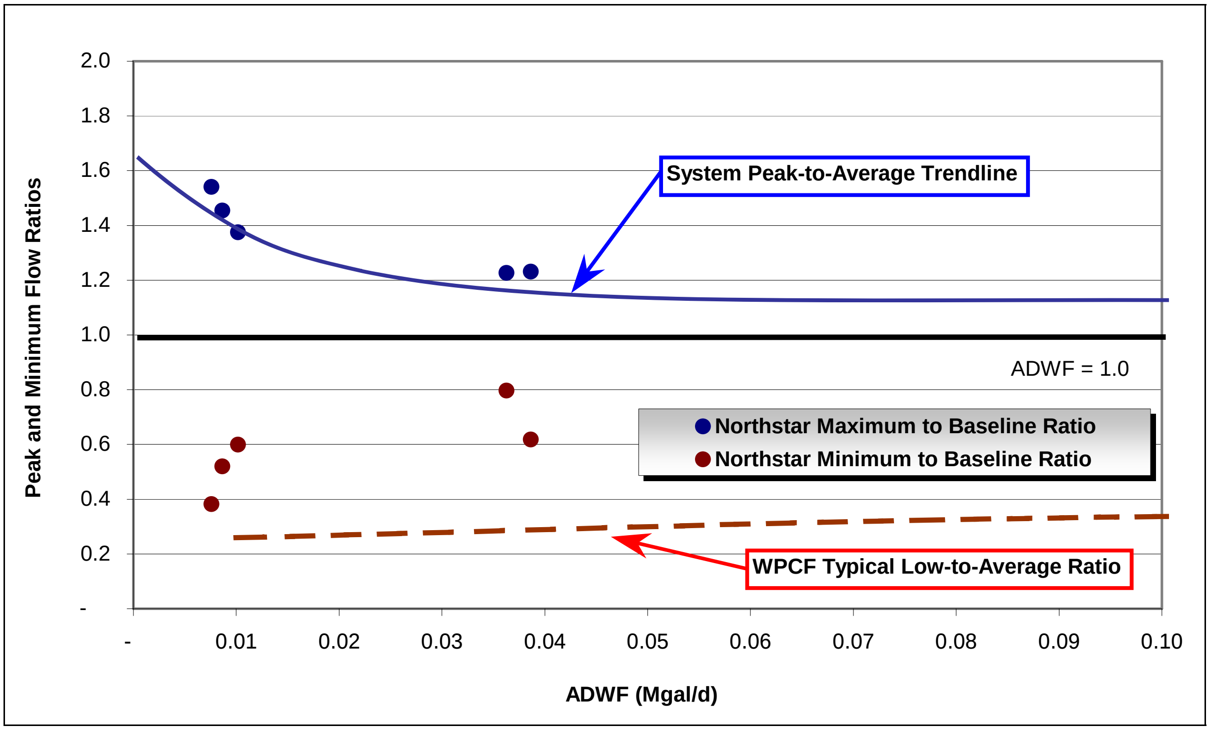


Figure 2-6
Minimum-to-Baseline Ratio Comparisons by Flow Monitoring Basin

All basins had minimum-to-baseline ratios that were higher than the typical minimum-to-baseline ratios defined by the WPCF. This *may* indicate that these basins have higher than normal groundwater infiltration during periods of dry weather.

Chapter 3

Land Use Data

3.1 PURPOSE

The purpose of this chapter is to provide an overview of existing and future developments and land use designations. Land uses and locations of existing and future development were provided by NCSD. Existing and future land use designations were used to determine current and future wastewater generation rates for use in the hydraulic model.

This chapter is divided into the following sections:

- Existing Development
- Future Development

3.2 EXISTING DEVELOPMENT

Land uses for existing developments are shown in Figure 3-1. For the purposes of this Master Plan, existing development was divided into three land uses: commercial, residential, and condominiums. These land use designations were compiled by ECO:LOGIC from the NCSD GIS data. For each existing land use designation, total numbers of units are shown in Table 3-1.

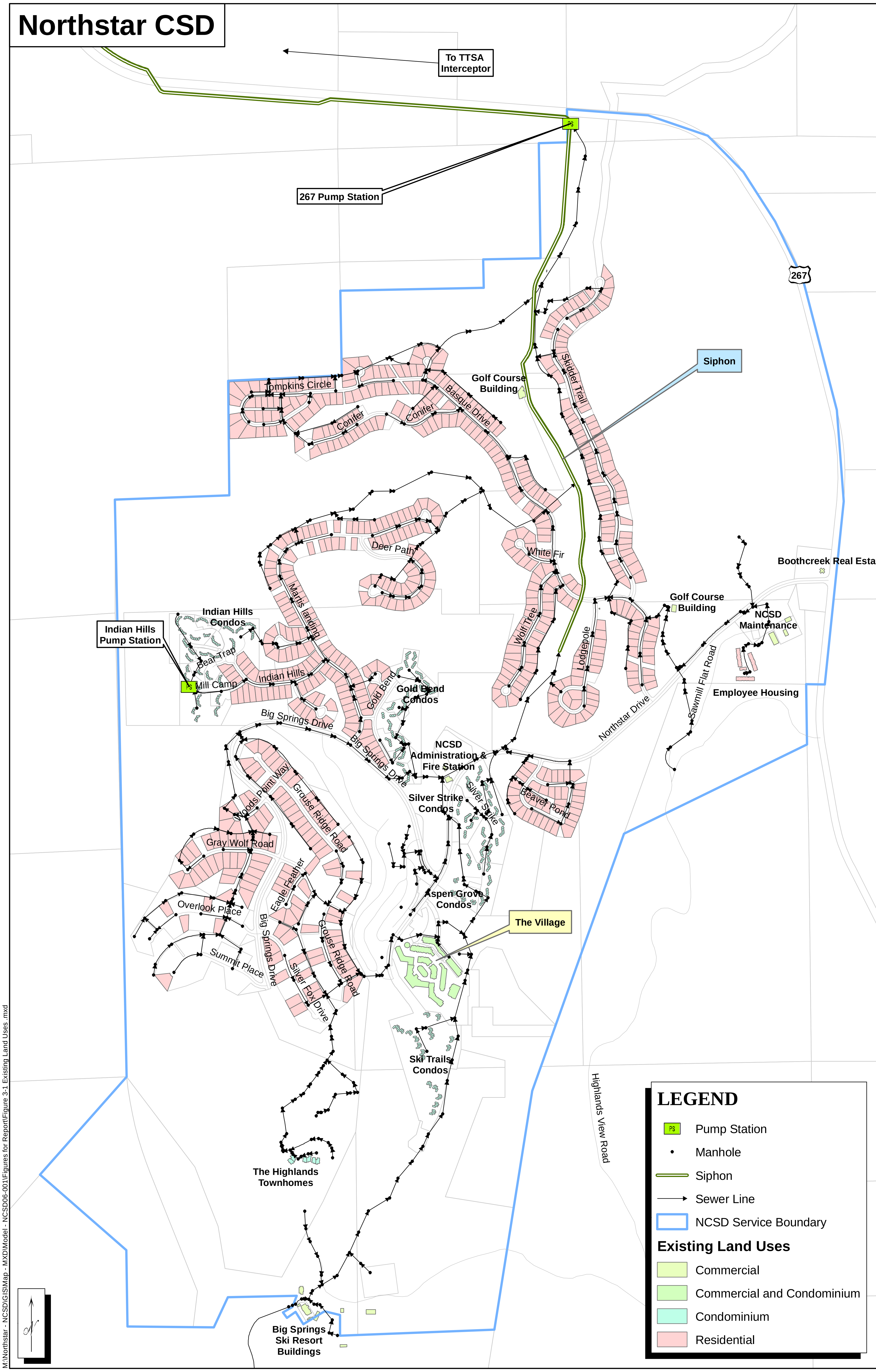


Figure 3-1
Existing Development and Land Uses

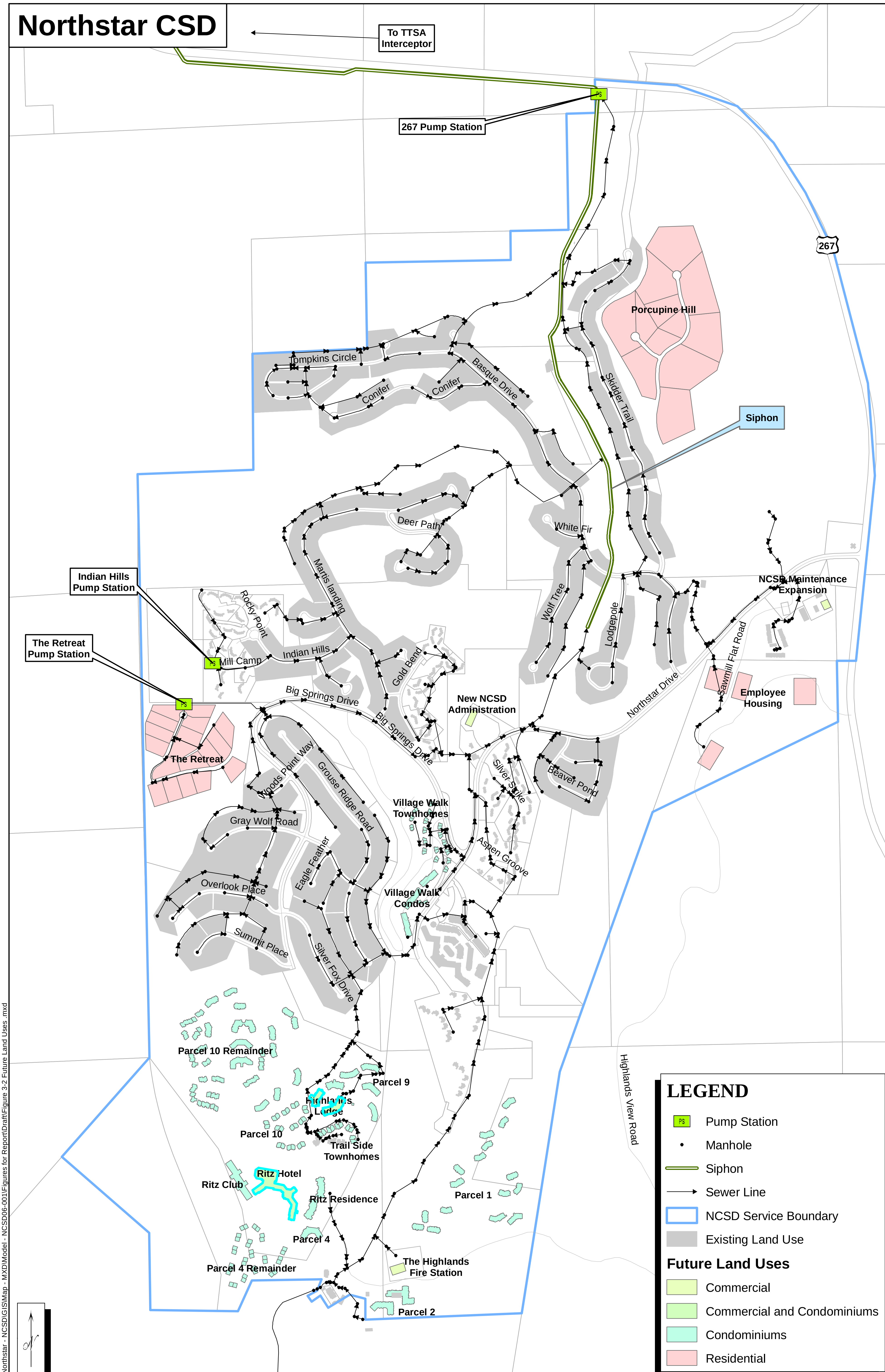
Table 3-1
Northstar CSD
Summary of Existing Development

Land Use	Unit Type	Units
Residential		
Single Family Residential	SFR (a)	703
Employee Housing	SFR	96
Condominiums		
Aspen Grove	Condo	180
Gold Bend	Condo	129
Ski Trails	Condo	144
Indian Hills	Condo	141
The Highlands	Condo	6
The Village	Condo	197
Commercial		
The Village	S.F. (a)	167,000
Golf Course Buildings	S.F.	13,200
NCSD Administration Building Maintenance Building Fire Station	S.F.	9,169
Big Springs Ski Resort	S.F.	62,900
Boothcreek Real Estate	S.F.	11,700
Mountain Restaurants	S.F.	14,000

(a) Single family residence
(b) Square feet

3.2.2 FUTURE LAND USE DEVELOPMENT

Anticipated developments, as determined for the water model developed by Auerbach Engineering, are shown in Figure 3-2. These developments are expected to occur in three stages. The first developments are expected to be completed by 2009, the second by 2012, and the third by 2016. The development details for each stage, such as square footages of planned commercial buildings or numbers of SFR lots, are shown in Table 3-2.



M:\Northstar - NCSD\GIS\Map - MXD\Model - NCSD06-001\Figures for Report\Draft\Figure 3-2 Future Land Uses .mxd

Table 3-2
Northstar CSD
Anticipated Future Developments

Development		2009 Development (a)	2012 Development (a)	2016 Development (a)	Total Development
Single Family Residential	SFR (a)	127	12	---	**139**
North Village Condominium	Condo	114	---	---	**114**
Village Walk Townhomes	TH (b)	10	22	---	**32**
The Highlands					
Parcel 1	Condo	---	---	354	**354**
Parcel 2	Condo	---	---	178	**178**
Parcel 4	Condo	---	---	28	**28**
Parcel 4 Remainder	Condo	---	---	33	**33**
Parcel 7	Condo	10	---	---	**10**
Parcel 9	Condo	---	---	196	**196**
Parcel 10	Condo	---	10	100	**110**
Parcel 10 Remainder	Condo	---	---	348	**348**
The Ritz Hotel	HR (c)	196	---	---	**196**
The Ritz Club	HR	---	78	---	**78**
The Ritz Residences	Condo	---	61	---	**61**
The Ritz Commercial	S.F. (d)	6,500	---	4,459	**10,959**
The Highland Lodge	Condo	---	---	60	**60**
The Highlands Commercial	S.F.	---	---	49,150	**49,150**
The Highlands Fire Station	S.F.	---	7,000	---	**7,000**
NCSD Administration Building	S.F.	---	13,725	---	**13,725**
Mountain Restaurants	S.F.	14,000	14,000	14,000	**42,000**
Employee Housing	SFR	---	---	74	**74**

(a) Single family residence
(b) Townhome
(c) Hotel room
(d) Square feet

Chapter 4

Future Flow Estimation

4.1 PURPOSE

This chapter describes the methodology used to calculate unit wastewater generation rates for different land uses. Unit wastewater generation rates (with peaking factor(s)) are typically used to estimate wastewater generation from new development seeking to connect to the sewer system. This chapter is divided into the following sections:

- Methodology
- Peaking Factor
- Recommended Unit Wastewater Generation Factors by Land Use and Peaking Factor

4.2 FUTURE WASTEWATER FLOWS

Average unit wastewater generation rates for new developments were calculated based on hourly wastewater flow for the system at current development (from the five V&A flow monitors) and annual water use records (from NCSD). The unit wastewater generation values were used to estimate average flows from future developments.

4.2.1 METHODOLOGY

The NCSD service area includes single family residential (SFR) lots, condominiums, townhouses, employee housing, and commercial space. It was important to determine approximate occupancy so that the wastewater flows could be correlated with the appropriate number of dischargers. First, the number of "permanent" residents was established. Wastewater generated in the second half of April, in May, and in June was assumed to be generated by people who lived there on a relatively full-time basis. Using the annual water meter records, each SFR lot using 83,950 gallons of water or more a year was considered to be a permanent resident. This value was based on 365 days of water usage by 2.3 people per house, each using 100 gallons of water per day (230 gpd/household). The population density per house was provided by NCSD and 100 gallons a day is a commonly used value for water usage by a single person in a single family residence. With these assumptions, a permanent occupancy rate of 32% in 703 SFRs was determined.

An 18.5% overall permanent occupancy of all housing units was provided by NCSD. Since NCSD does not meter the water usage in its condominiums and townhouses, the percentage of occupied condominiums and townhouses was determined by taking the total number of "permanently occupied" SFR lots (as determined from the water meter records), subtracting this from 18.5% of all housing units (excluding employee housing), and dividing by the total number of condominiums and townhouses. From this method, it was estimated that 6.6% of condominiums and townhouses are occupied on a semi-permanent basis.

To determine how much wastewater was generated in each flow monitoring basin, the following procedure was used:

1. The total annual water use volume was determined from the NCSD water use records for each land use in each basin. Residential and commercial usage was taken directly from the water meter records, while condominium and townhouse usage was estimated based on average day water demand values used by Auerbach Engineering in the water model. The volume of usage from all of these land uses was summed for the total annual water usage.

2. A weighting system was derived from the annual water use volume determined in step 1 by dividing the water usage of each residential, commercial, and condominium unit by the total annual water usage of all existing development. This produced a unitless weighting factor for each unit, which was then applied to the wastewater flows measured by V&A to derive a wastewater generation rate for each land use type.

4.2.2 Peaking Factor

A peaking factor is typically applied to the unit wastewater generation factors to account for peaks resulting from inflow during storm events and for diurnal fluctuations.

Flow records from the NCSD pump station flow monitor at Highway 267 showed a peak flow of 0.31 million gallons per day (Mgal/d) during the December 30- 31, 2005 storm event described in Chapter 2. The flow monitor at the fire station (manhole 248) showed a peak flow of 0.29 Mgal/d during the same storm event. When divided by the average flow, the peaking factors produced were 2.6 and 2.2, respectively.

4.2.3 Recommended Unit Wastewater Generation Factors by Land Use and Peaking Factor

Recommended unit wastewater generation factors sorted by land use are shown in Table 4-1. These values account for groundwater infiltration and some rainfall-dependent infiltration. It is recommended that a peaking factor of 2.6 be applied to compensate for inflow. The last column of the table compares these wastewater generation rates with the maximum daily water demands as determined by Auerbach Engineering for the water model. Table 4-2 shows the estimated peak wastewater flow for each development through 2016.

Table 4-1
Northstar CSD
Recommended Unit Wastewater Generation Rates

Land Use	Units (a)	Recommended Average Unit Flow Factor (b)	Recommended Peaked Unit Flow Factor (c)	Recommended Maximum Day Water Demand (d)
Residential				
Single Family Residence (e)	gpd/SFR	389	1,011	575
Condominium	gpd/condo	339	881	415
Townhouse	gpd/townhouse	339	881	415
Other				
Hotel/Motel Room	gpd/room	339	881	415
Commercial	gpd/s.f.	0.37	0.96	0.41

(a) gpd = gallons per day; SFR = single family residence; s.f. = square foot.
(b) All factors include a groundwater infiltration component. Peaking factor(s) should be applied prior to use.
(c) All recommended unit flow factors are multiplied by the peaking factors of 2.6, as recommended.
(d) Maximum day water demands are from the Auerbach Engineering water model data.

Table 4-2
Northstar CSD
Estimated Peak Wastewater Flow for Each Development Stage

Land Use Development	2009 Development (a) Peak Flow (Mgal/d) (b)	2012 Development (a) Peak Flow (Mgal/d) (b)	2016 Development (a) Peak Flow (Mgal/d) (b)	Total Development Peak Flow (Mgal/d) (b)
Single Family Residential	0.13	0.012		0.14
North Village Condominium	0.11			0.10
Village Walk Townhomes	0.0088	0.019		0.028
The Highlands				
Parcel 1			0.31	0.31
Parcel 2			0.16	0.16
Parcel 4			0.024	0.024
Parcel 4 Remainder			0.029	0.029
Parcel 7	0.088			0.0088
Parcel 9			0.17	0.17
Parcel 10		0.0088	0.088	0.097
Parcel 10 Remainder			0.31	0.31
The Ritz Hotel	0.17			0.17
The Ritz Club		0.069		0.069
The Ritz Residences		0.054		0.054
The Ritz Commercial	0.0062		0.0043	0.011
The Highland Lodge			0.053	0.053

Table 4-2 (*Cont.*)
Northstar CSD
Estimated Peak Wastewater Flow for Each Development Stage

Land Use Development	2009 Development (a) Peak Flow (Mgal/d)(b)	2012 Development (a) Peak Flow (Mgal/d) (b)	2016 Development (a) Peak Flow (Mgal/d) (b)	Total Development Peak Flow (Mgal/d) (b)
The Highlands Commercial	---	---	0.047	0.047
The Highlands Fire Station	---	0.0067	---	0.0067
NCSD Administration Building	---	0.013	---	0.013
Mountain Restaurants	0.013	0.013	0.013	0.040
Employee Housing	---	---	0.075	0.075
TOTAL (rounded)	**0.44**	**0.20**	**1.3**	**1.9**

(a) Includes incremental flows only.
(b) Mgal/d = million gallons per day.

Chapter 5

Hydraulic Model

5.1 PURPOSE

The purpose of this chapter is to present an overview of the construction (including inputs) and calibration of the hydraulic model of the NCSD wastewater collection system.

This chapter has been divided into the following sections:

- Modeling Software
- Model Inputs
- Model Calibration

5.2 MODELING SOFTWARE

Wastewater collection system capacity was evaluated using a dynamic flow routing model (Wallingford Software's *InfoWorks).* Dynamic flow routing models are considered one of the most sophisticated means to assess sewer system capacity. The model simulates sewer system hydraulic response during peak flow events resulting from a combination of peak diurnal sanitary flows, groundwater infiltration, and rainfall dependent infiltration and inflow.

5.3 MODEL INPUTS

The following inputs were used in construction of the hydraulic model and are described in more detail below:

- Pipes and Manholes
- Pumps
- Subcatchments
- Design Storm

5.3.1 PIPES AND MANHOLES

All sewer lines in the NCSD system were modeled except for lateral lines connecting private properties to main lines. The entire system is shown in Figure 2-1. An atlas of the system is included in Appendix A, while a detailed inventory of all the pipes in the system is included in Appendix B.

5.3.2 PUMP STATIONS

All three pump stations in the existing system were modeled. These include:

- the pump station at Highway 267 (267 Pump Station)
- the lift station serving the Indian Hills condominiums
- the lift station serving Schaffer's Camp Restaurant

5.3.3 SUBCATCHMENTS

Subcatchments are geographic areas within a sewer basin that represent a composite of land uses (such as residential or commercial) and discharge to a common manhole. The total existing single family residences, condos, and townhouses for each subcatchment were determined based on GIS data from NCSD. Since the calibration period was selected to occur during approximately 100% occupancy, all units were assumed to be occupied.

All units were multiplied by a wastewater generation rate, which was adjusted during the calibration process, to determine the total wastewater flow of each subcatchment. For subcatchments containing existing commercial buildings, a wastewater generation rate was calculated in terms of the square footage of each building's foot print and assigned to the subcatchment as an additional base flow. Estimated flows for future subcatchments were determined using the recommended unit flows and peaking factor outlined in Chapter 4.

5.3.4 DESIGN STORM

Design storms are developed from statistical analysis of local precipitation records and represent the distribution of rainfall depths over a time increment for a given storm duration and frequency. The design storm concept assumes that a precipitation event of a particular frequency will produce rainfall-dependent infiltration and inflow (peak flows) of the same magnitude as a naturally occurring storm of the same duration and frequency.

The storm frequency is typically expressed as the storm return period. Storm duration is expressed in hours or days of precipitation. Storms with long return periods and short durations result in large flows. Design storms are selected based on the level of protection desired for the wastewater collection system while considering the likelihood of the event. Based on past experience with other similarly sized communities, it is recommended to provide adequate system capacity to convey peak flows during a 10-year return period storm (at a minimum) occurring over a 24-hour period (a 10-year/24-hour storm). Therefore, a 10-year/24-hour design storm was used for all simulations in the capacity analysis described in Chapter 6.

Because design storms are developed based on local precipitation records, data from rainfall gauges in and around the NCSD area were analyzed. According to the California Department of Water Resources (http://cdec.water.ca.gov/), a 10-year/24-hour design storm in the NCSD area produces a total of 4.78 inches of rain. In comparison to recent storms observed at NCSD, the storm event on March 26 produced 0.59 inches of rain in 6 hours (slightly less than a 1-year/6-hour storm) and the storm event on May produced 0.22 inches of rain in 6 hours (significantly less than a 1-year, 6-hour storm). However, the December 30-31, 2005 storm, which was ultimately used for wet weather calibration, produced five inches of rainfall and was a 25-year/24-hour storm.

A rainfall pattern (or hyetograph) was developed to distribute total rainfall over the design storm's 24-hour duration. The hyetograph selected for this design storm is based on the Sacramento Method (Sacramento City and County Drainage Manual, December 1996), which assumes the highest intensity of rainfall occurs in the middle of the storm. The hyetograph developed for NCSD's 10-year/24-hour design storm is provided in Figure 5-1.

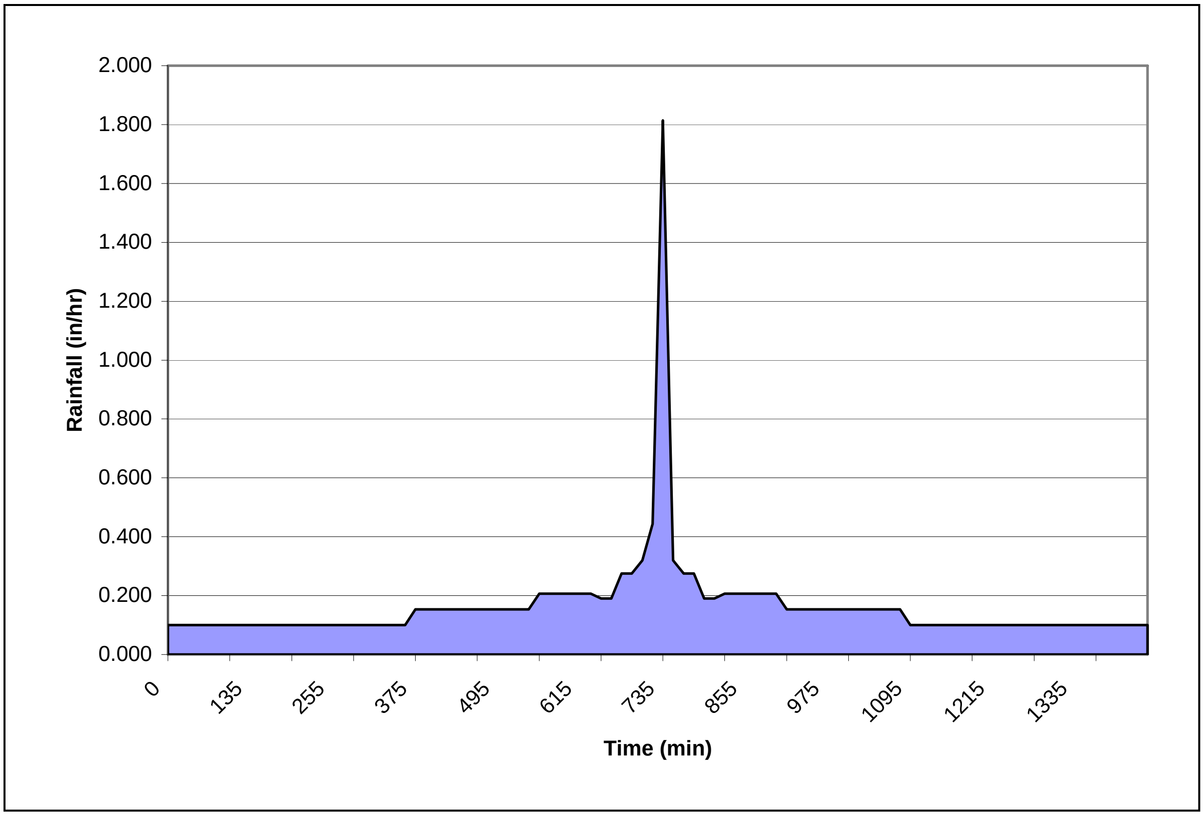


Figure 5-1
Northstar CSD
10-Year/24-Hour Design Storm Hyetograph

5.4 MODEL CALIBRATION

Calibration is the process of matching hydraulically modeled results with observed results to assure that a model reflects actual conditions. The hydraulic model was calibrated for both dry weather and wet weather conditions during full occupancy.

5.4.1 DRY WEATHER CALIBRATION

Because of the minimal response from the storm events observed during the flow monitoring period in March and May 2008 (as discussed in Chapter 2), the December 31, 2005 storm event was chosen instead for wet weather calibration. Because this storm event occurred at close to full occupancy, dry weather flow during May or June is not representative of dry weather flow that would occur during the high occupancy ski season. Therefore, the dry period just prior to the December 31, 2005 rainfall event (December 29, 2005), when the area was close to 100% occupancy, was chosen instead for calibration.

The only flow data for this date was from the permanent NCSD flow monitors at the pump station on Highway 267 and near the Northstar Fire Station. Therefore, the model was calibrated using this data.

To calibrate the model, the simulated flows at the 267 Pump Station and the fire station were graphically compared to the observed flows in *InfoWorks.* Unit flow factors were then adjusted until simulated flows sufficiently matched observed flows. An example of the calibrated dry weather flow for the 267 Pump Station flow monitor is shown in Figure 5-2.

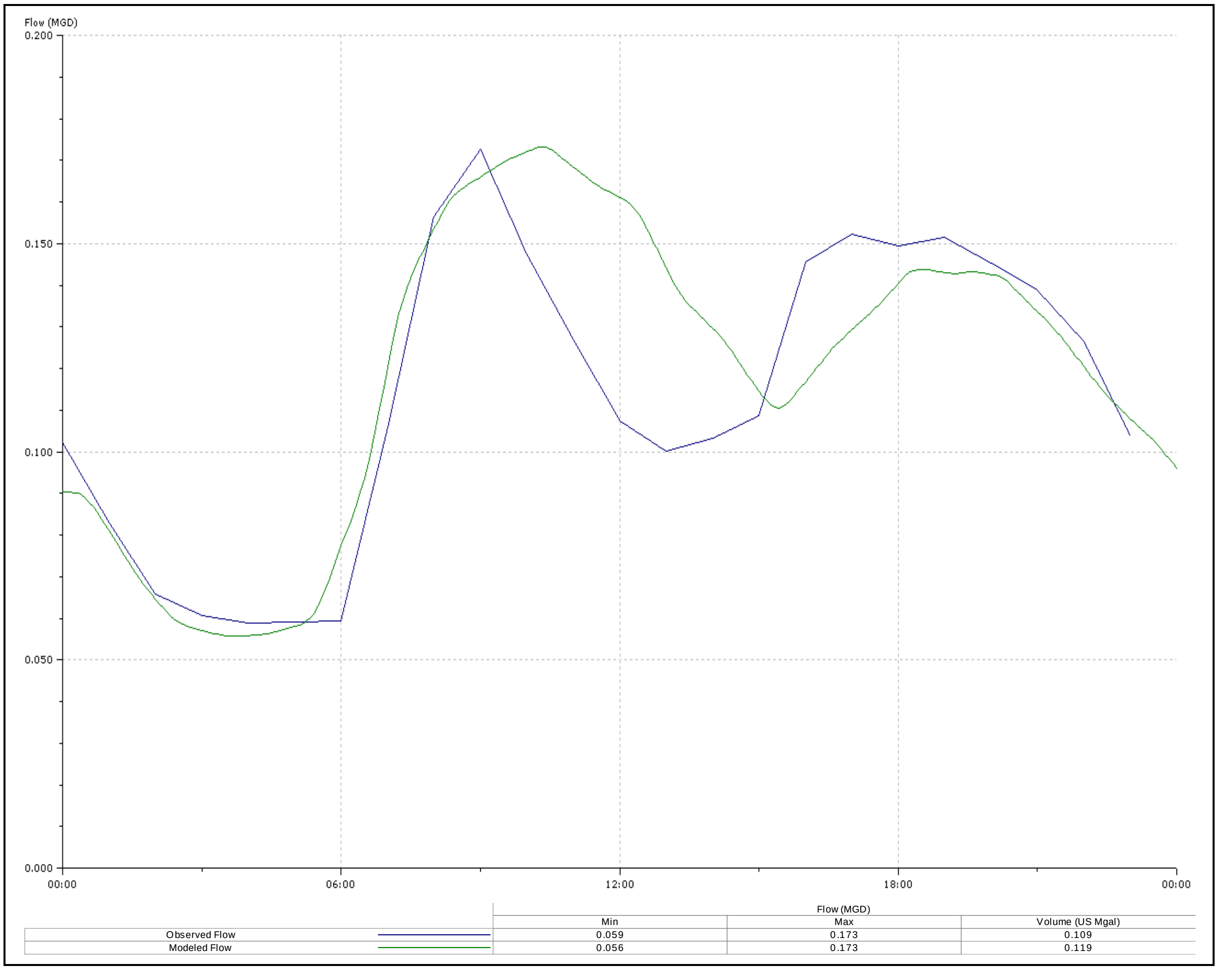
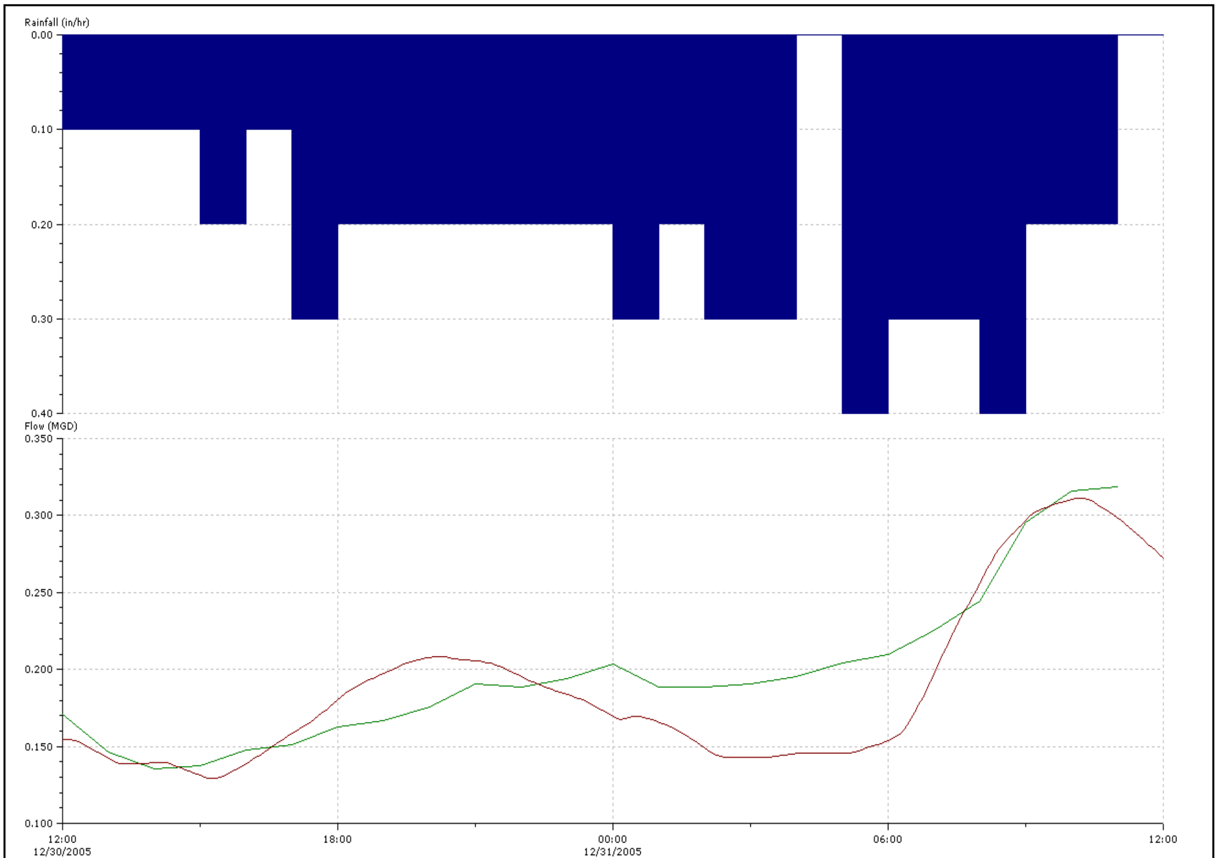


Figure 5-2
Northstar CSD
Dry Weather Flow Calibration – 267 Pump Station

5.4.2 WET WEATHER CALIBRATION

Once the dry weather flow calibration was completed for each flow monitoring site, the wet weather calibration was performed using the December 31, 2005 storm event. Ideally, a significant storm event occurs during the flow monitoring study so that a response is measured in the system. Although flow monitoring was conducted during the wet season, no significant storm event occurred at Northstar during the flow monitoring period (March 8 through June 15, 2007) and, thus, no significant response was observed in the collection system. Therefore, rainfall data and flow measurements from the 267 Pump Station during past storm events were obtained to determine the overall system response to rainfall.

Peak flows simulated in the model during the December 30-31, 2005 storm even were compared to the maximum observed flow at the 267 Pump Station during the storm event (0.32 Mgal/d). The simulated peak flow was modified to match the measured peak flow at the pump station by adjusting the leakage rates of the tributary subcatchments. After the peak simulated flow was calibrated to the observed flow, the leakage rates for the tributary subcatchments were applied to the rest of the system. These leakage rates were then verified by comparing simulated flows to those observed at both NCSD flow monitors. Wet weather calibration using data from the 267 Pump Station flow monitor is shown in Figure 5-3.



		Rainfall			Flow (MGD)		
		Depth (in)	Peak (in/hr)	Average (in/hr)	Min	Max	Volume (US Mgal)
Rain		5.000	0.400	0.200			
Observed Flow					0.135	0.318	0.188
Modeled Flow					0.129	0.311	0.189

Figure 5-3
Northstar CSD
Wet Weather Calibration – 267 Pump Station

Chapter 6

Capacity Evaluation Results

6.1 PURPOSE

The purpose of this chapter is to provide a summary of the results of the model simulations. Modeling was conducted for dry weather flow, observed peak flows, and during a simulated 10-year/24-hour design storm event for (1) the existing level of development, (2) existing plus expected development through 2009, (3) existing plus expected development through 2012, and (4) existing plus expected development through 2016.

This chapter is divided into the following sections:

- Recommended Capacity Criteria
- Modeled Scenarios
- Model Results – Existing Level of Development
    - Existing System – Average Dry Weather Flow
    - Existing System - Design Storm (10-year/24-hour)
- Model Results – Future Conditions
    - Development through 2009
    - Development through 2012
    - Development through 2016

6.2 RECOMMENDED CAPACITY CRITERIA

Wastewater collection systems can generally accommodate some degree of surcharging during peak flow conditions. However, once a manhole surcharges, it takes only a small amount of extra flow for an overflow to occur. Criteria for acceptable levels of maximum surcharging in model simulations were developed based on criteria used by nearby communities. These criteria are presented in Table 6-1. These recommended criteria were used to evaluate capacity in flow limited segments of sewer pipelines in all modeled scenarios.

Table 6-1
Northstar CSD
Recommended Acceptable Manhole Surcharging
During Design Storm (10-year/24-hour) Conditions

Manhole Depth (a)	Acceptable Level of Manhole Surcharging
Less than 4 feet	None
4 feet to 7 feet	Not to exceed 2 feet below ground surface
7 feet and greater	Not to exceed 4 feet below ground surface

(a) Manhole depth as measured from the crown of the pipe to the rim of the manhole.

6.3 MODELED SCENARIOS

Several scenarios were modeled to evaluate capacity in the existing system at differing levels of development. The following simulations are described in more detail in the remainder of this chapter:

- Existing system with existing level of development during dry weather flow
- Existing system with existing level of development during design storm (10-year/24-hour) event
- Existing system with anticipated development through 2009 during design storm (10-year/24-hour) event
- Existing system with anticipated development through 2012 during design storm (10-year/24-hour) event
- Existing system with anticipated development through 2016 during design storm (10-year/24-hour) event

The modeled results for the simulations listed above are listed by pipe in Appendix C.

6.4 MODEL RESULTS – EXISTING LEVEL OF DEVELOPMENT

Model simulations of the existing collection system at the existing level of development were run for both average dry weather flow (ADWF) and for a 10-year/24-hour design storm.

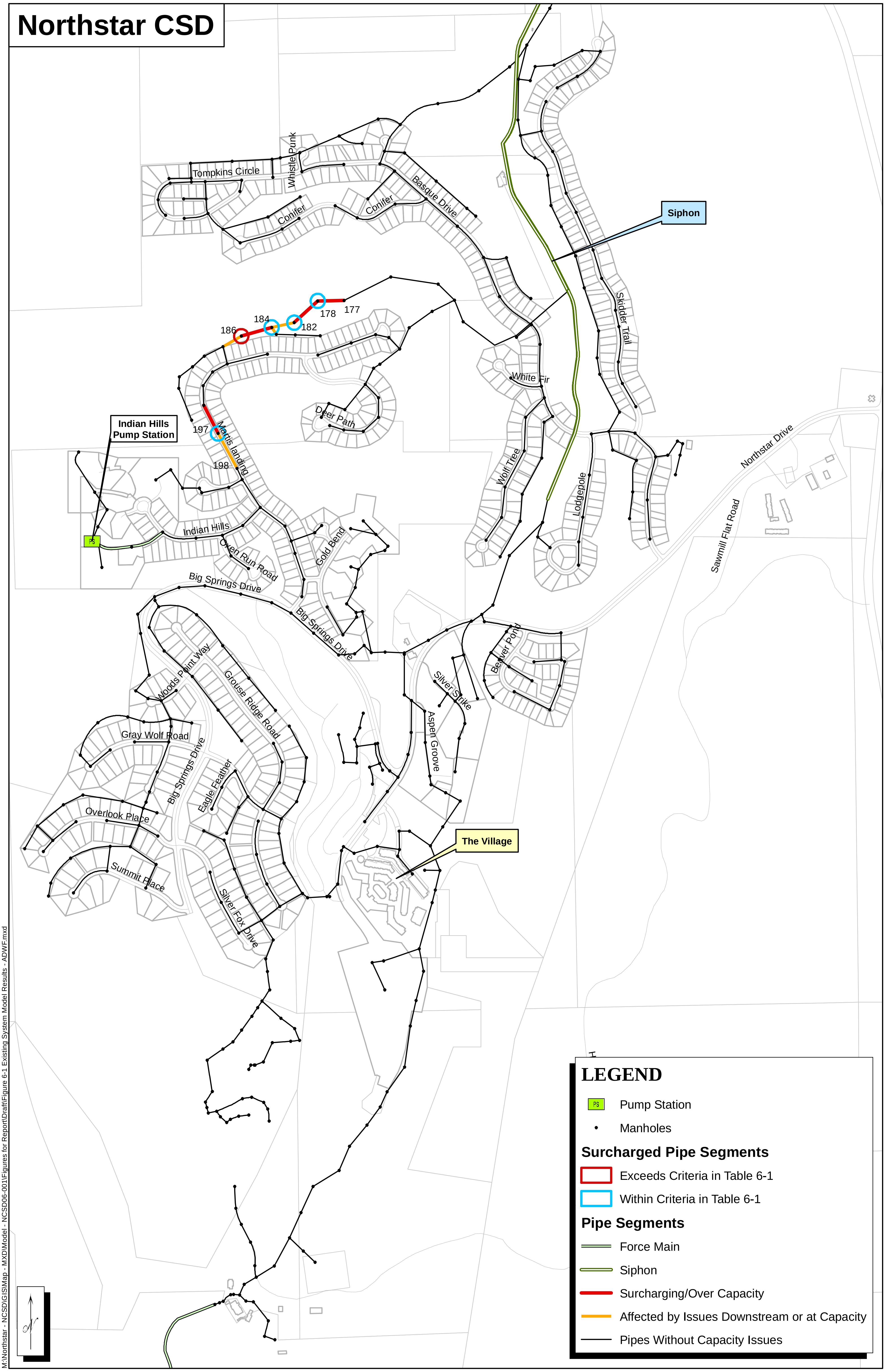
6.4.1 EXISTING SYSTEM – AVERAGE DRY WEATHER FLOW

At the existing level of development, at full occupancy, and with a minimal amount of groundwater infiltration, model simulations indicated that the dry weather flow is 0.7 million gallons per day (Mgal/d) at the outfall. The majority of pipes in the system were shown to be at less than 80% capacity. However, one section of the system appears to be experience surcharging due to flat gradient of the pipes. Model simulation results for the existing system are shown in Figure 6-1. Black pipes show pipes with no capacity issues. Pipes shown in orange are at capacity or are being impacted by problems downstream. Pipes shown in red are experiencing surcharged conditions. The specific surcharged areas include:

1. Manhole 177 to 188 (North of the Single Family Residential (SFR) lots along Martis Landing across from Deer Path Court)
2. Manhole 195 to 198 (Along Martis Landing north of Logging Trail Court)

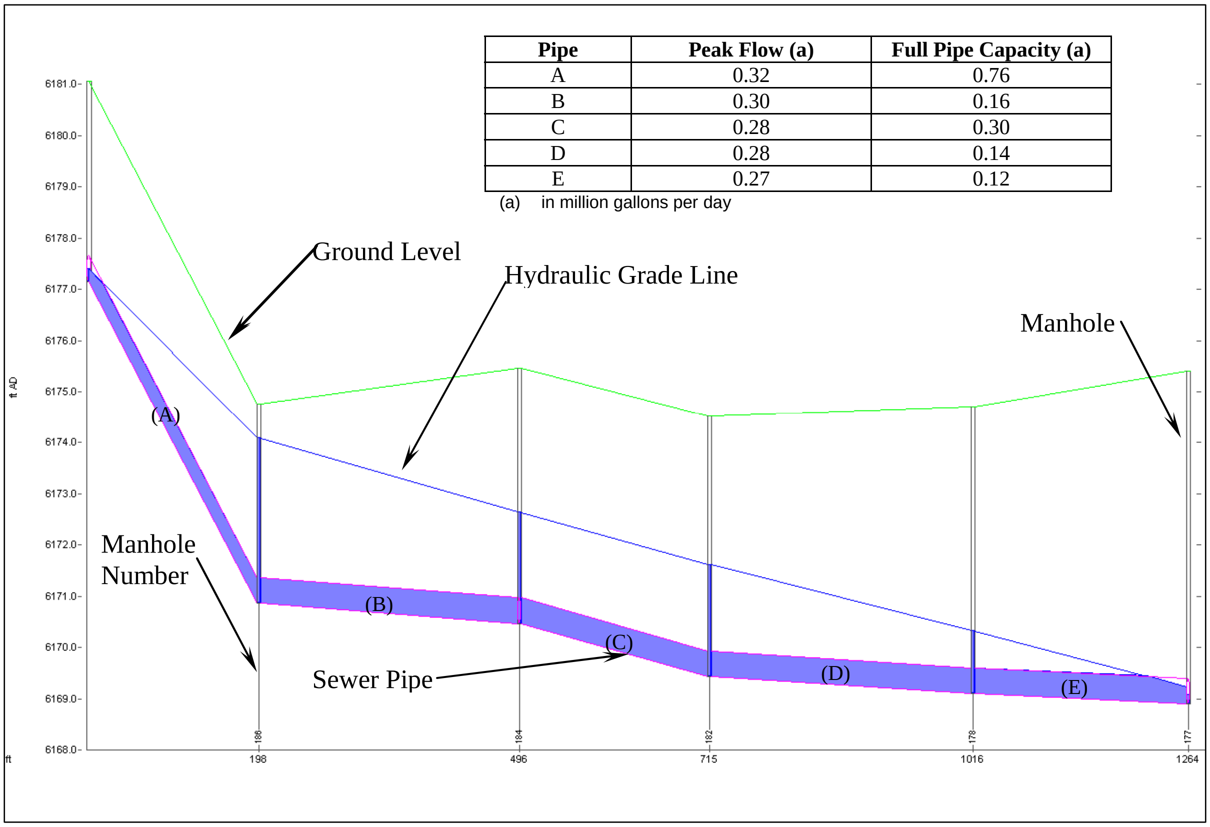
Of these sewer segments, only the first section has predicted surcharging that exceeded the surcharging criteria outlined in Table 6-1. A profile of this pipe segment is shown in Figure 6-2. The green line represents ground level and the blue line represents the hydraulic grade line (HGL). The pipe floors and crowns are shown in pink and manholes are represented by two vertical black lines. As shown in Figure 6-2, manhole 186 is less than 4 feet deep and any surcharging is unacceptable according to the criteria stated in Table 6-1.

The second section of pipeline listed above is also predicted to experience surcharging. However, this surcharging did not exceed the criteria outlined in Table 6-1. Additionally, the profile view of this area indicates a gradient in the surcharging pipe which is uncharacteristically flat compared the pipe sections before and after it (Figure 6-3). Therefore, it is recommended that the gradient and surcharging be verified prior to implementing any mitigation measures.



M:\Northstar - NCSD\GIS\Map - MXD\Model - NCSD06-001\Figures for Report\Draft\Figure 6-1 Existing System Model Results - ADWF.mxd

Figure 6-1
Existing System Model Results - Average Dry Weather Flow



Pipe	Peak Flow (a)	Full Pipe Capacity (a)
A	0.32	0.76
B	0.30	0.16
C	0.28	0.30
D	0.28	0.14
E	0.27	0.12

(a) in million gallons per day

Figure 6-2
Northstar CSD
Existing System – Average Dry Weather Flow
Surcharging Pipe Segments Manholes 188 to 177

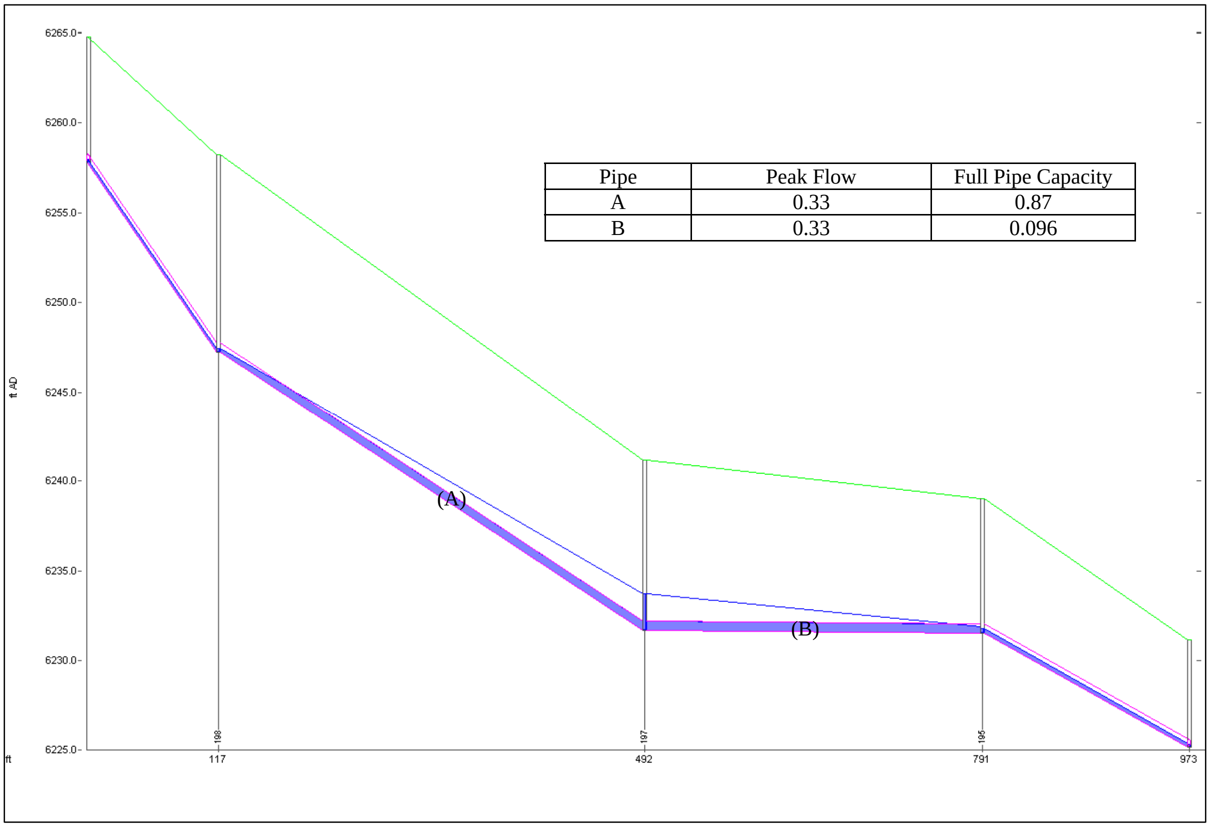


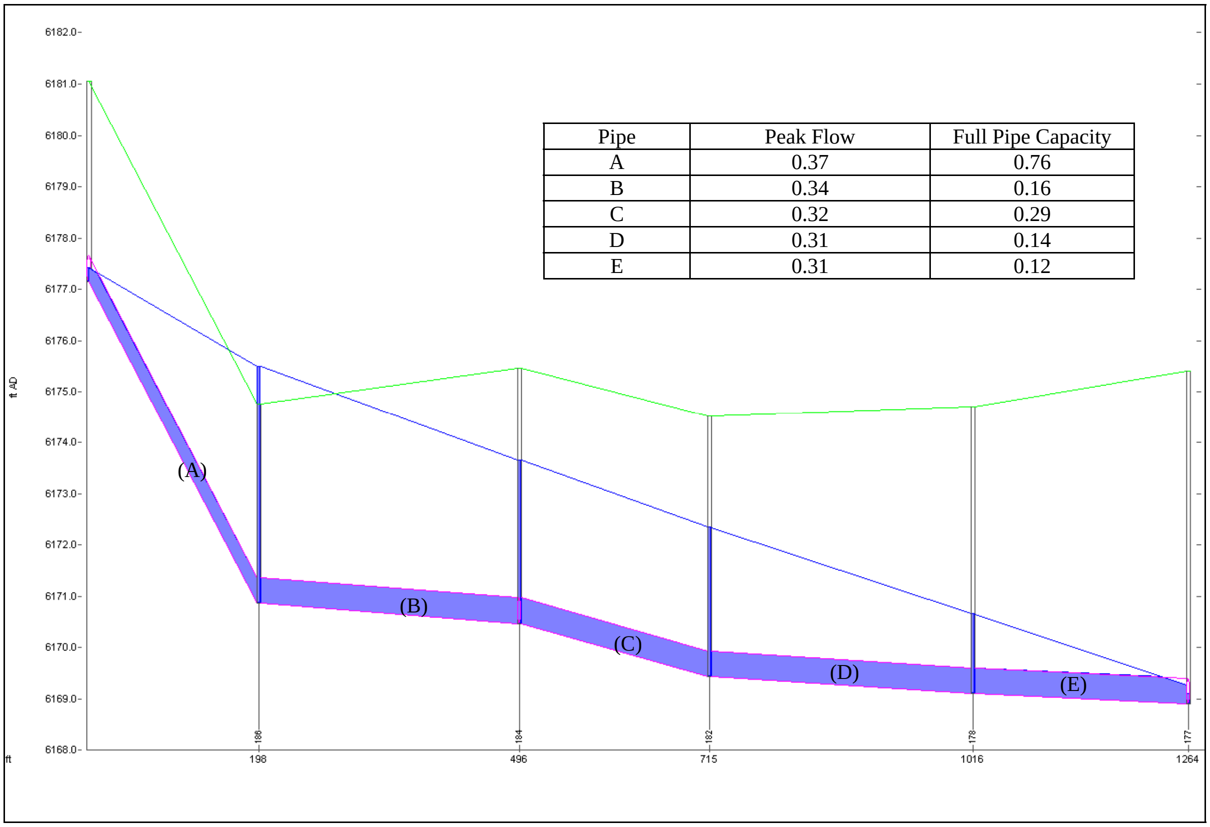
Figure 6-3
Northstar CSD
Existing System – ADWF
Surcharging Pipe Segments Manholes 199 to 193

6.4.3 EXISTING SYSTEM - DESIGN STORM (10-YEAR/24-HOUR)

At the current level of development and full occupancy, a 10-year/24-hour design storm is predicted to generate a peak flow of 1.1 Mgal/d in the system. For comparison, existing dry weather flow for the system is estimated to be 0.7 Mgal/d. The peak flow is predicted to cause no additional surcharging in any areas beyond those described in the previous section. However, these areas were more significantly impacted by the storm event than they were by flows from 100% occupancy during “dry weather”. This increased impact is shown in the profile in Figure 6-4 by the increased surcharge heights in all manholes.

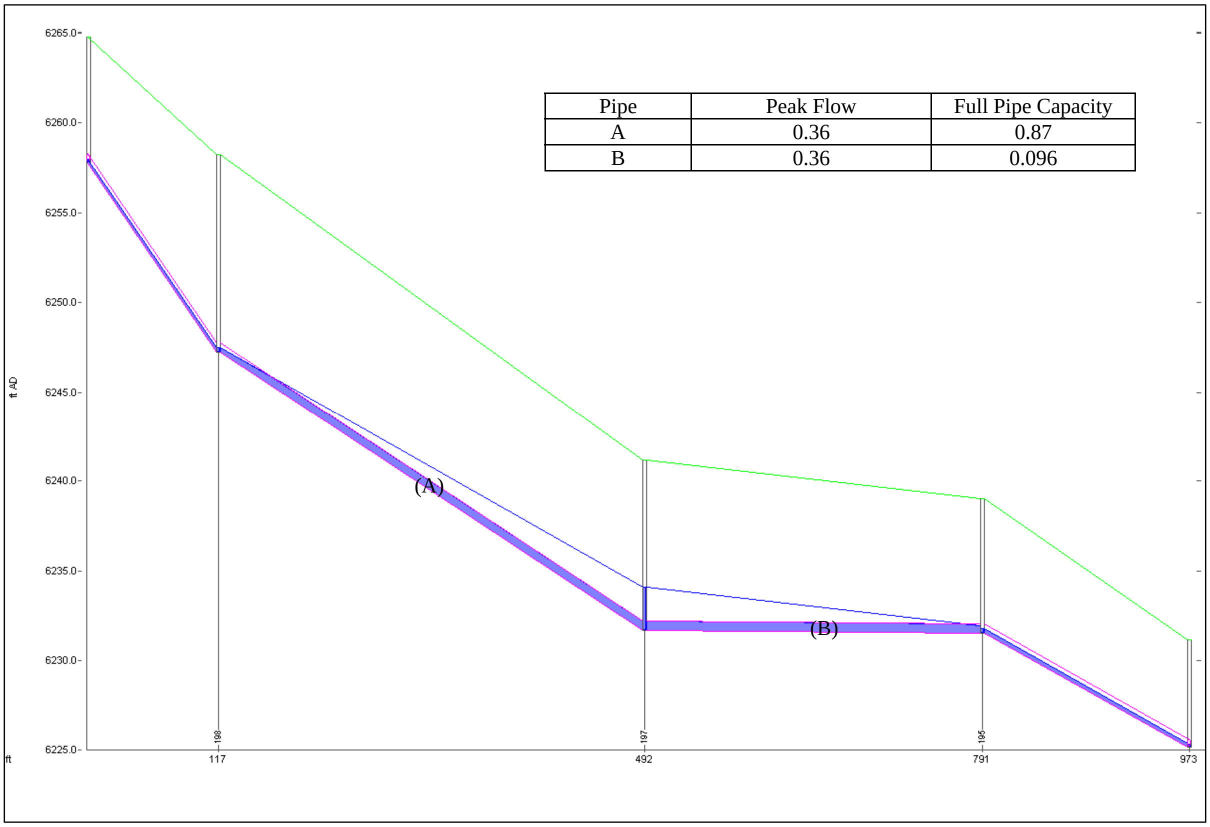
The surcharged section of pipeline from manhole 177 to manhole 188 is shown in Figure 6-4. The design storm increases peak flow by about 0.041 Mgal/d. The capacity of this pipe segment is limited to 0.122 Mgal/d and this limitation creates a bottleneck upstream of manhole 177. This bottleneck is predicted to cause an overflow at manhole 186. Since surcharging has not been verified by field observation, it is recommended that the inverts and slopes be verified through field survey prior to any capital improvements.

Peak flow from manhole 195 to 198 is predicted to increase by 0.033 Mgal/d as a result of the design storm. The resulting surcharging, as shown in Figure 6-5, was within the acceptable criteria as defined in Table 6-1.



Pipe	Peak Flow	Full Pipe Capacity
A	0.37	0.76
B	0.34	0.16
C	0.32	0.29
D	0.31	0.14
E	0.31	0.12

Figure 6-4
Northstar CSD
Existing System – 10 Year, 24 Hour Design Storm
Surcharging Pipe Segments Manholes 188 to 177



Pipe	Peak Flow	Full Pipe Capacity
A	0.36	0.87
B	0.36	0.096

Figure 6-5
Northstar CSD
Existing System – 10 Year, 24 Hour Design Storm
Surcharging Pipe Segments Manholes 199 to 193

6.5 MODEL RESULTS – FUTURE CONDITIONS

6.5.1 DEVELOPMENT THROUGH 2009

The anticipated development through 2009 and the manholes to which the wastewater generated by the developments was assumed to discharge is shown in Table 6-2.

Table 6-2
Northstar CSD
2009 Development

Development	Manhole Assignment	Total Peak Flow (gpd) (a)
Development of all currently vacant single family residential (SFR) parcels	Various	110,199 (b)
Build out of all SFR parcels at the Retreat	New MH 108 New MH 105 New MH 102	12,132
The North Village Condominiums	New MH 121 352	89,903
Ten Village Walk Townhomes	New MH 93 New MH 91 New MH 83	8,814
Ten Trailside Townhomes	Trailside - 27 Trailside - 8 Trailside - 3	8,814
The Ritz Hotel and Commercial Space	Ritz - 12	179,007
14,000 square feet of restaurants	Ritz - 12	13,468

(a) gallons per day
(b) Peak flow is divided between various manholes throughout the system.

These developments are shown in Figure 6-6 and are described in more detail in Chapter 3. The estimated wastewater generation rates for these lots and developments are discussed in Chapter 4. With the addition of peak flow from the 2009 developments, the peak flow at the system's outfall during the 10-year/24-hour design storm was estimated to be 1.5 Mgal/d. The addition of these peak flows did not result in any further capacity issues beyond what was described in the previous section.

In Figure 6-6, as in the previous figure, pipes shown in red are experiencing surcharged conditions, pipes shown in orange are at capacity or are being impacted by problems downstream, and pipes shown in yellow are at 80% to full pipe capacity. Pipes shown in green are experiencing over 80% of full pipe depth at their downstream end, even though they are flowing at well below 80% of their full pipe capacity. Hydraulics due to levels of flow in the downstream interceptors to which they are connected result in increased depth near the point of intersection. Pipes shown in black had no capacity issues.

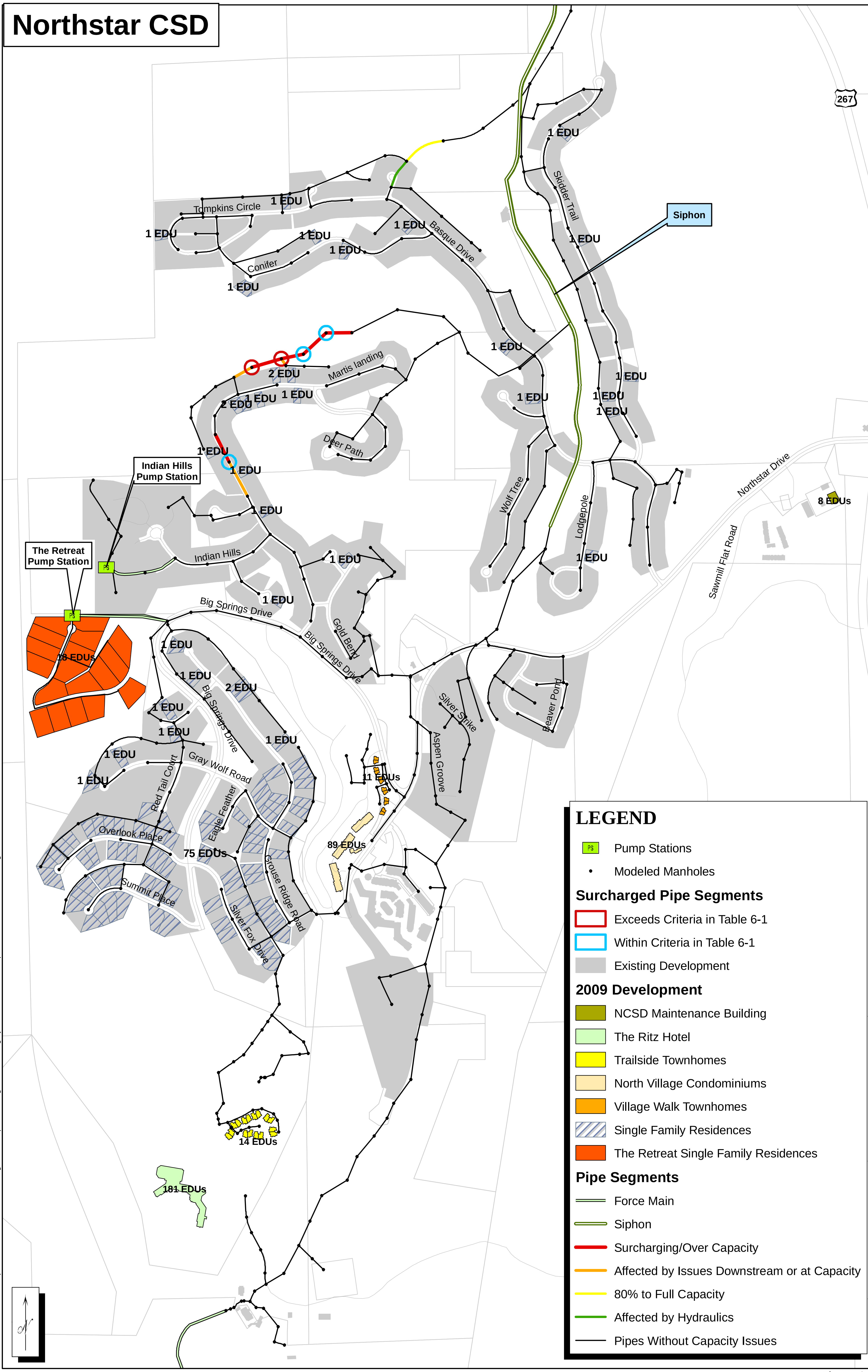


Figure 6-6
Development through 2009 Model Results - 10-year/24-hour Design Storm

6.5.2 DEVELOPMENT THROUGH 2012

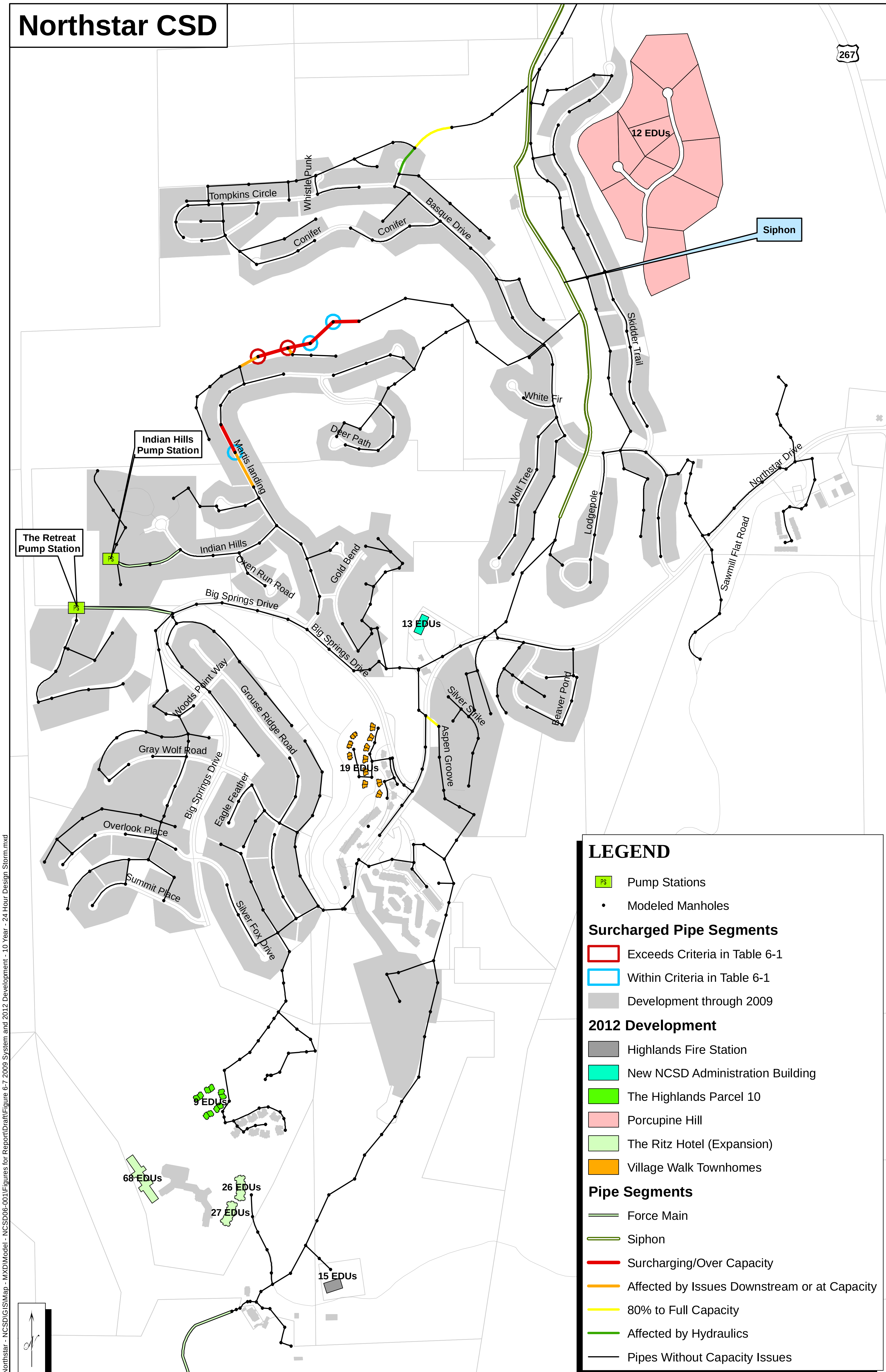
Anticipated development through 2012 along with the manholes to which the wastewater generated by the developments was assumed to discharge is shown in Table 6-3.

Table 6-3
Northstar CSD
2012 Development

Development	Manhole Assignment	Total Peak Flow (gpd) (a)
Build-out of all SFR parcels at Porcupine Hill	24	12,136
22 Village Walk Townhomes	New MH 92 New MH 90 to 84	19,390 (b)
Ten Highlands Condominiums (Parcel 10)	Trailside - 33	8,814
The Ritz Hotel (Expansion) The Ritz Club The Ritz Residences	Ritz - 12	122,514
The Highlands Fire Station	16	6,734
The NCSD Administration Building	243	13,203
14,000 square feet of restaurant space	Ritz - 12	13,468

(a) gpd = gallons per day
(b) Peak flow is divided between various manholes throughout the system.

These developments are shown in Figure 6-7 and are described in more detail in Chapter 3. With the addition of peak flows from the 2012 developments, the peak flow at the system's outfall during the 10-year, 24-hour design storm was estimated to be 1.7 Mgal/d. The addition of these peak flows did not result in any further capacity issues beyond what was described in the previous sections.



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Northstar CSD Wastewater Collection System Master Plan

Figure 6-7
Development through 2012 Model Results - 10-year/24-hour Design Storm

6.5.2 DEVELOPMENT THROUGH 2016

Anticipated development through 2016 along with the manholes to which the wastewater generated by the developments was assumed to discharge is shown in Table 6-4.

Table 6-4
Northstar CSD
2016 Development

Development	Manhole Assignment	Total Peak Flow (gpd) (a)
The Highlands Parcel 1	371	312,016
The Highlands Parcel 2	New MH 128 and 129	156,889 (b)
The Highlands Parcel 4	Ritz - 15	53,765
The Highlands Parcel 9	New MH 47	172,754
The Highlands Parcel 10	Trailside MH 32 and 33	394,867
The Highlands Lodge	Trailside - 32 New MH 96	100,166
Employee Housing	New MH75 New MH 74 New MH 71 New MH 65	74,844
14,000 square feet of restaurants	Trailside - 32	13,468

(a) gpd = gallons per day
(b) Peak flow is divided between various manholes throughout the system.

With the addition of peak flows from the 2016 developments (as described in Chapter 3 and shown in Figure 6-8), the peak flow at the system's outfall during the 10-year/24-hour design storm was estimated to be 3.0 Mgal/d. While the addition of these peak flows did not further impact those areas already experiencing capacity issues, they did result in further capacity issues in the following areas:

1. Manhole 337 to 335 (Southern-most portion of Aspen Grove)
2. Manhole 333 to 248 (Aspen Grove north to Northstar Drive to the fire station)

The modeled results for the system after the completion of development through 2016 during the 10 year/24 hour design storm are shown in Figure 6-8.

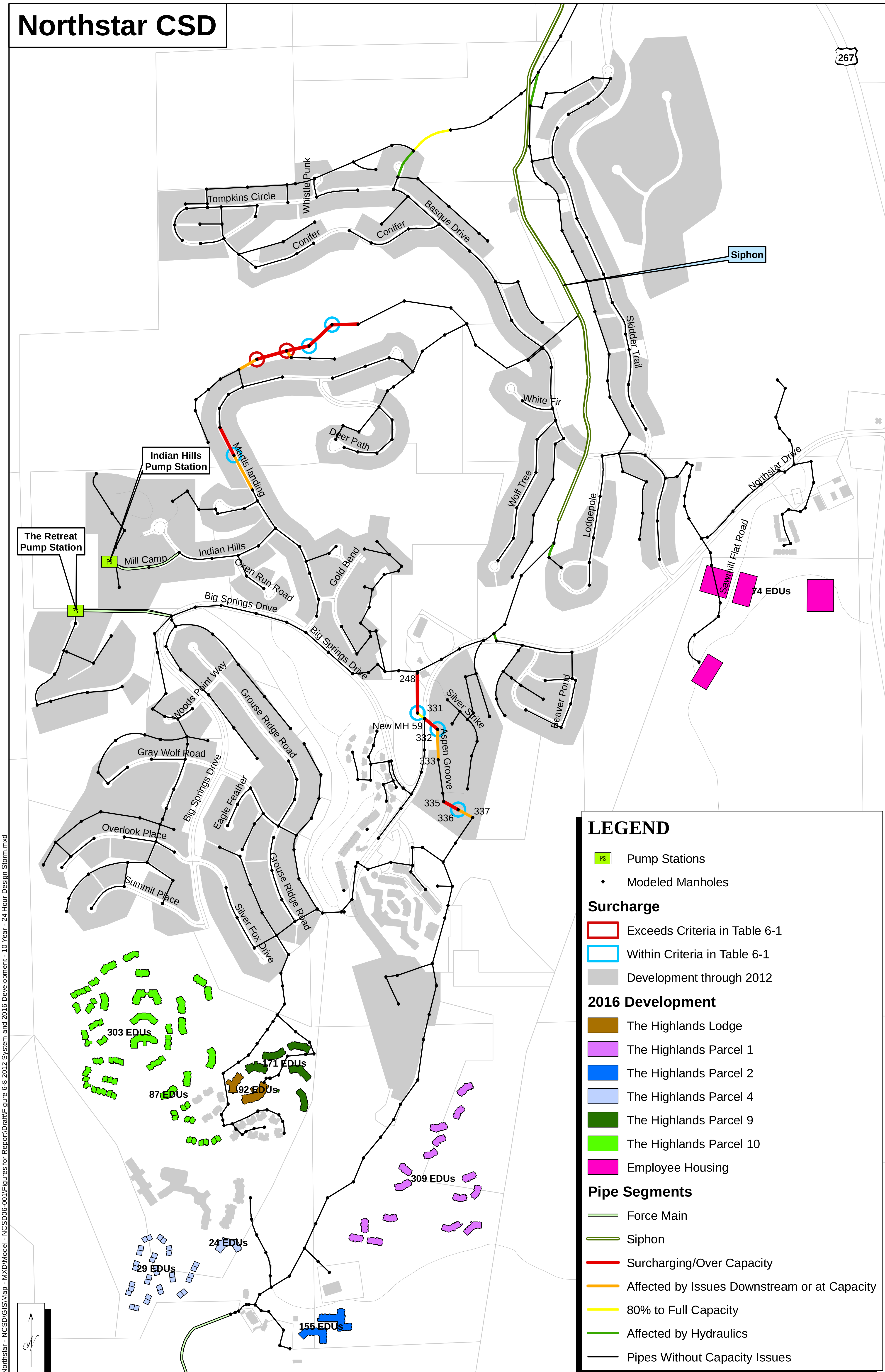


Figure 6-8
Development through 2016 Model Results - 10-year/24-hour Design Storm

The two pipeline sections with limited capacity described above (manholes 337 to 335 and manholes 333 to 348) were not predicted to experience surcharging greater than the capacity criteria shown in Table 6-1.

Profiles of pipe sections from manhole 337 to 335 and manholes 333 to 348 are shown in Figures 6-9 and 6-10, respectively. It is recommended that the new manhole 59 be verified as a drop manhole.

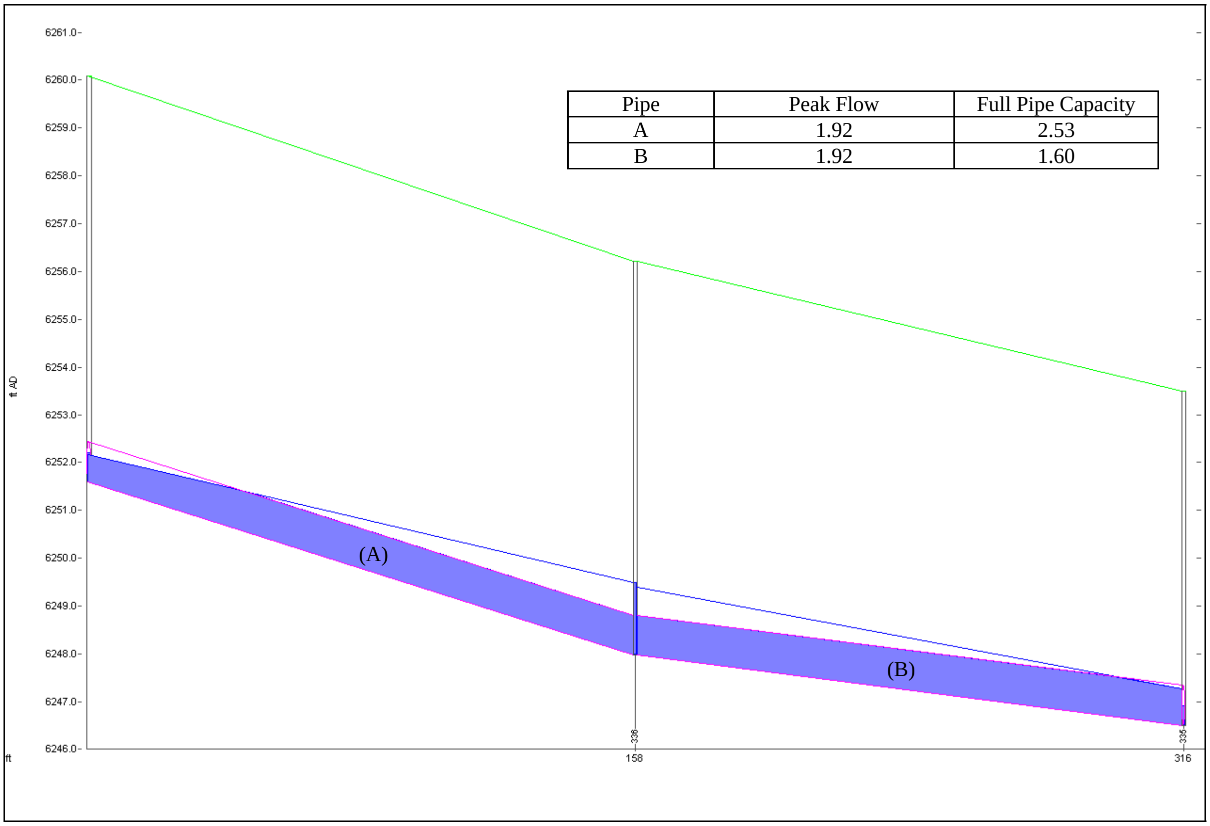
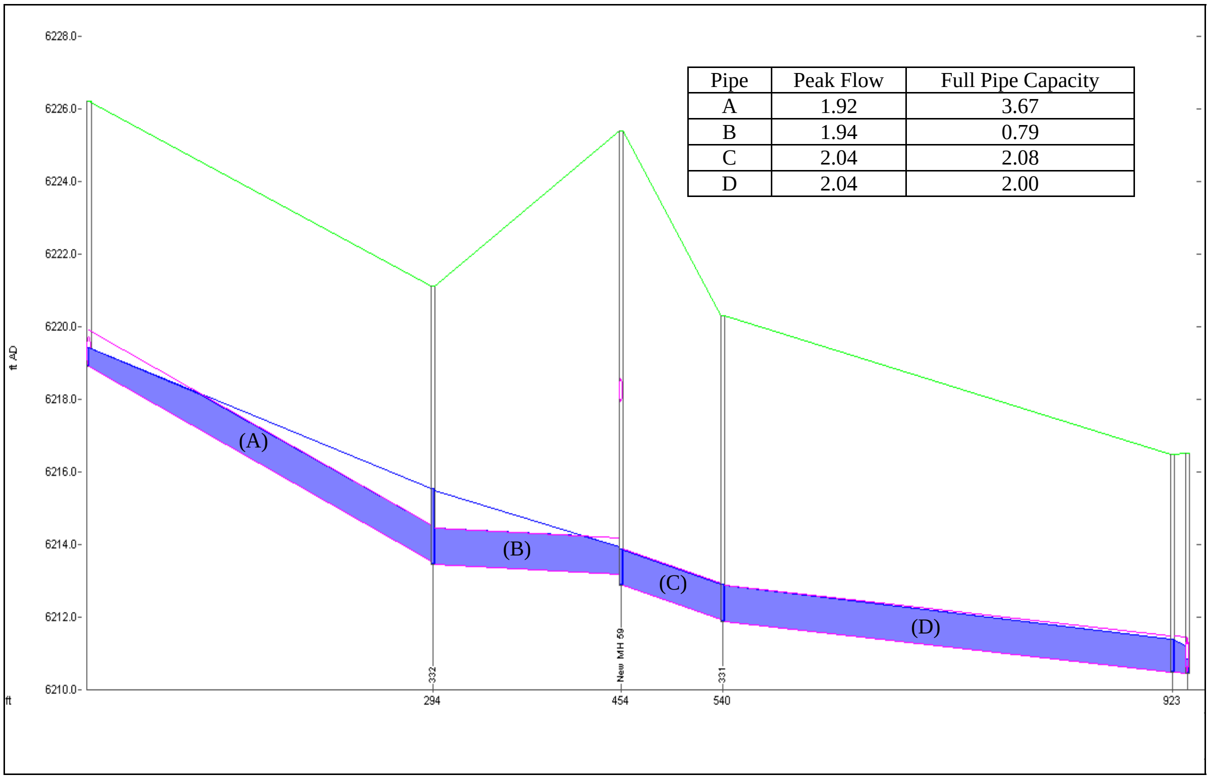


Figure 6-9
Northstar CSD
Development through 2016 – Design Storm
Surcharging Pipe Segments Manholes 337 to 335



Pipe	Peak Flow	Full Pipe Capacity
A	1.92	3.67
B	1.94	0.79
C	2.04	2.08
D	2.04	2.00

Figure 6-10
Northstar CSD
Development through 2016 – Design Storm
Surcharging Pipe Segments Manholes 333 to 248

Chapter 7

Recommendations

7.1 PURPOSE

The purpose of this chapter is to provide recommendations for mitigating capacity issues based on the model results detailed in Chapter 6. Planning level cost estimates for capacity mitigation strategies are also included.

This chapter is divided into the following sections:

- Current Priority Maintenance Locations
- Mitigation Strategies for Existing System Deficiencies
- Phased Capital Improvement Plan
- Capital Cost Estimates

7.2 CURRENT PRIORITY MAINTENANCE LOCATIONS

High priority maintenance locations in the Northstar Community Services District (NCSD) service area were provided by NCSD and are listed in Table 7-1. These areas are shown graphically in Figure7-1.

Table 7-1
Northstar CSD
Priority Maintenance Locations in the Existing Wastewater Collection System

Location	Location Description	Issue
1	Lateral from Day Lodge	Limited access
2	Lateral from Mountain Operations Building (under Village ski run)	Low spot in sewer line
3	Six inch sewer line north of Martis Landing	Roots cracking sewer line
4	End of Basque Drive at Tompkins Circle	Feeds into flat sewer line
5	Downhill side of Skidder Trail off Basque Drive	No access for maintenance
6	Northstar Drive between Beaver Pond and Aspen Grove Condominiums	Manholes 238 and 239 collect debris; Manhole 84 surcharges from debris
7	Basque Road at the bottom of Wolf Tree	High velocity flow
8	Lateral from Timber Creek Restaurant	Collects debris

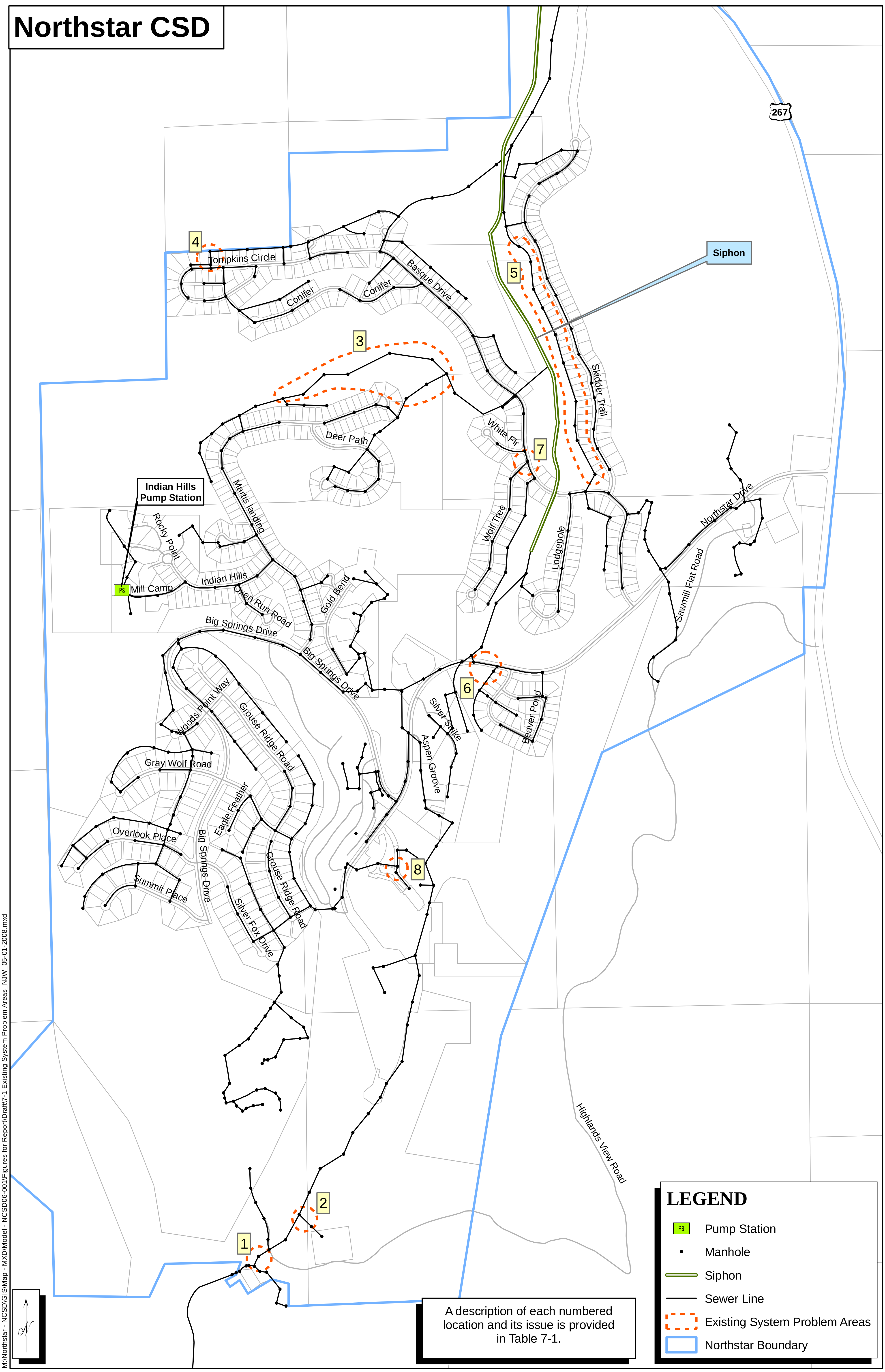


Figure 7-1
Priority Maintenance Locations in the Existing Wastewater Collection System

In addition to addressing these areas in the system, NCSD also periodically maintains the eight and twelve inch siphon lines and the Indian Hills and Highway 267 pumps and force mains. The pump stations, both built in the 1970's, have never had any major issues.

Locations 4 and 7 from Table 7-1 were verified against the modeled results. Comments on these two locations include:

- In the model, the pipe segment at location 4 has a much shallower gradient than the two upstream tributary sewer lines. While the model did not indicate any surcharging or hydraulics issues in the upstream pipes, it did show a velocity of only 1.0 foot per second (fps), which is likely causing solids build-up in this line.

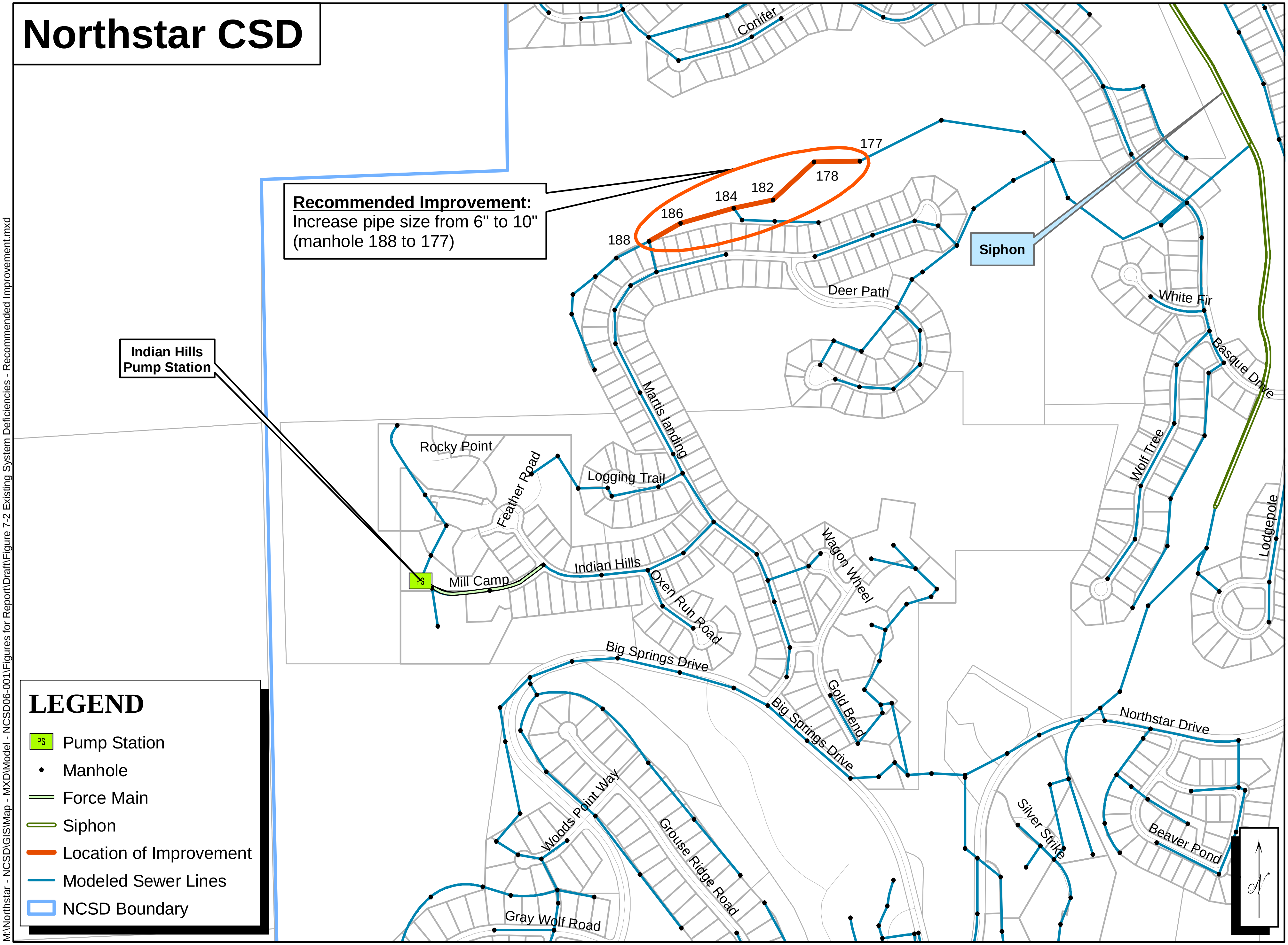
- At location 7, the hydraulic model does not indicate a high velocity through this stretch of sewer pipe (1.34 fps). Since this area was surveyed using a GPS unit which has a vertical error of plus or minus several feet, the invert and rim data may not be portraying actual gradients of the pipe segments at this location. This discrepancy in gradients would result in modeled flows being slower than those actually occurring.

7.3 MITIGATION STRATEGIES FOR EXISTING SYSTEM DEFICIENCIES

During a 10-year/24-hour design storm and at the existing level of development, the only section of sewer line predicted to exceed recommended capacity criteria is the sewer line from manhole 177 to manhole 188, north of Martis Landing across from Deer Path Court (described in more detail in Section 6.4.1). This pipeline may require mitigation to provide adequate protection during a design level storm. *However, prior to implementing any mitigation strategies or improvements, it is highly recommended that surveys be performed to confirm existing inverts, rims, and slopes.*

7.3.1 RECOMMENDED IMPROVEMENT – NORTH OF MARTIS LANDING

It is recommended that the 1,264 foot section of pipeline north of Martis Landing (manhole 188 to manhole 177) be upsized from 6-inches to 10-inches in diameter to accommodate existing flows during a 10-year/24-hour storm event. The location of this improvement is shown in Figure 7-2. Prior to implementation, it is highly recommended these manholes be professionally surveyed.



M:\Northstar - NCSD\GIS\Map - MXD\Model - NCSD06-001\Figures for Report\Draft\Figure 7-2 Existing System Deficiencies - Recommended Improvement.mxd

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Northstar CSD Wastewater Collection System Master Plan

Figure 7-2
Existing System - Recommended Improvement

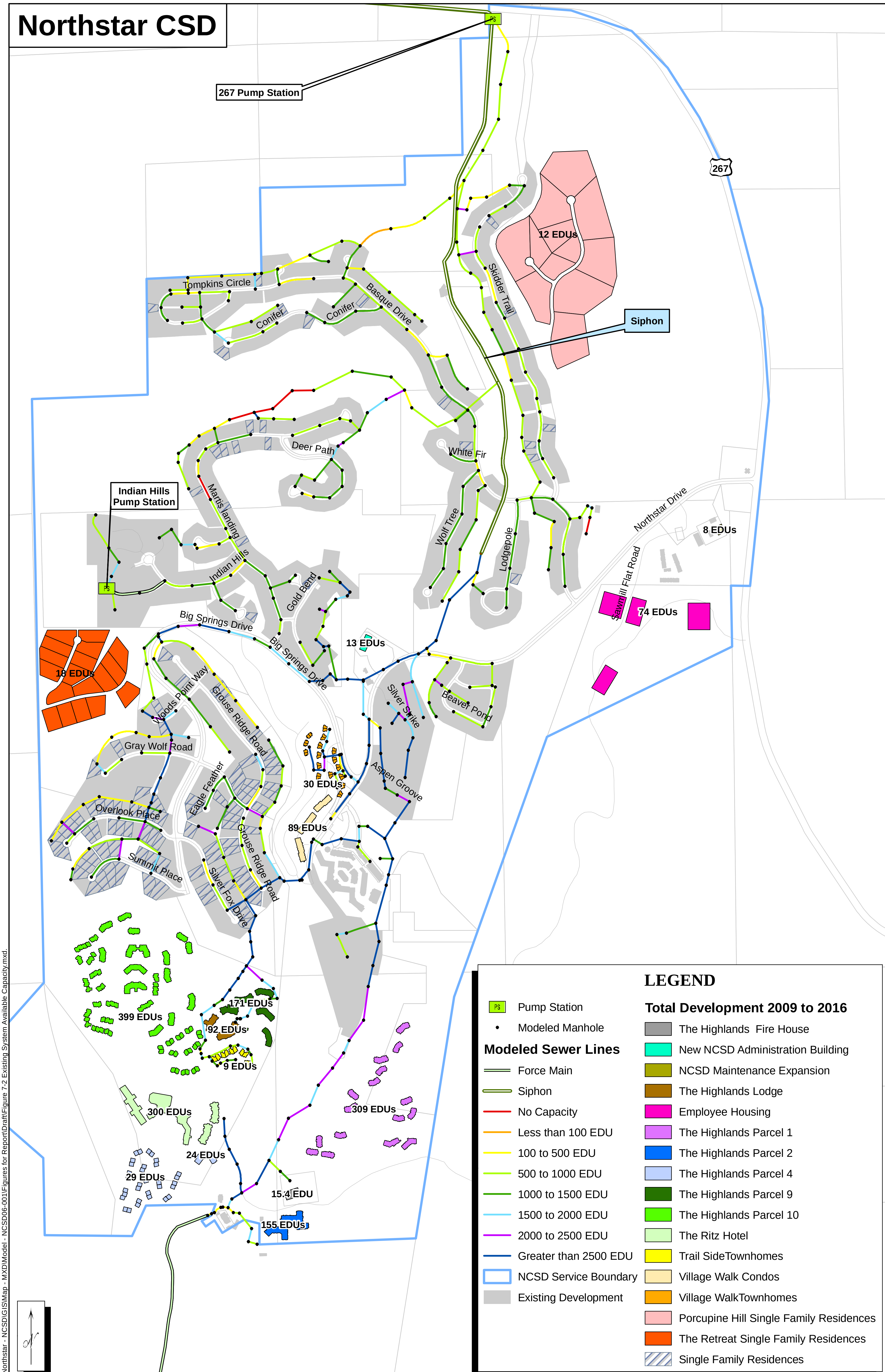
7.4 CAPITAL IMPROVEMENT PROJECTS

The following sections outline strategies to accommodate future development in NCSD's service boundary that is not already included in previous chapters [? Is this what you're trying to say here?? Is the future development not included in previous chapters or the strategies not included??].

7.4.1 INTERIM CAPACITY PLAN

Through the modeling process, it was determined that the existing NCSD wastewater collection system has the capacity to serve peak wastewater flows for known new development through 2016. However, if these developments do not occur as planned or another development that is not included in this master plan is built, the ability of the existing system to accommodate these developments may be different. Available capacity in the existing system at the existing level of development during a 10-year/24-hour design storm is shown in Figure 7-3.

The available capacity shown in Figure 7-3 is expressed in terms of equivalent dwelling units (EDUs). An EDU is a normalized value representing the wastewater generation from a single-family residential house in Northstar. For instance, a commercial building may generate the equivalent amount of wastewater as 17 single family residences. The commercial building is then said to be equivalent to 17 EDUs. Peak wastewater flow generated from each of the future development areas was estimated by multiplying the average unit flow determined in Chapter 4 by a peaking factor of 2.6. Using this method, the peak flow from one EDU is estimated to be about 1,011 gallons per day (gpd). Available capacity in the collection system (shown in Figure 7-3) was converted from flow to EDUs based on this value.



M:\Northstar - NCSD\GIS\Map - MXD\Model - NCSD06-001\Figures for Report\Draft\Figure 7-2 Existing System Available Capacity.mxd.

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Northstar CSD Wastewater Collection System Master Plan

Figure 7-3
Available Interim Capacity in the Existing Collection System
At Existing Level of Development during 10-year/24-hour Design Storm

7.4.2 LONG-TERM SYSTEM NEEDS

As described in Chapter 6, the model predicted that the existing system can accommodate all proposed development through 2016 during a 10-year/24-hour design storm, with the exception of the area north of Martis Landing described in Section 7.2.

However, model predictions showed the following areas as possible problems and should be verified and/or kept under observation.

- It is recommended that the drop manhole inverts at new manhole 59 be verified. The drop causes a flattened slope in the incoming pipe, leading to a potential future bottleneck in the system.
- With the addition of development through 2016, the stretch of pipe between manholes 248 and 337, near the Aspen Grove condominiums, is predicted to surcharge. This area should be observed for capacity issues when development through 2016 comes online.
- Because many of the inverts and rims were determined using a GPS system with a vertical error of plus or minus several feet, it is recommended that unsurveyed areas of the system be professionally surveyed.
- With the addition of the Porcupine Hill Development to the collection system, it is recommended that the 267 pump station be assessed for available capacity.

7.5 CAPITAL COST ESTIMATES

Planning level costs for recommended improvements to the existing system (as described in Section 7.2) are provided in Table 7-4.

The pipe costs include pipe material, excavation, laying and joining, backfill, manholes, testing, cleanup, and contractor's overhead and profit. This estimate also includes a 30% contingency for unknown conditions and a 10% allowance for design and administration. These costs do not include any costs for easement acquisitions. All costs have been estimated at a current Engineering News-Record Construction Cost Index (ENRCCI) of 8,141 (May 2008).

Table 7-4
Northstar CSD
Preliminary Cost Estimate for Recommended Improvement

Improvement Description	Cost (a)
Upsize Pipeline (Manholes 177 to 188) from 6-inch to 10-inch	$190,000 (b)
Estimating Contingency (30%)	$57,000
SUBTOTAL – CONSTRUCTION COSTS	**$247,000**
Design/Administration (10%)	$25,000
TOTAL	**$272,000**

(a) May 2008 costs; ENRCCI = 8,141.
(b) Cost of pipeline = 10” diameter of new pipe x $15 per inch diameter per linear foot x 1,264 linear feet of pipeline

Chapter 8

Sewer System Management Plan (SSMP) Development Plan and Schedule

8.1 BACKGROUND

On May 2, 2006, the California State Water Resources Control Board (SWRCB) issued statewide general waste discharge requirements (WDRs) for all publicly owned sanitary sewer systems greater than one mile in length. Guidelines and requirements for WDRs are described in the State Water Resources Control Board Order No. 2006-0003 Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, herein referred to as WDR 2006-0003. A significant requirement outlined in WDR 2006-0003 is the completion of a Sewer System Management Plan (SSMP).

One of the initial requirements of WDR 2006-0003 is an SSMP Development Plan and Schedule, which is required to receive approval by the municipality's governing board at a public meeting. This document serves to fulfill the SSMP Development Plan and Schedule requirement of WDR 2006-0003.

The purpose of this document is to provide an assessment of the Northstar Community Services District's current sewer system management, operation, and maintenance procedures and to recommend actions to produce a complete SSMP in compliance with the requirements as described in WDR 2006-0003.

This document is organized into the following major parts:

(1) Description of each SSMP element including the minimum requirements discussed in WDR 2006-0003;

(2) Assessment of the District's compliance with these requirements for each SSMP element;

(3) A scope of work for completion of procedure elements the District needs to develop or improve; and

(4) An implementation schedule for completion of each element.

8.2 SEWER SYSTEM MANAGEMENT PLAN (SSMP) ELEMENTS

The SSMP is a general compilation of information about the management, operation and maintenance of a municipality's sanitary sewer collection system. The SSMP has 11 primary components:

1. Goal
2. Organization
3. Legal Authority
4. Operation and Maintenance Program
5. Design and Performance Provisions
6. Overflow Emergency Response Plan (OERP)
7. Fats, Oils and Grease (FOG) Control Program
8. System Evaluation and Capacity Assurance Plan (SECAP)
9. Monitoring, Measurement, and Program Modifications
10. SSMP Program Audits
11. Communication Program

A brief explanation of each of the eleven elements and the minimum requirements, as outlined in WDR 2006-0003, is provided below. The full WDR 2006-0003 is located in Appendix A.

8.2.1 GOALS

Program goals are an important aspect of the SSMP because they provide focus for the municipality's staff to continue to implement improvements in their management of the sanitary sewer collection system. The goals will determine steps that must be undertaken to establish and define the purpose and anticipated results of the program. Goals should reflect performance, safety, customer service, resource use, compliance, and other considerations, including the Sanitary Sewer Overflow (SSO) policy goals of reducing and mitigating the impacts of SSO's.

8.2.2 ORGANIZATION

An organizational chart should be developed that identifies administrative and management positions responsible for implementing the SSMP program. The organizational chart also includes operations and maintenance personnel that will be involved in developing and implementing the program. The employees involved with the SSMP program should be provided with the necessary training required to perform their assigned SSMP duties.

A chain of communication for reporting SSO events is also required. The chain of communication encompasses all those affected by the SSO event, including the initial receipt of a complaint to the notification of permitting authorities, other agencies, and the public.

8.2.3 LEGAL AUTHORITY

Sufficient legal authority must be provided to implement an effective SSMP program. Legal authority can be provided through sewer use ordinances, service agreements, discharge permits, or other legally binding documents.

The municipality must demonstrate, through sanitary system use ordinances, that it possesses the necessary legal authority to:

- Prevent illicit discharges into the sanitary sewer system;
- Require that sewers and connections be properly designed and constructed;
- Ensure access for maintenance, inspection, or repairs;
- Limit the discharge of fats, oils, and grease and other debris that may cause blockages; and
- Enforce any violation of sewer ordinances.

8.2.4 OPERATIONS AND MAINTENANCE (O&M) PROGRAM

A collection system needs to be properly operated and maintained. The SSMP requires that the following elements (and person or position responsible) of the municipality's operation and maintenance (O&M) program be addressed:

- Maintain an up-to-date map of the collection system;
- Describe routine O&M activities, including regularly scheduled maintenance and cleaning with more frequent maintenance and cleaning in known problem areas. The O&M activities should be listed within a system that tracks work orders and can assess the effectiveness of the program;
- Develop and implement short and long-term rehabilitation and replacement plans;
- Provide training on a regular basis for O&M staff;
- Keep an inventory of general and critical equipment and replacement parts.

8.2.5 DESIGN AND PERFORMANCE PROVISIONS

The design and performance provisions should identify minimum design and construction standards and specifications for the installation of new sewer systems, and for rehabilitation and repair of existing sewers. An effective program that ensures new sewers are properly designed and installed can minimize system deficiencies that could create or contribute to future overflows and/or operations and maintenance problems. Design criteria should include specifications such as pipe materials, minimum sizes, minimum cover, strength, minimum slope, trench and backfill, structure standards, flow factors, and other relevant parameters as necessary. Also, procedures and standards are required for inspecting and testing the installation of new sewers, pump stations, and other facilities and for rehabilitation and repair projects.

8.2.6 Overflow Emergency Response Plan (OERP)

An Overflow Emergency Response Plan (OERP) provides a standardized course of action to be followed by collection system personnel during an SSO event. An up-to-date OERP is necessary to ensure that a municipality is adequately prepared to respond to an SSO event. The OERP should describe protocols for the response, remediation, and notification of an SSO event under varying scenarios.

The OERP should identify measures to protect the public health and the environment from a broad range of potential collection system failures that could lead to an SSO. The OERP should also include procedures to mitigate the effects of an SSO, when they do occur.

Lastly, to ensure successful implementation of the OERP during an SSO, appropriate staff and contractors should have adequate training.

8.2.7 Fats, Oils, and Grease (FOG) Control Program

The service area is required to be evaluated to determine whether a FOG control program is needed. If FOG is found to be a problem, preparation and implementation of a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system is required.

The FOG control program needs to include legal authority to prohibit and enforce grease discharges (as from restaurants), require installation of grease removal devices, provide design standards and maintenance requirements for the grease removal devices, establish Best Management Practice (BMP) requirements, and establish record keeping and reporting requirements for grease producing facilities.

The FOG control program also needs to establish legal authority to inspect and enforce the requirements of the program, as well as provide sufficient staff to perform these tasks.

Finally, the FOG program needs to develop an outreach program to educate the public on proper disposal of fats, oils and grease.

8.2.8 System Evaluation and Capacity Assurance Plan (SECAP)

The collection system should be evaluated to determine where hydraulic deficiencies exist. Based on the hydraulic deficiencies, a capital improvement program (CIP) should be developed and implemented to ensure adequate capacity for dry and wet weather flow conditions.

Capacity enhancement measures should establish short and/or long-term actions to correct each identified hydraulic deficiency. Short and long term actions should include alternative analyses, a prioritization of recommended projects, an implementation schedule, and source of funding.

8.2.9 MONITORING, MEASUREMENT, AND PROGRAM MODIFICATIONS

During implementation of the SSMP program, the program elements should be monitored for their effectiveness. If the elements are not effective, the program elements should be modified or updated to increase their effectiveness.

8.2.10 SSMP PROGRAM AUDITS

Internal audits should be performed at a frequency of every two years or less, as appropriate. The internal audits will assess the effectiveness of the SSMP. They are also intended to identify and correct any deficiencies within the SSMP.

8.2.11 COMMUNICATION PROGRAM

As part of developing and implementing the SSMP, a public outreach program should be established to inform the public of the process. The public outreach program will provide a means of incorporating public input into the SSMP development.

8.3 SSMP ASSESSMENT RESULTS

An assessment was conducted on how the District's current practices comply with the eleven elements described in Section 2. Information pertaining to the District's current policies for management, operation and maintenance of their collection system was gathered through the completion of a Collection System Initial Assessment Form. The Collection System Initial Assessment Form was used to evaluate the level to which the District complies with each of the SSMP program elements (Table 3-1). The elements are assessed for level of completion and rated as:

- Completed or nearly completed
- In-progress
- Need to be initiated to comply with SSMP requirements

Table 8-1
Northstar Community Services District
SSMP Assessment

Program Element	Program Completed or Nearly Completed	Program In-Progress	Program Needed
1. Goals			X
2. Organization			
a. SSMP Organization Chart		X	
b. Chain of Communication for Reporting SSO Events			X
3. Legal Authority			
a. Illicit Discharges	X		
b. Proper Design and Construction	X		
c. Access for Maintenance, Inspection and Repairs	X		
d. Limit FOG and debris	X		
e. Enforcement	X		
4. Operation & Maintenance Program			
a. Maintain Up-to-Date Map		X	
b. Perform Routine Preventative Maintenance		X	
c. Rehabilitation and Replacement Plan		X	
d. Training Program		X	
e. Parts & Equipment Inventory		X	
5. Design and Performance Provisions			
a. Design and Construction Standards	X		
b. Inspection and Testing Standards	X		

Table 8-1
Northstar Community Services District
SSMP Assessment

Program Element	Program Completed or Nearly Completed	Program In-Progress	Program Needed
6. Overflow Emergency Response Plan			
a. Notification Procedures			**X**
b. Overflow Response			**X**
c. SSO Notification			**X**
d. Training			**X**
e. Emergency Operations			**X**
f. SSO Mitigation			**X**
7. Fats, Oils & Grease (FOG) Control Program			
a. Develop a Public Outreach Program to Promote Proper Disposal of FOG		**X**	
b. Establish a Plan and Schedule for Disposal of FOG Generated within System		**X**	
c. Exercise Legal Authority to Prohibit FOG Discharges		**X**	
d. Require the Implementation of Grease Removal Devices and other BMPs		**X**	
e. Enforce FOG Ordinances and Inspect Grease Producing Facilities		**X**	
f. Identify Problem Areas & Establish Cleaning Schedule		**X**	
g. Source Control Measures		**X**	
8. System Evaluation & Capacity Assurance Plan			
a. Evaluation		**X**	
b. Capacity Enhancement Measures		**X**	
c. Capital Improvement Program Schedule		**X**	
9. Monitoring, Measurement, and Program Modifications			
a. Implementation and Effectiveness of SSMP			**X**
b. Update SSMP Program Elements			**X**
c. Identify and Track SSO Trends			**X**
10. SSMP Program Audits			**X**
11. Communications Program			**X**

8.4 SSMP SCOPE OF WORK

As shown in Table 3-1, the District has several of the SSMP elements either in-place or currently being developed. However, there are also several elements that will need to be developed or added to the programs in order to comply with the minimum SSMP requirements. These program elements are:

1. **Goals –** The District will need to develop goals for their collection system which are aimed at the proper management, operation, and maintenance of the sanitary sewer system which result in the prevention of SSOs.
2. **Organization –** The District currently has an organizational chart identifying the authorized representative, but a documented chain-of-communication for reporting SSO's needs to be developed. In addition, the existing organizational chart should be updated to show lines of authority, identify key staff members who are responsible for implementing various elements of the SSMP, and document the names and contact information for these staff members.
3. **Legal Authority –** The District's legal authority is defined in Section 11 of the Northstar Community Services District General Sewer Ordinance 22-05. This ordinance appears consistent with the SSMP requirements. However, the ordinance should be reviewed and updated if necessary.
4. **Operations & Maintenance Program –** To comply with the requirements established in the WDR, the following improvements are recommended:
    - Update the District's GIS database with all sewer and stormwater infrastructure. Use this database to create and maintain up-to-date map of the sewer system showing manholes, gravity sewers, force mains, pump stations, and stormwater collection systems. The District's stormwater system needs to be shown on the sewer system map to identify locations where potential SSOs could enter the system
    - Develop a Preventative Maintenance (PM) program to document routine operation and maintenance activities. The District is in the process of acquiring an Asset Management System (AMS) which will schedule preventative maintenance activities based on historical trends, identify problem areas that require more frequent cleaning, and manage and track operation and maintenance activities.
    - Formalize a rehabilitation and replacement plan that identifies and prioritizes deficiencies, establishes a short and long-term schedule, and includes a capital improvement plan (CIP). The forthcoming Asset Management System (AMS) will have the ability to prioritize rehabilitation and replacement projects.
    - Establish a standardized training program for the operation and maintenance of the District's collection system. Develop annual training goals and include methods for assessing the effectiveness of the training programs. Require any contractors who

perform operation or maintenance activities on the system, such as internal TV inspection, be properly trained. In addition, the District's Safety Manual should be updated to include a written safety policy.

- Identify critical equipment and replacement parts and create an inventory of these parts.

5. **Design and Performance Review –** The District has design and construction standards for installation, rehabilitation, and repair of new and existing sewer systems. These standards are outlined in the Northstar Community Services District General Sewer Ordinance 22-05 and include inspection and testing standards for new and existing sewers. These current standards should be reviewed and, if necessary, modified.

6. **Overflow Emergency Response Plan (OERP) –** The District does not currently have an Overflow Emergency Response Plan (OERP). To be consistent with the SSMP requirements the following improvements are recommended:

    - Establish procedures for notifying key responders and regulatory agencies in a timely manner.
    - Outline methods for ensuring proper response to any SSO.
    - Develop procedures for reporting of SSO's that effect public heath or discharge into waters of the State to all regulatory agencies and other involved agencies. These procedures should identify the officials who receive immediate notification.
    - Establish procedures that guarantee all appropriate staff and contracts are aware of the Overflow Emergency Response Plan and are properly trained on how to respond to SSO's.
    - Update procedures currently used to address emergency situations such as traffic and crowd control. If applicable, other agencies such as the police and fire departments may take responsibility during these situations.
    - Update existing practices which are used to contain and prevent SSO's from discharging into the waters of the United States and limit the impact of any discharge.

7. **Fats, Oils and Grease (FOG) Control Program –** The District is currently in the process of completing and implementing a fats, oils and grease (FOG) control program, which is described in the Northstar Community Services District General Sewer Ordinance 22-05. This FOG program will be incorporated into the newly acquired Asset Management System (AMS), which will allow the District to track trouble spots and focus enforcement and cleaning efforts.

8. **System Evaluation and Capacity Assurance Plan (SECAP) –** The District does not currently have a System Evaluation and Capacity Assurance Plan (SECAP). However, a

capital improvement plan that includes system capacity evaluation, short and long-term solutions for hydraulic deficiencies, and a schedule for completion is currently being developed as part of the District's Collection System Master Plan.

SSMP Elements 9, 10 & 11

The last three SSMP elements are focused on measuring and reviewing the effectiveness of an existing SSMP as well as communicating its performance to the public. Once the District has an implemented SSMP, the requirements for these elements, as outlined in WDR 2006-0003, must be addressed.

8.5 SSMP PROGRAM IMPLEMENTATION SCHEDULE

The SRWCB has provided a time frame upon which to complete each of the required program components. The schedule provides completion dates based on service area population, with smaller communities having more time than larger ones. For collection systems serving populations less than 2,500, which includes the Northstar Community Services District, the required program element completion and implementation schedule is presented in Table 5-1. The responsible District staff member for each element is also provided in Table 5-1. The District is required to certify that the SSMP elements are in compliance with the WDR within the time frame shown. This certification is done electronically in the SSO database.

This SSMP Development Plan and Schedule and the final completed SSMP are required to be presented to the District's governing board for approval at a public meeting. The District is not required to send the completed SSMP to the State or Regional Water Boards for review or approval. However, the District must make the document available to the State and/or Regional Water Board upon request. Furthermore, the completed SSMP must be publicly available at the District's office and/or available on the Internet.

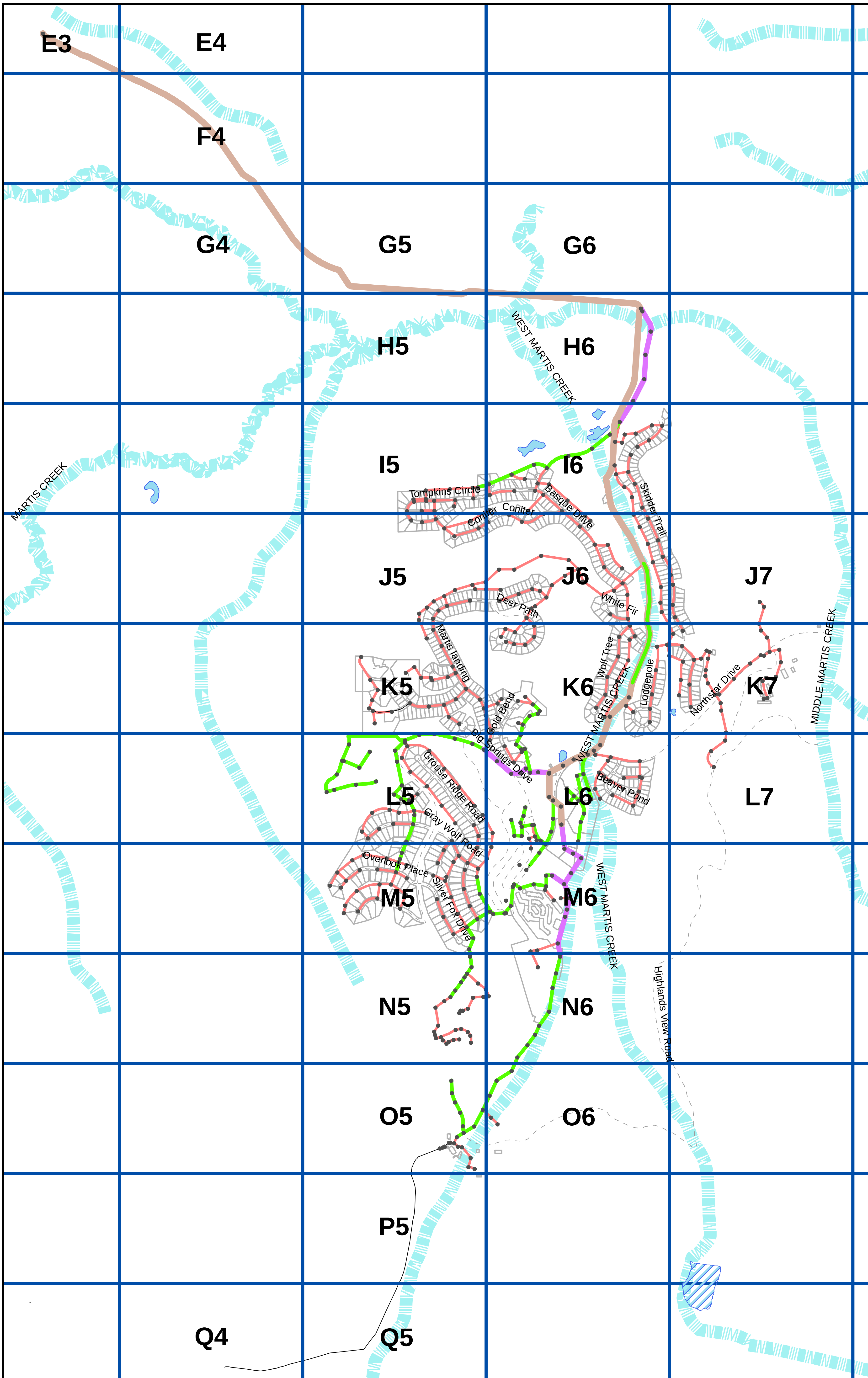
The WDR requires that the SSMP be updated every five years to include any significant program changes. Approval by the District's Board is required when significant updates to the SSMP are made. Furthermore, to complete the re-certification process, the District must enter the data into the online SSO database and mail the form to the State Water Board as described in the WDR.

Table 8-2
Northstar Community Services District
Completion of SSMP Elements Schedule

SSMP Element	Completion Date	Responsible District Staff Member
Application for Permit Coverage	November 2, 2006	Michael Staudenmayer
Reporting Program	September 2, 2007	Michael Staudenmayer
SSMP Development Plan and Schedule	May 2, 2008	Michael Staudenmayer
Goal and Organization		Michael Staudenmayer
Legal Authority	February 2, 2010	Michael Staudenmayer
Operation and Maintenance Program		Michael Staudenmayer
Overflow Emergency Response Program		Michael Staudenmayer
FOG Control Program (if needed)		Michael Staudenmayer
Design and Performance Provisions	August 2, 2010	Michael Staudenmayer
System Evaluation and Capacity Assurance Plan		Michael Staudenmayer
Monitoring and Program Modifications		Michael Staudenmayer
Program Audits		Michael Staudenmayer
Communication Program		Michael Staudenmayer
Final SSMP Implementation		Michael Staudenmayer

Appendix A

Wastewater Collection System Atlas



NORTHSTAR CSD
SEWER SYSTEM

MAP SYMBOLS

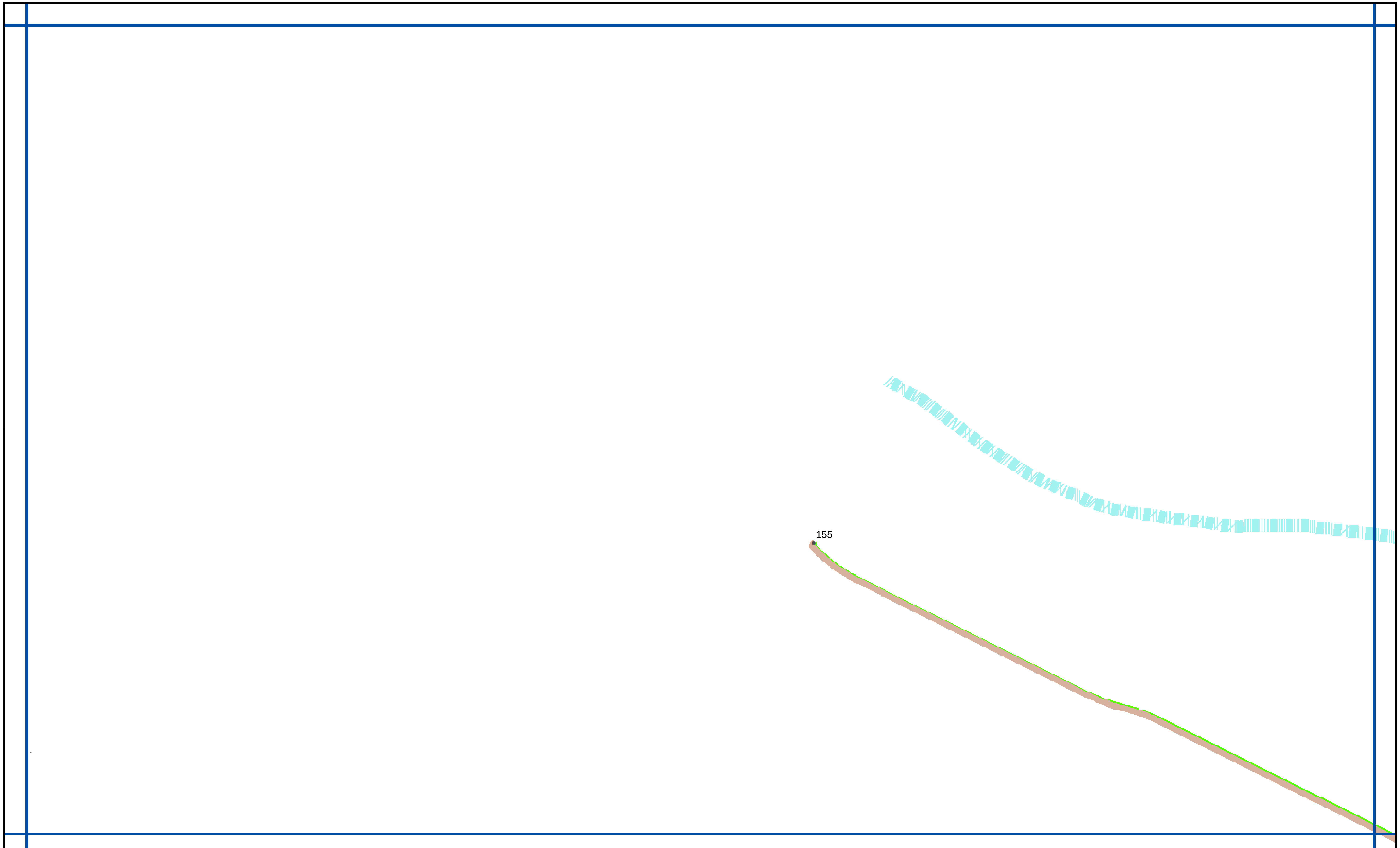
MAP GRID	LAKE	ROAD	MANHOLE	6"	10"		
PARCEL	RESERVOIR	STREAM	< 6"	8"	12"		

N

300 0 300 600

Scale Feet

3/4" = 900'



NORTHSTAR CSD
SEWER SYSTEM

MAP: E3

MAP SYMBOLS

MAP GRID
ROAD
MANHOLE
6"
10"
PARCEL
STREAM
< 6"
8"
12"

1" = 200'

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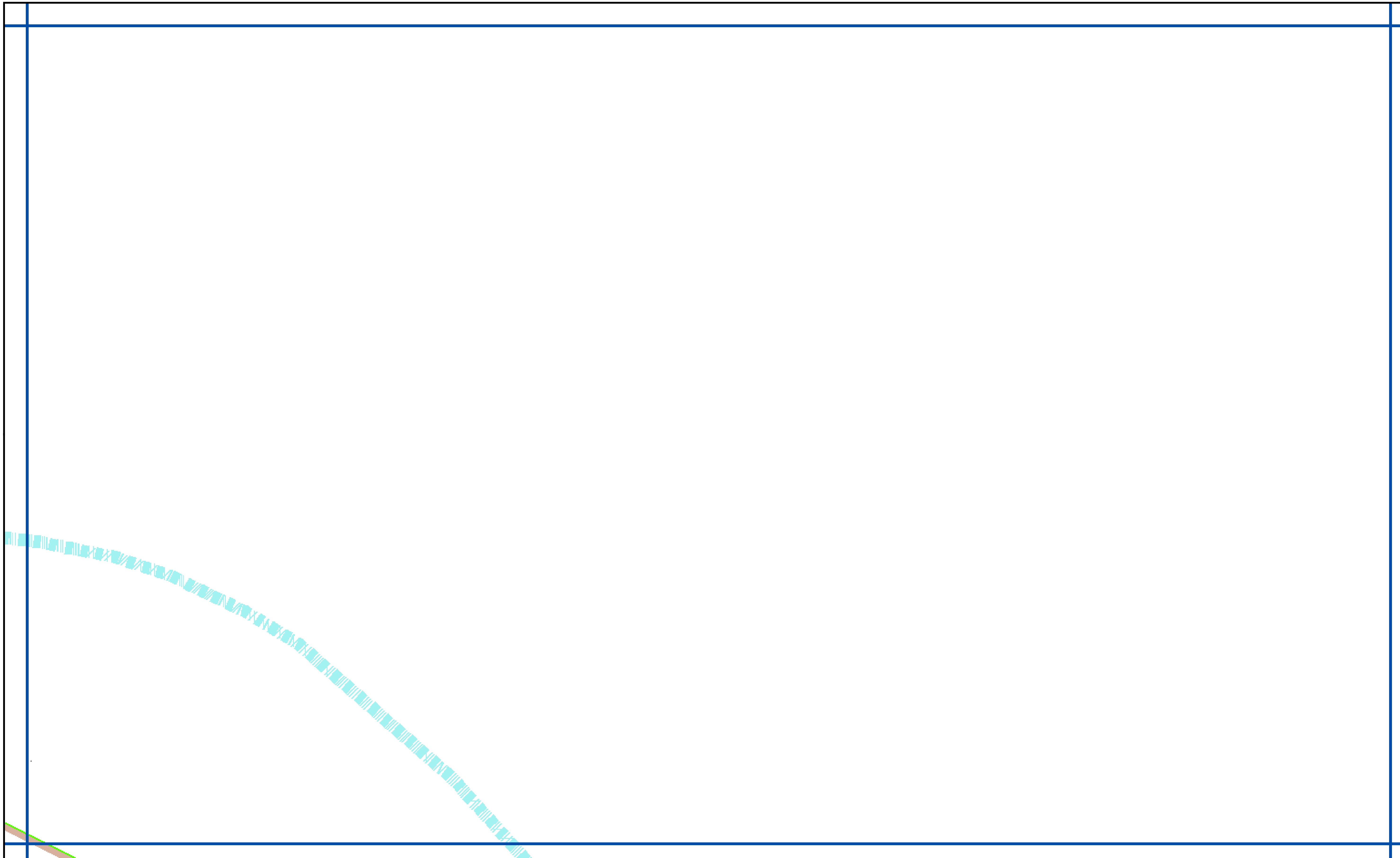

NORTHSTAR CSD
SEWER SYSTEM

MAP: E4

MAP SYMBOLS

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PARCEL — STREAM — < 6" — 8" — 12"

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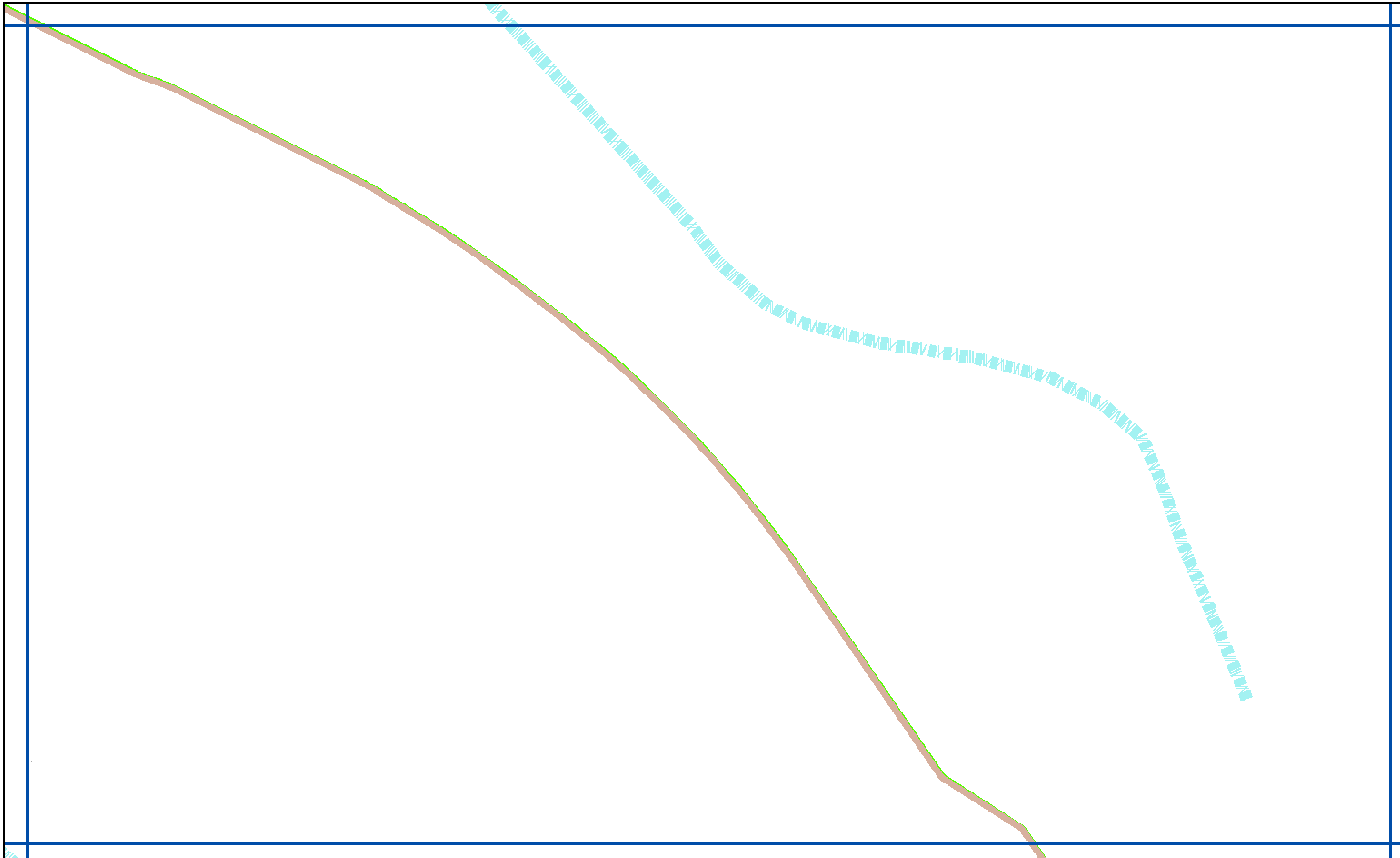
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: F4

MAP SYMBOLS

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PARCEL | STREAM | < 6" | 8" | 12"

1" = 200'

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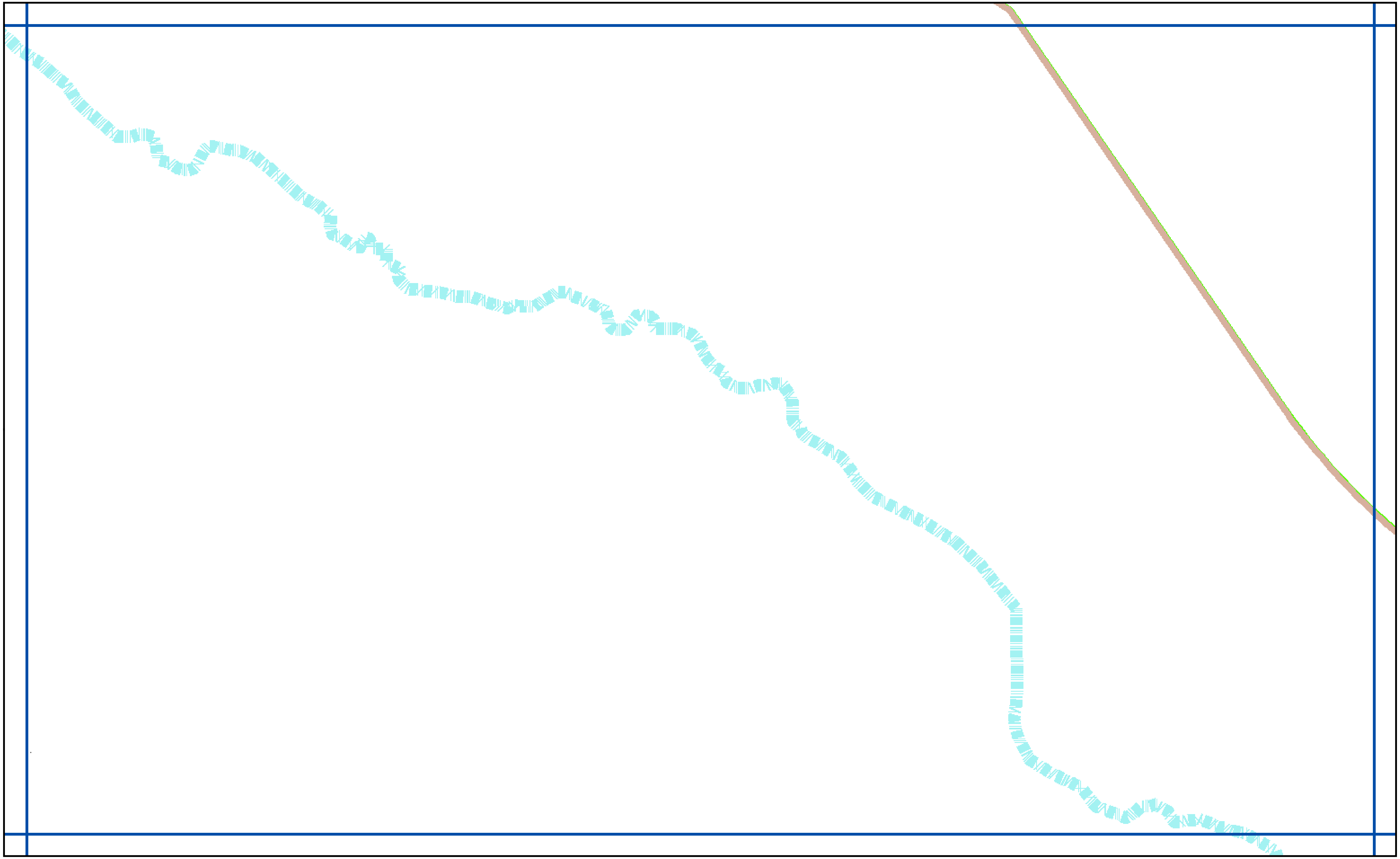
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: G4

MAP SYMBOLS

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1" = 200'

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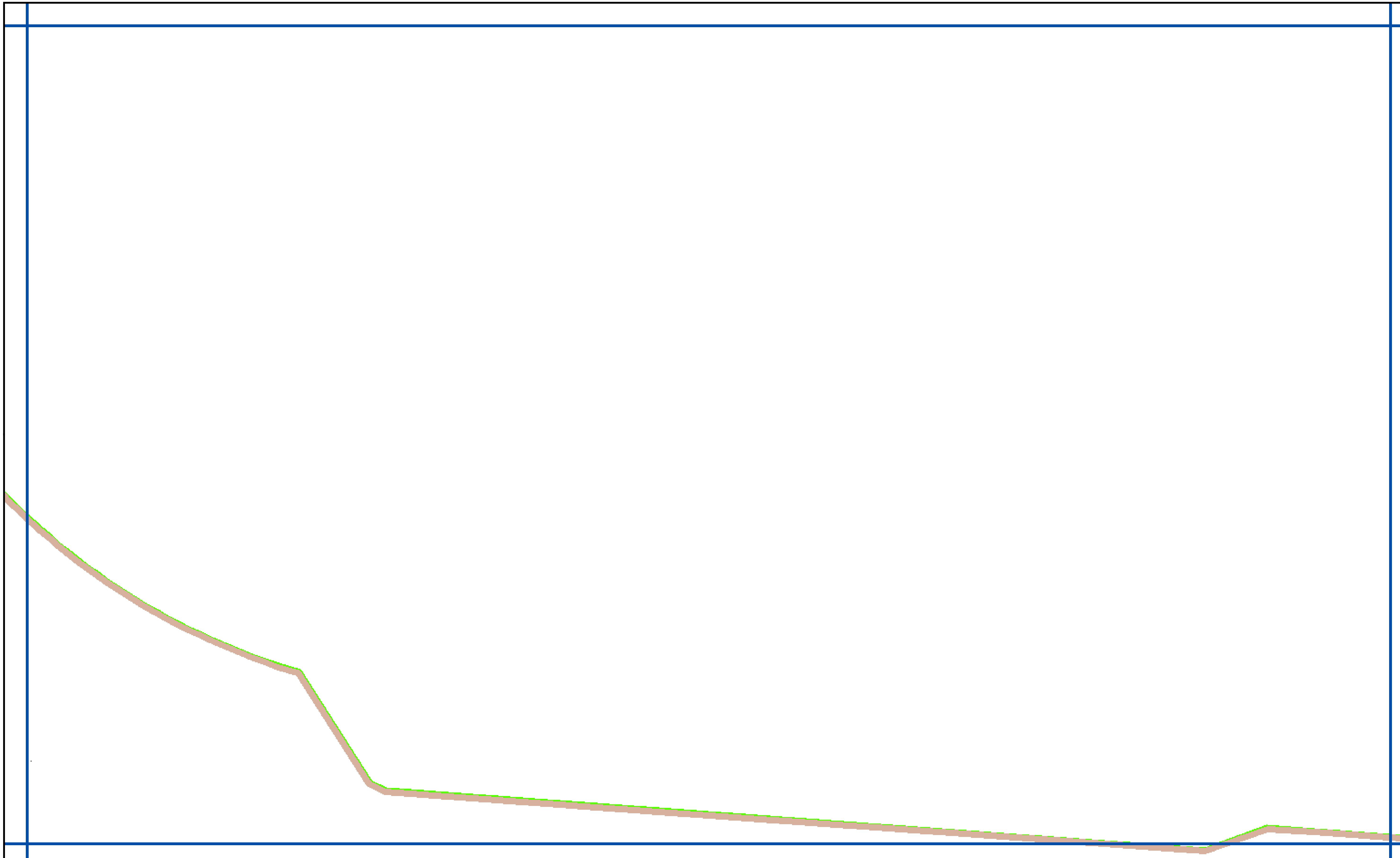

NORTHSTAR CSD
SEWER SYSTEM

MAP: G5

MAP SYMBOLS

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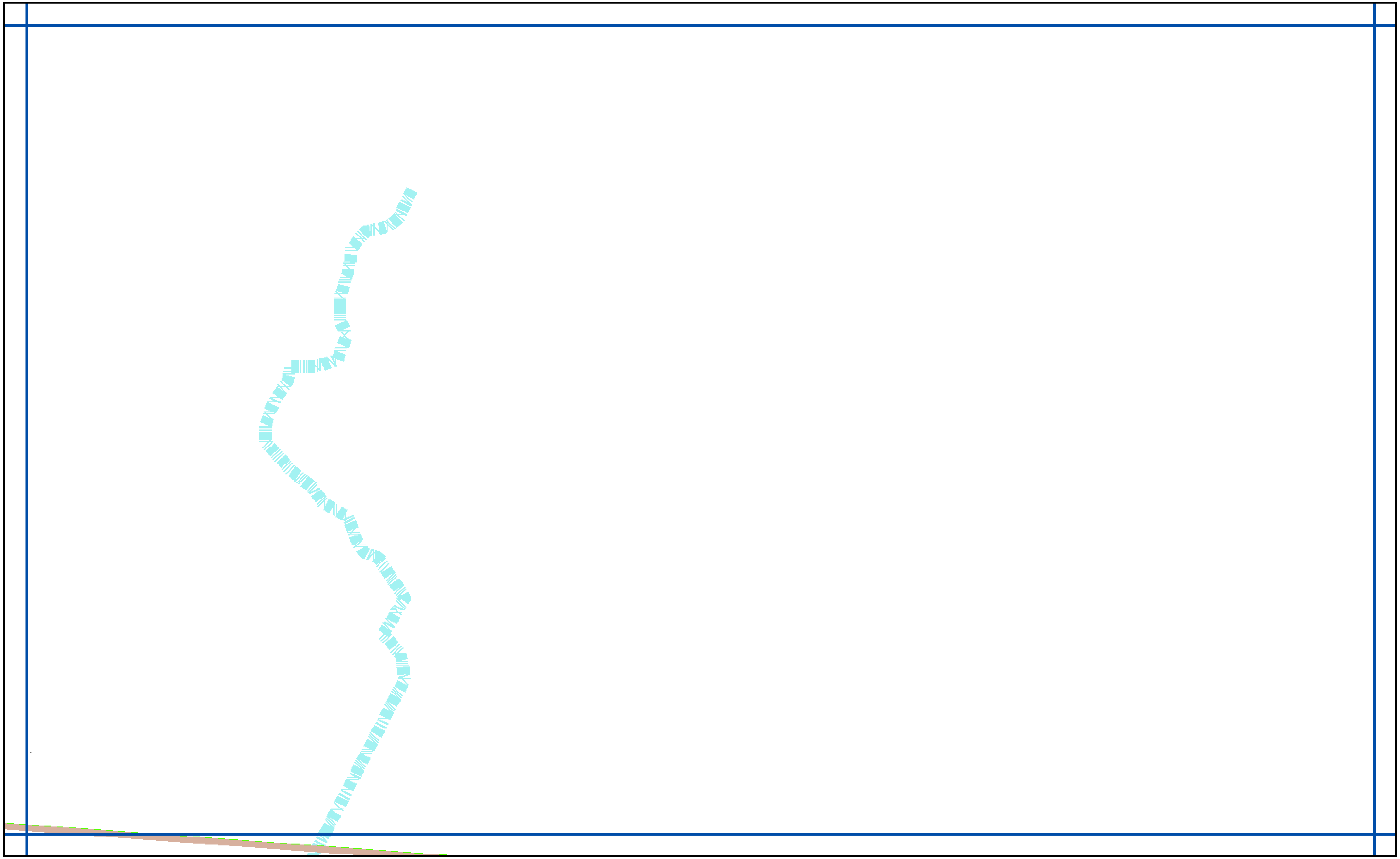

NORTHSTAR CSD
SEWER SYSTEM

MAP: G6

MAP SYMBOLS

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PARCEL — STREAM — < 6" — 8" — 12"

1" = 200'

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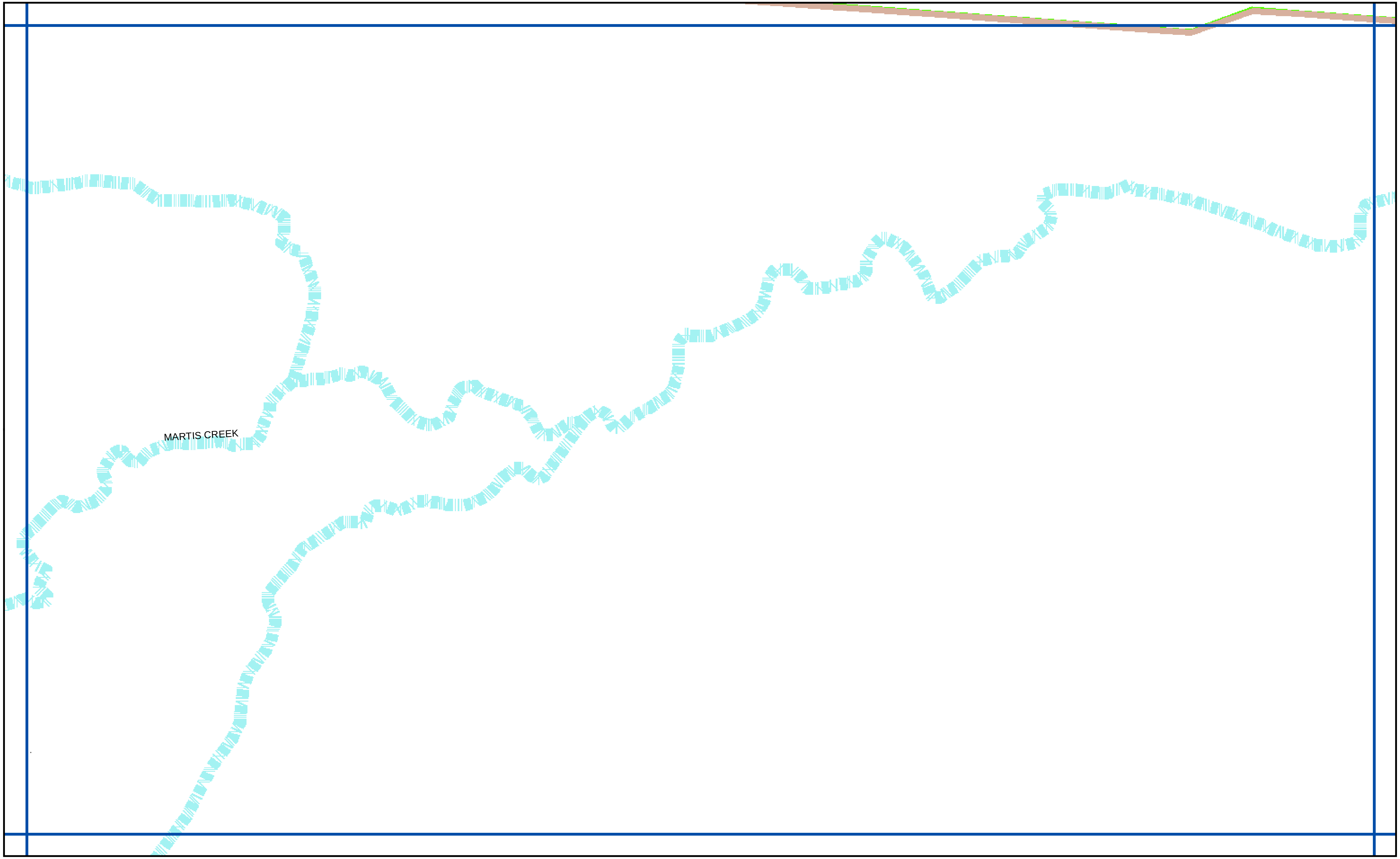
Scale Feet

PAGE # 6



NORTHSTAR CSD
SEWER SYSTEM

MAP: H5

MAP SYMBOLS

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1" = 200'

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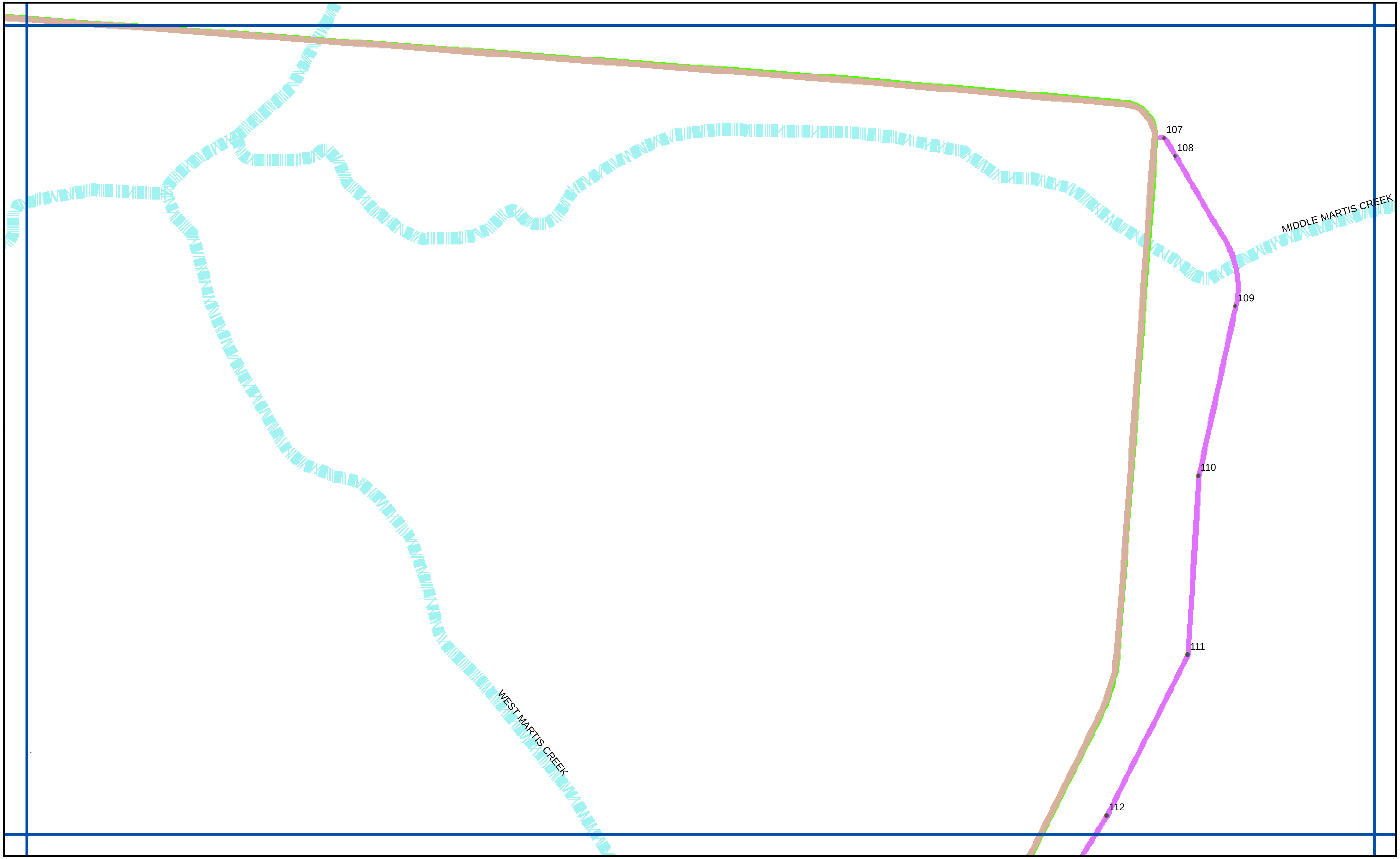
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: H6

MAP SYMBOLS

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PARCEL, STREAM, < 6", 8", 12"

1" = 200'

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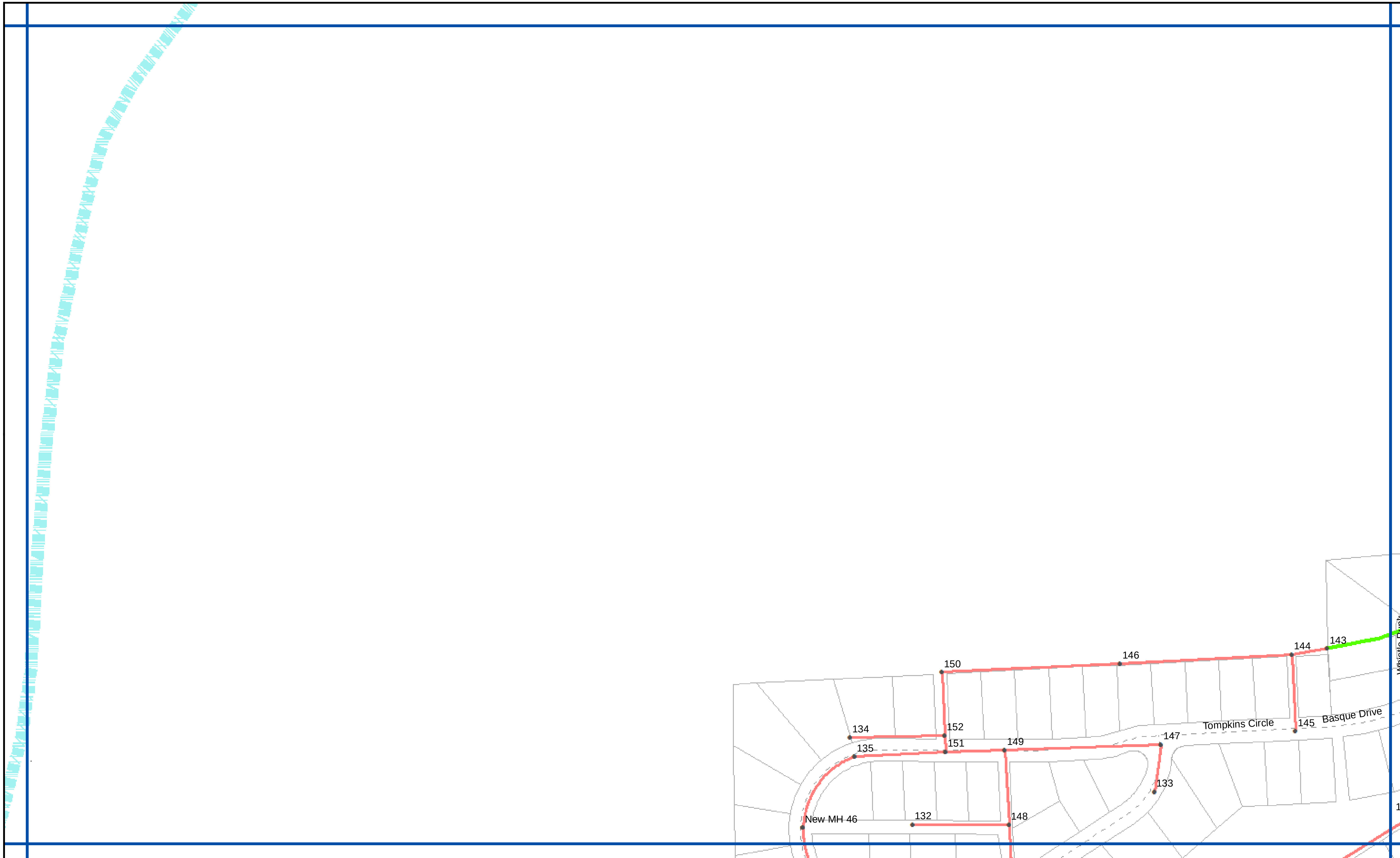
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: I5

MAP SYMBOLS

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PARCEL STREAM < 6" 8" 12"

1" = 200'

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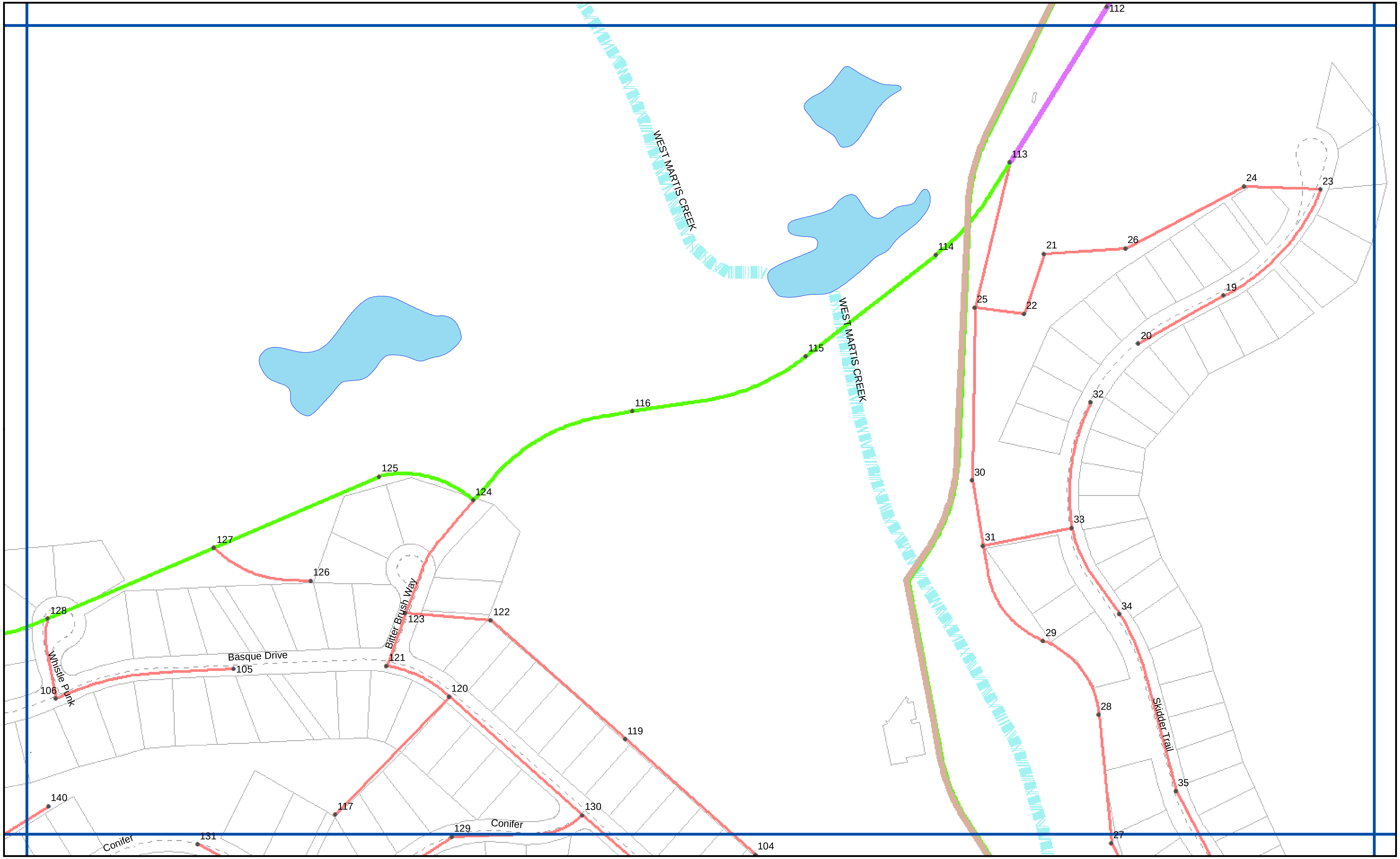
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: 16

MAP SYMBOLS

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PARCEL
ROAD
STREAM
MANHOLE
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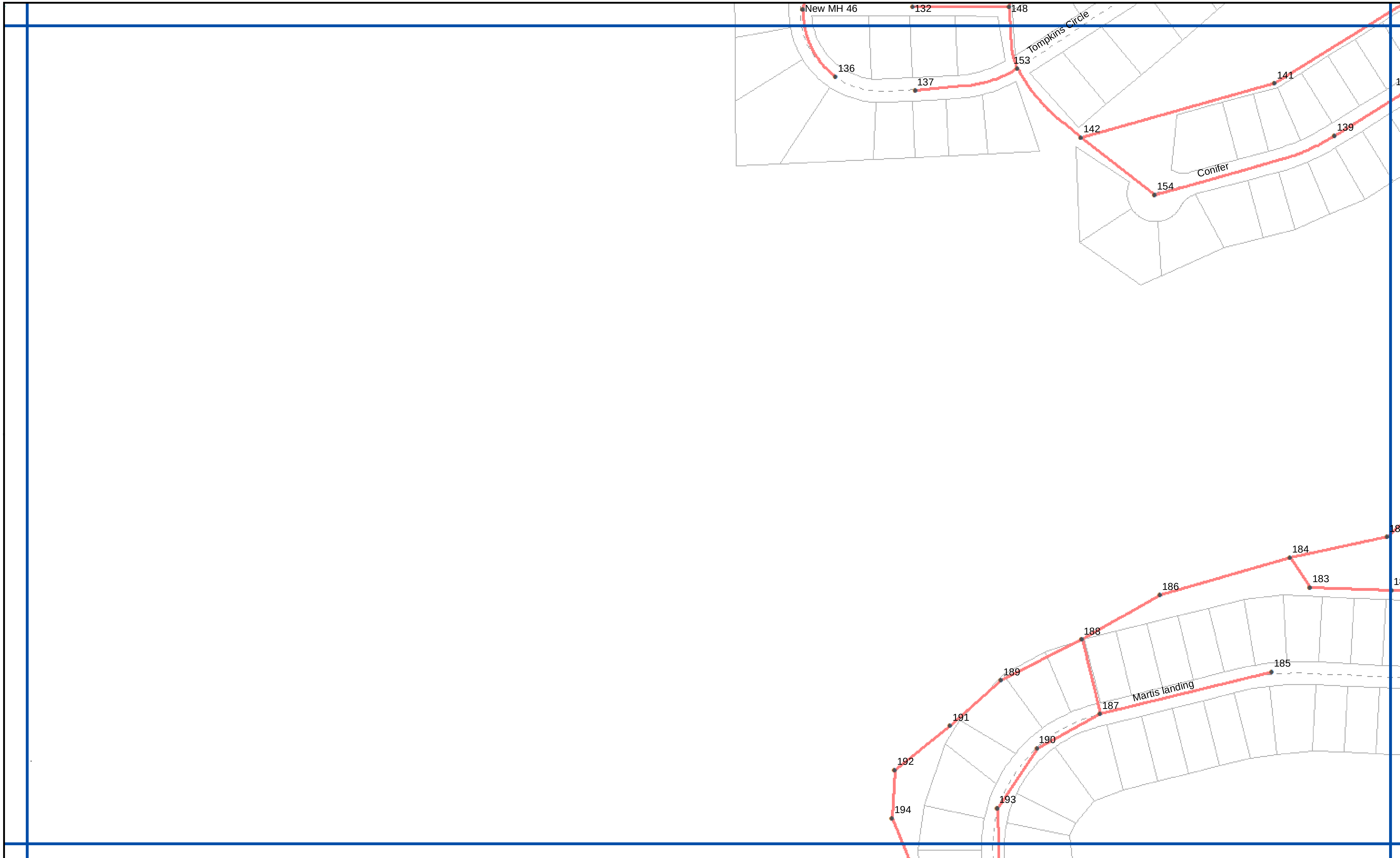
6"
8"
10"
12"

1" = 200'

200 0 200 400

Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: J5

MAP SYMBOLS

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PARCEL | STREAM | < 6" | 8" | 12"

1" = 200'

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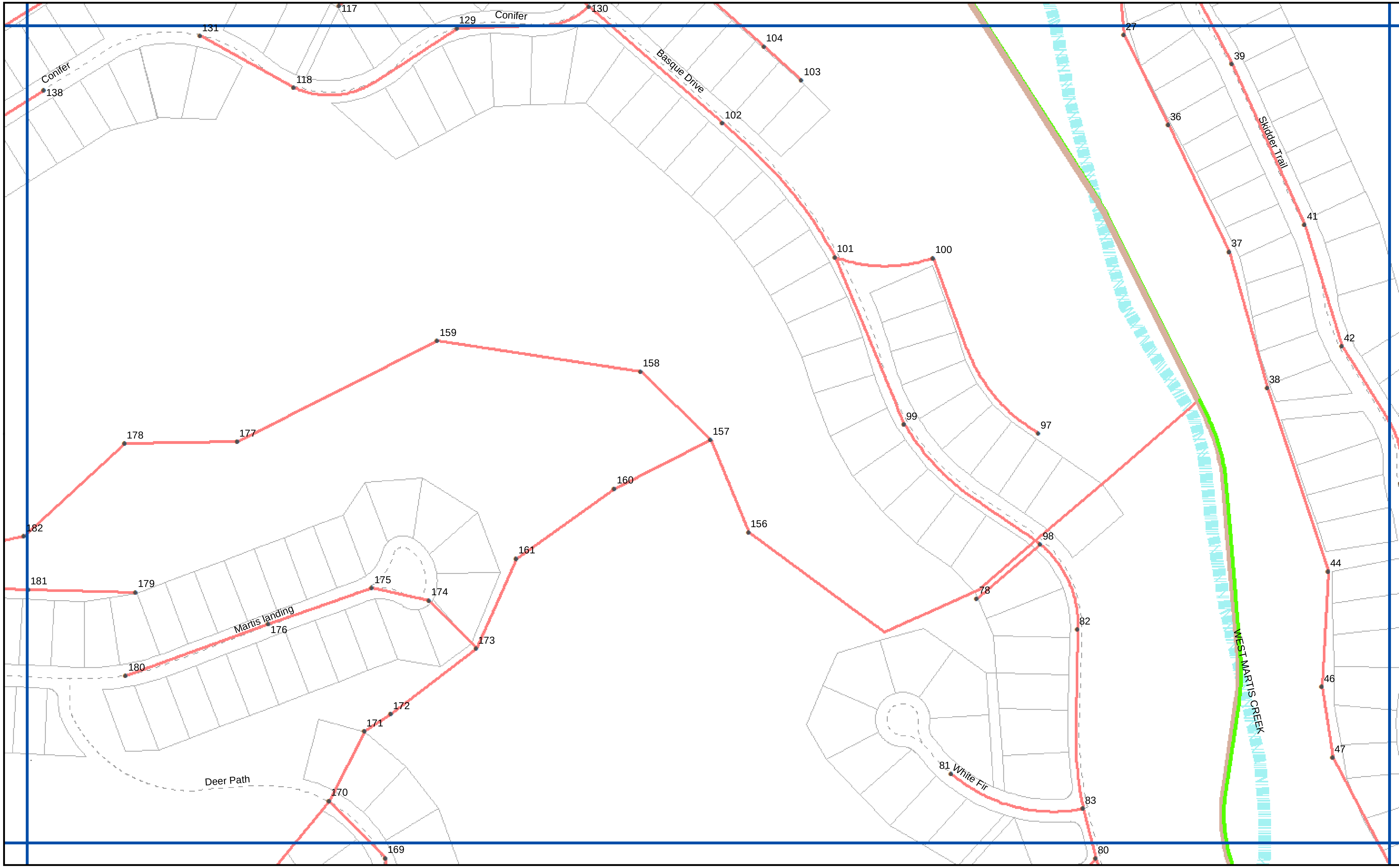
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

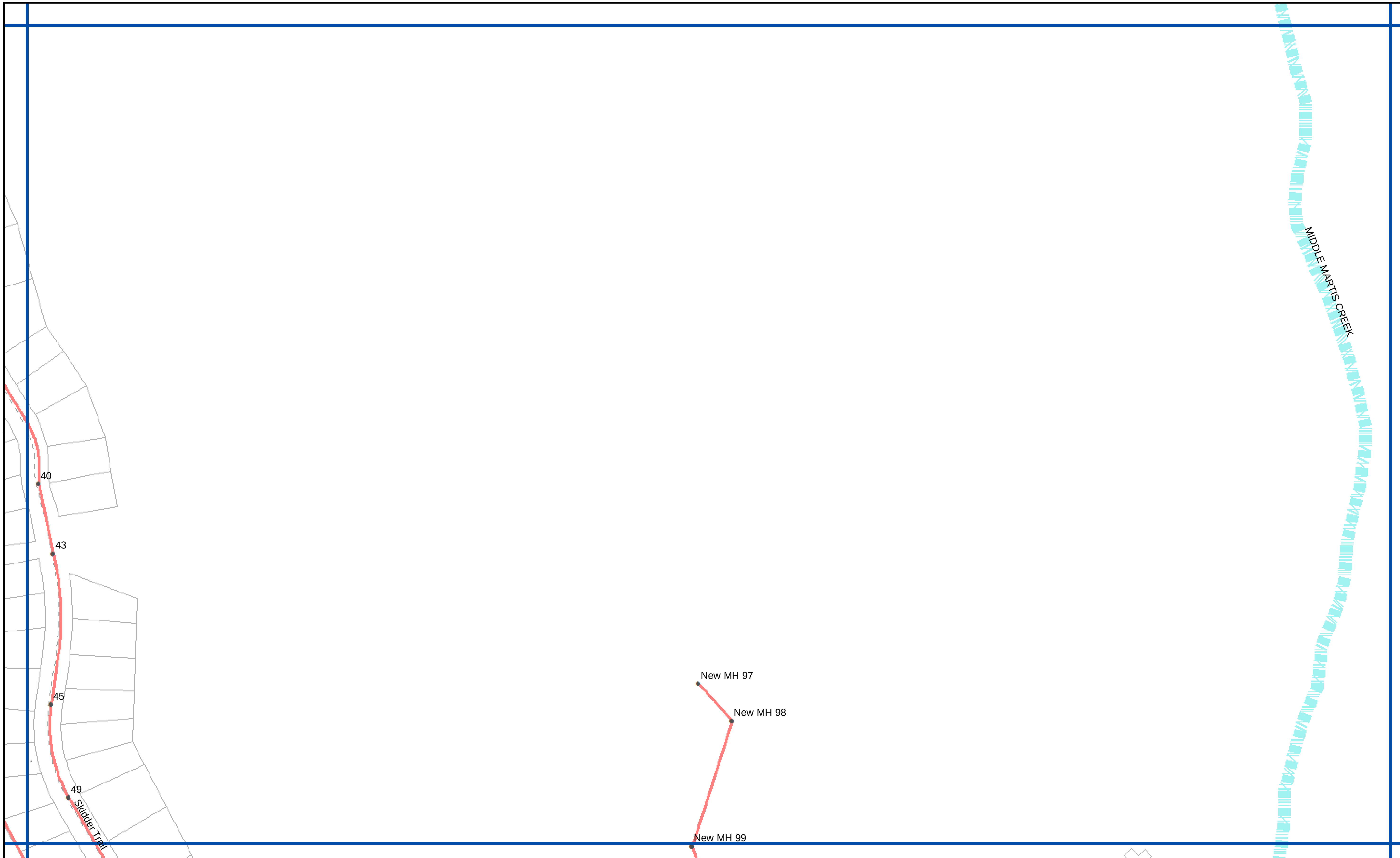
MAP: J6

MAP SYMBOLS

MAP GRID · ROAD · MANHOLE · 6" · 10"
PARCEL · STREAM · < 6" · 8" · 12"

1" = 200'

200 0 200 400
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: J7

MAP SYMBOLS

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PARCEL — STREAM — < 6" — 8" — 12"

1" = 200'

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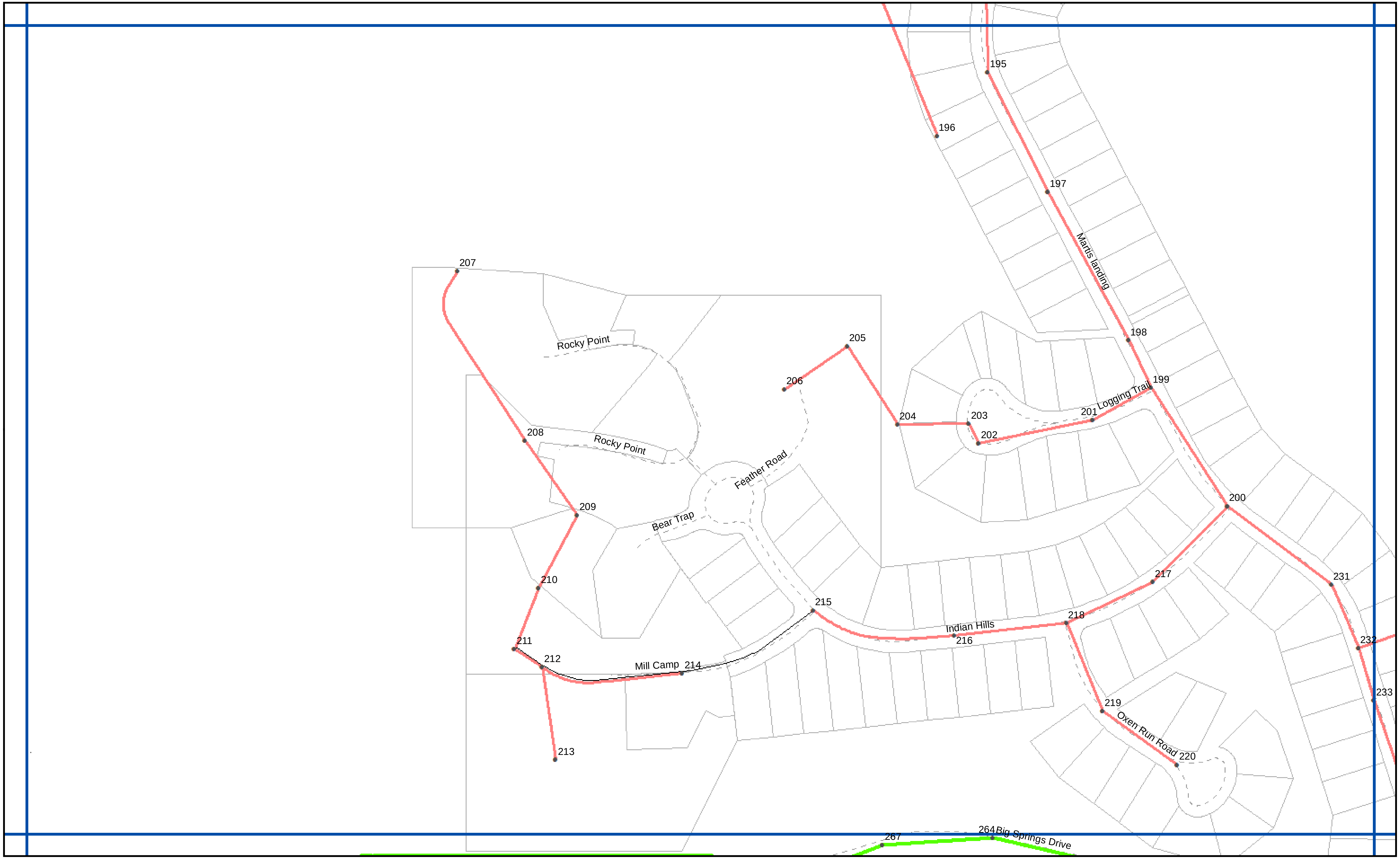
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: K5

MAP SYMBOLS

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1" = 200'

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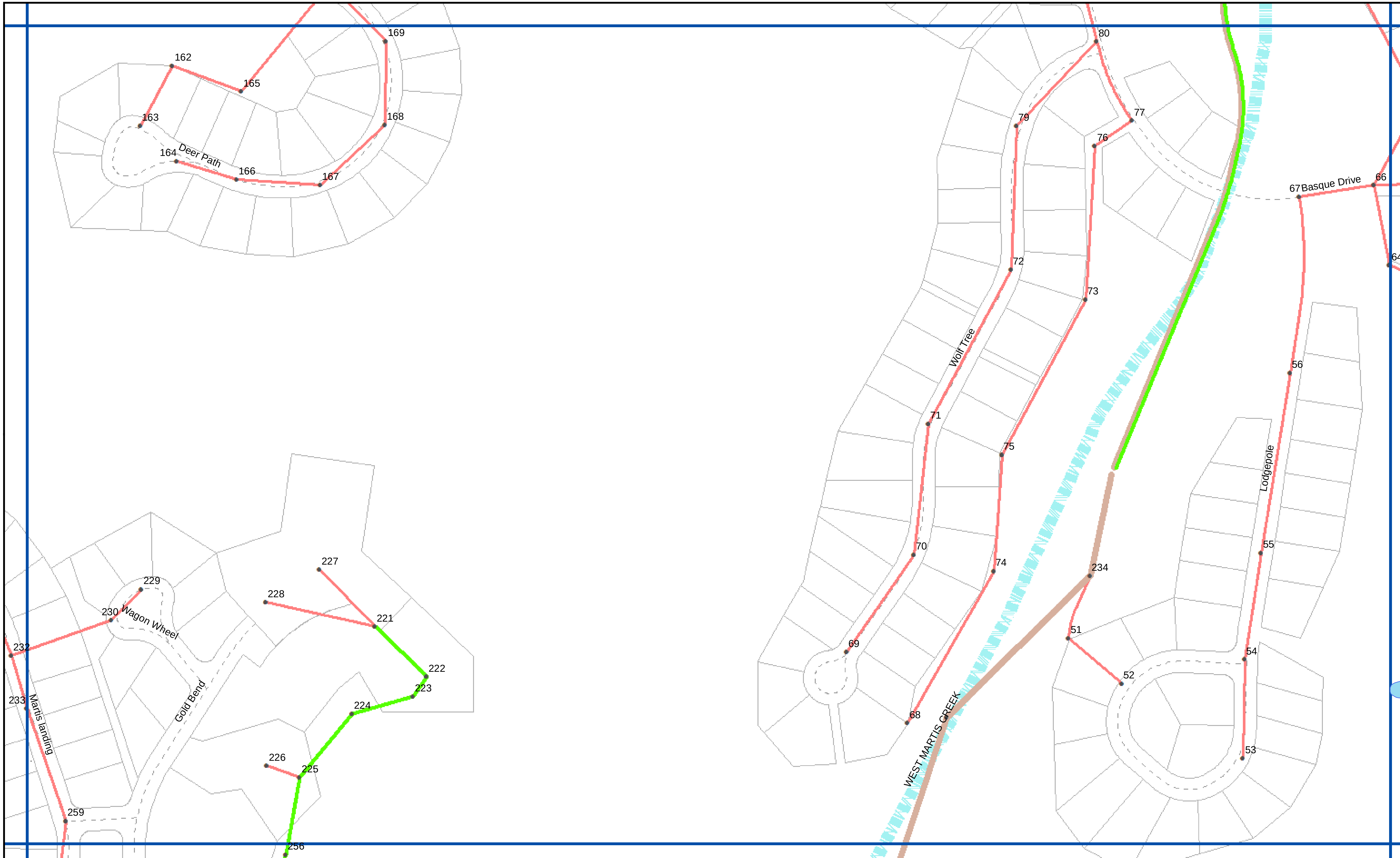

NORTHSTAR CSD
SEWER SYSTEM

MAP: K6

MAP SYMBOLS

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PARCEL | STREAM | < 6" | 8" | 12"

1" = 200'

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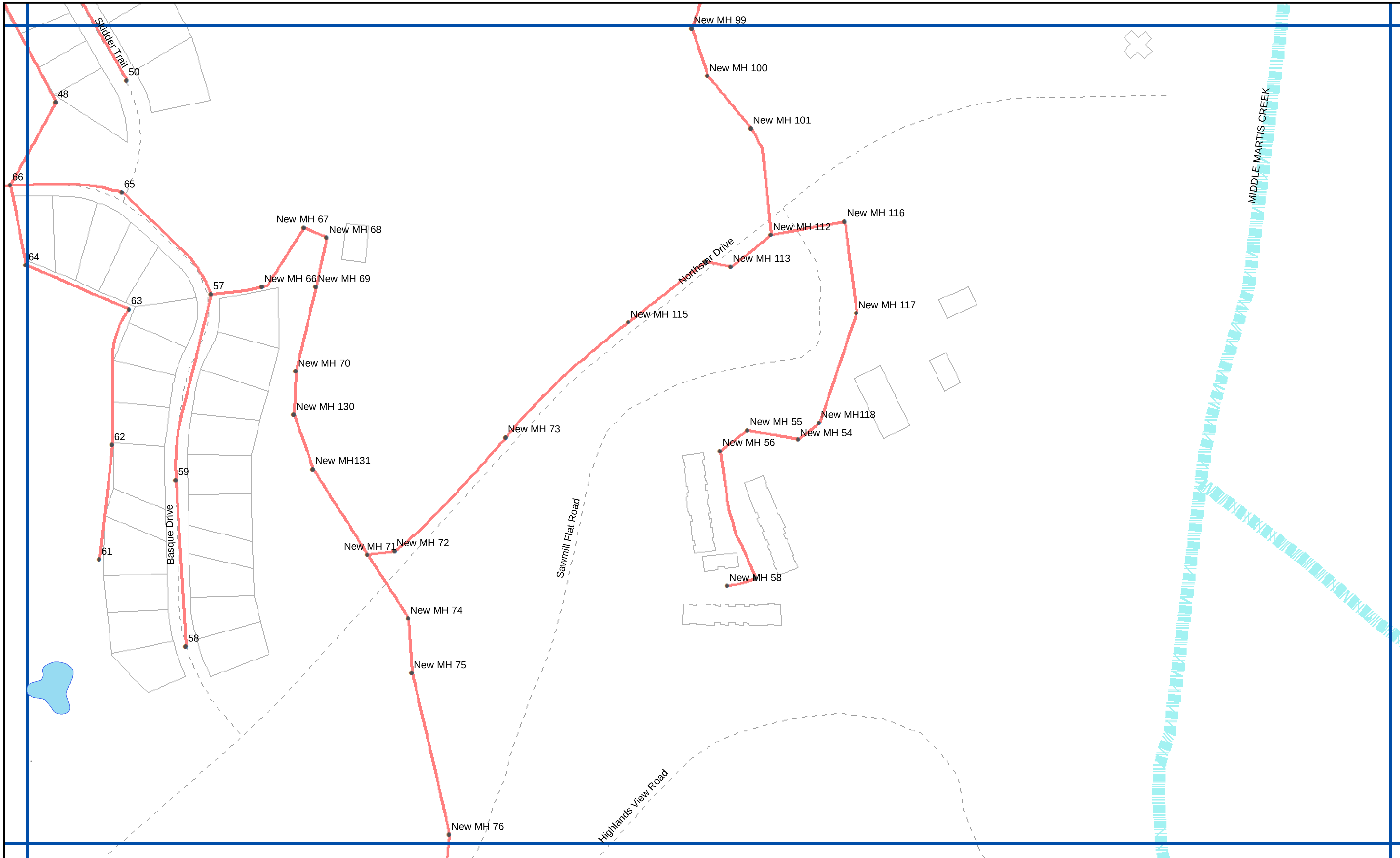
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: K7

MAP SYMBOLS

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1" = 200'

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Scale Feet

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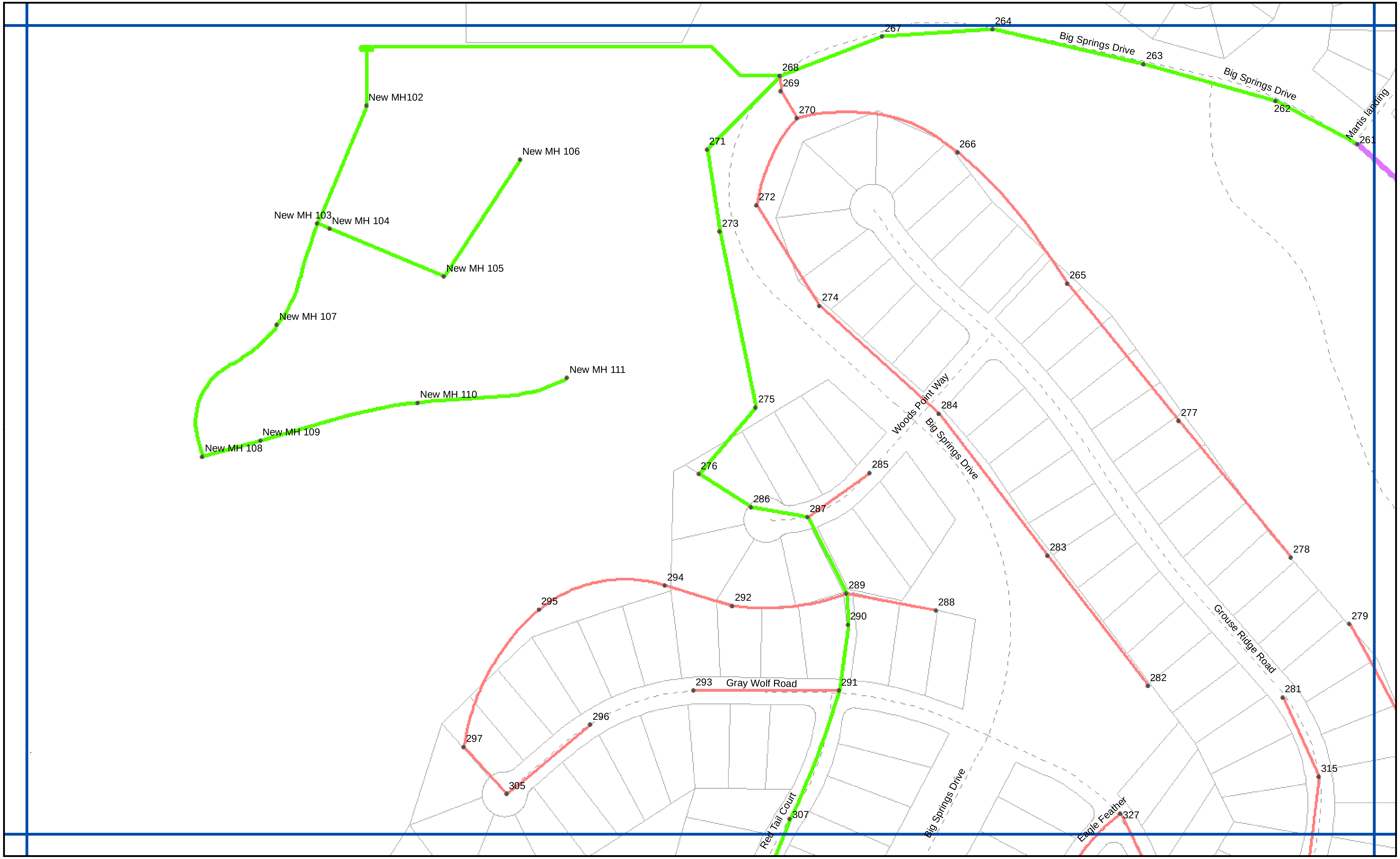

NORTHSTAR CSD
SEWER SYSTEM

MAP: L5

MAP SYMBOLS

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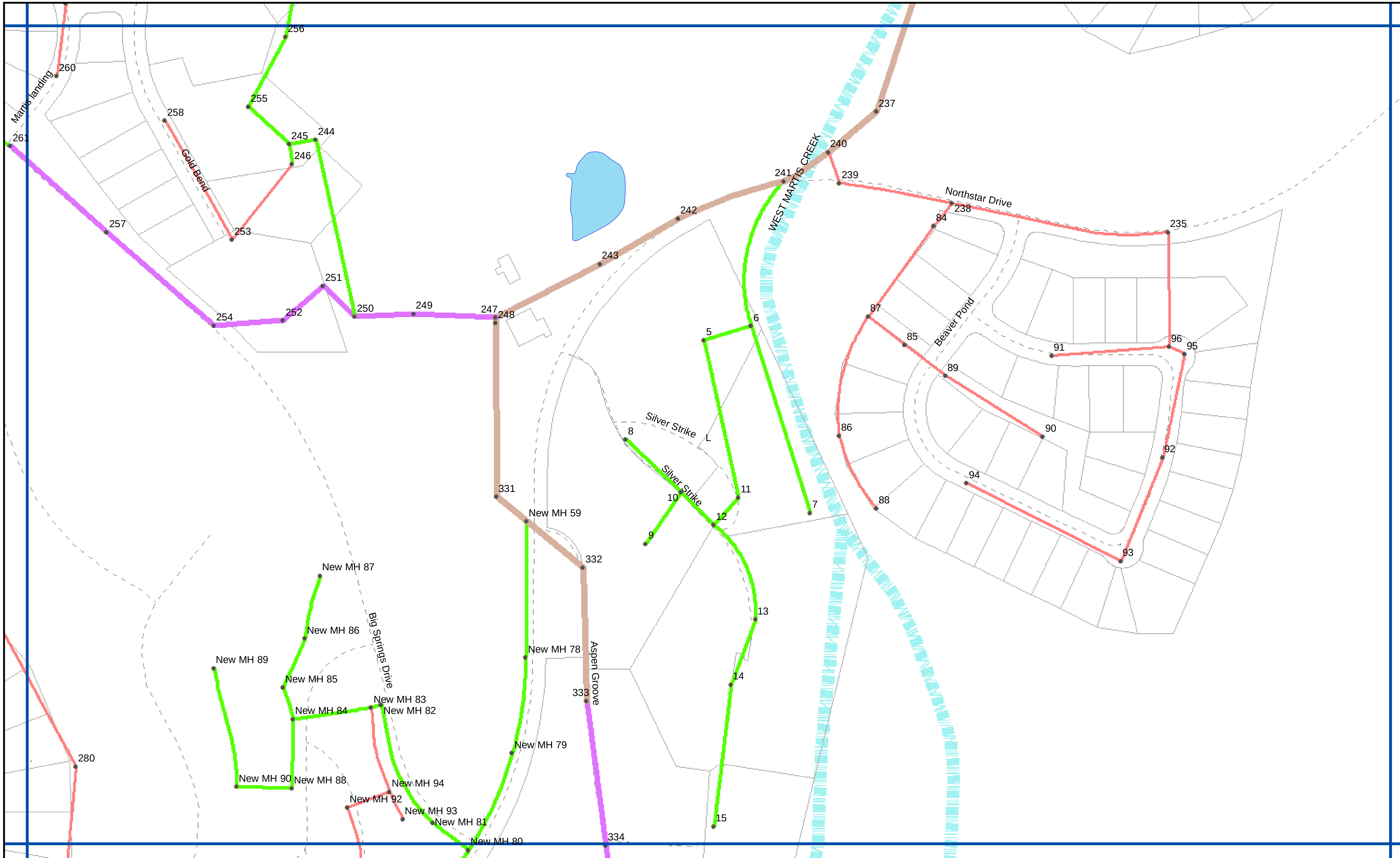
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: L6

MAP SYMBOLS

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PARCEL	STREAM	< 6"	8"	12"	

1" = 200'

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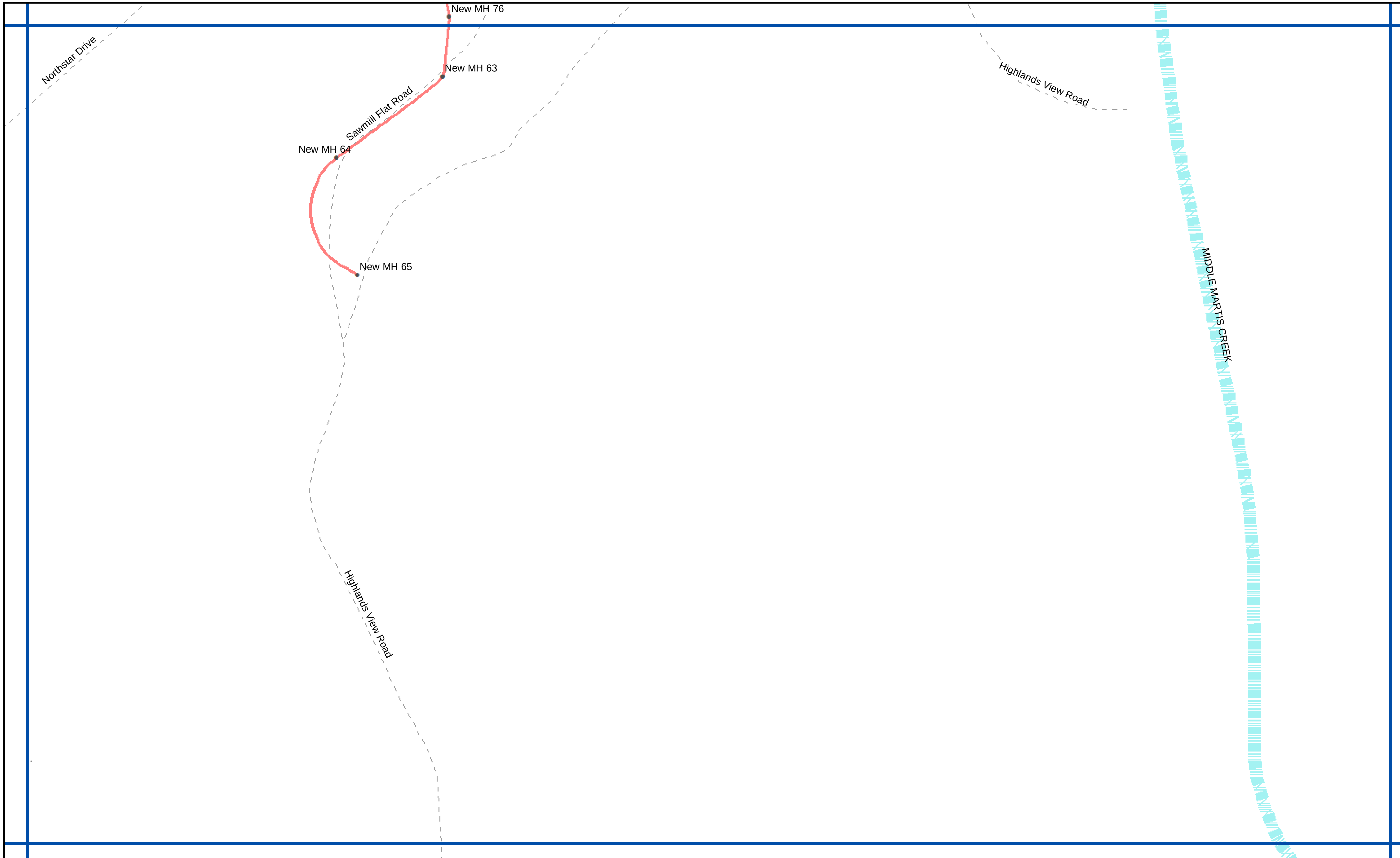
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: L7

MAP SYMBOLS

MAP GRID
ROAD
MANHOLE
6"
10"
PARCEL
STREAM
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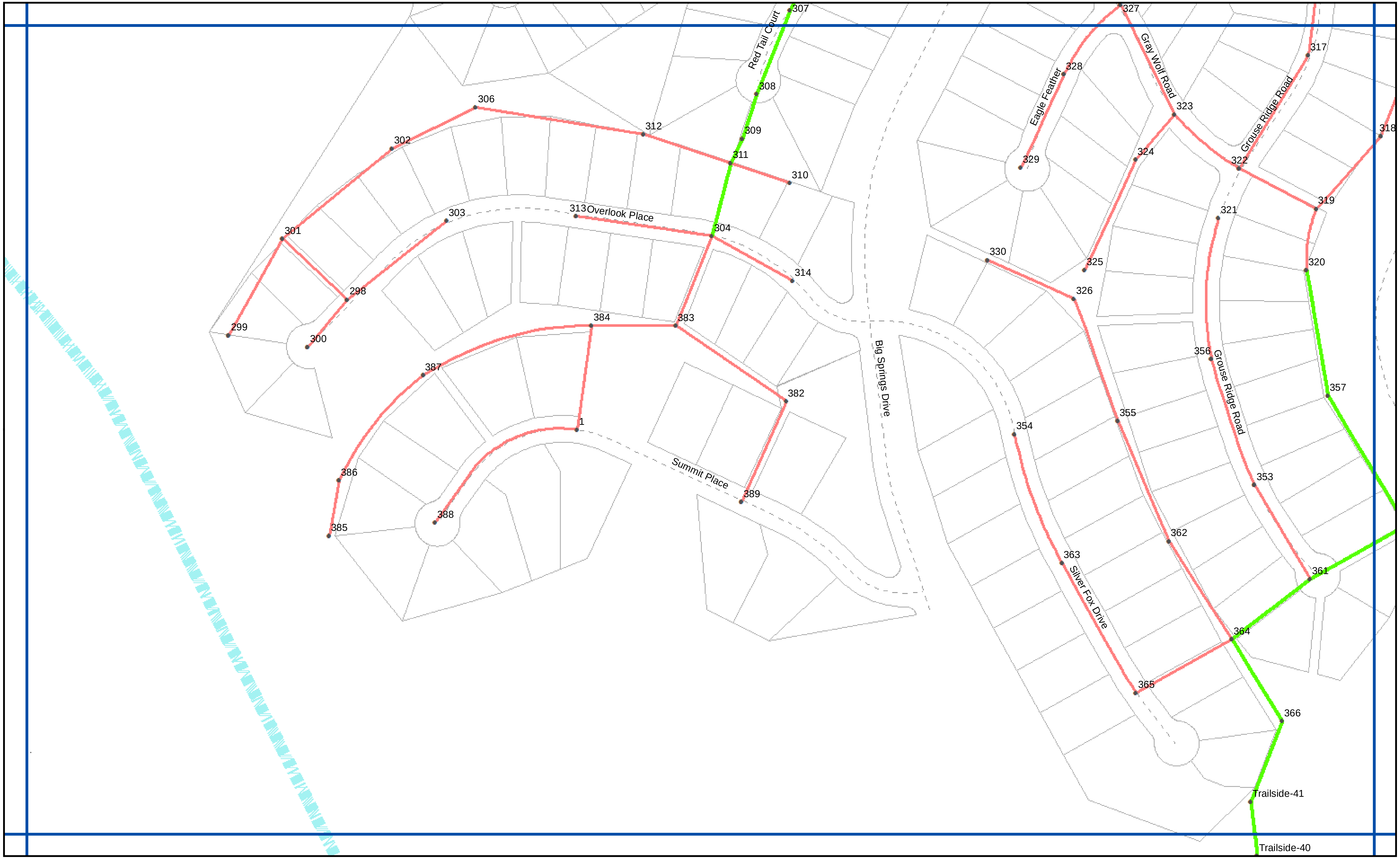
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: M5

MAP SYMBOLS

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PARCEL | STREAM | < 6" | 8" | 12"

1" = 200'

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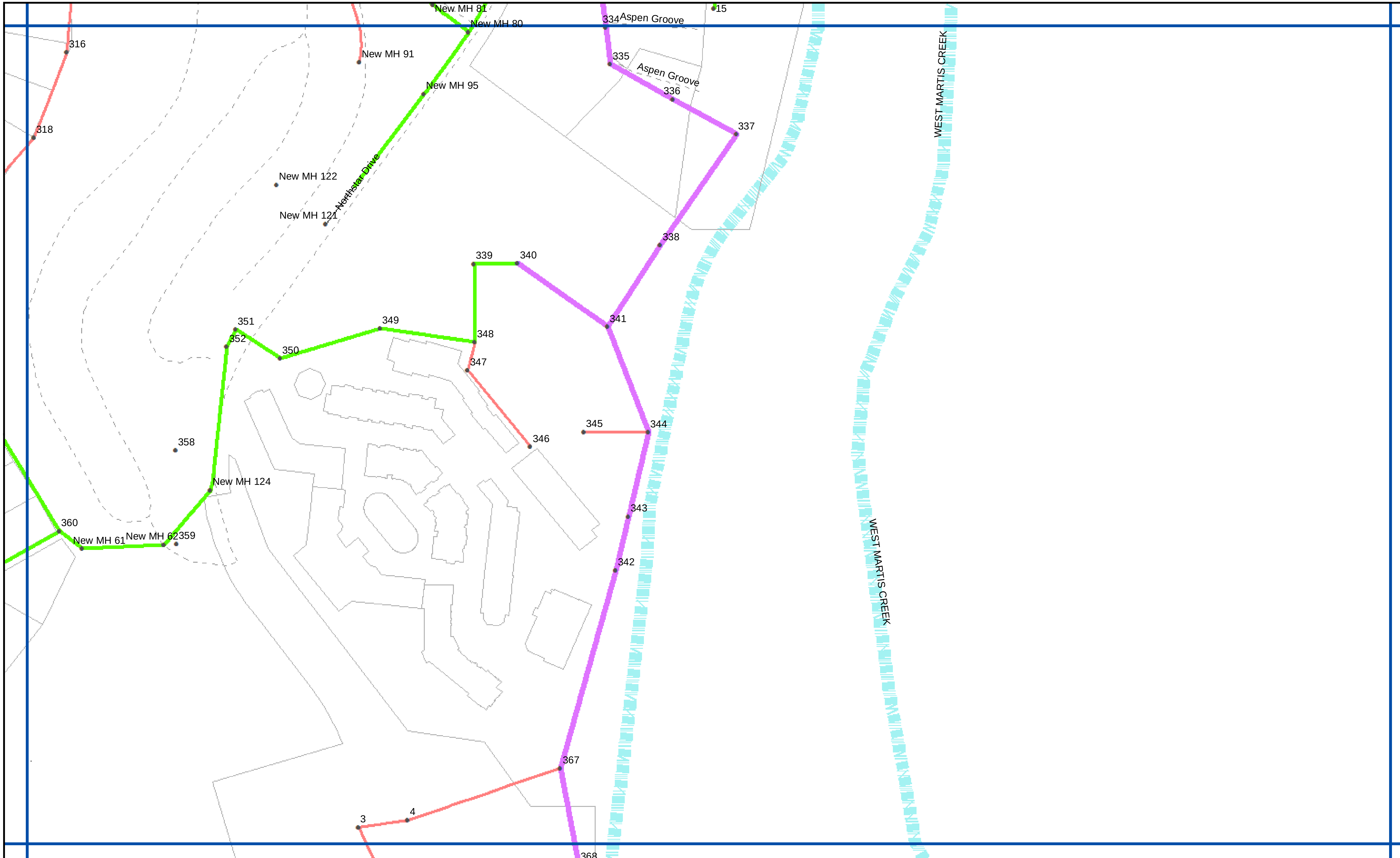
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: M6

MAP SYMBOLS

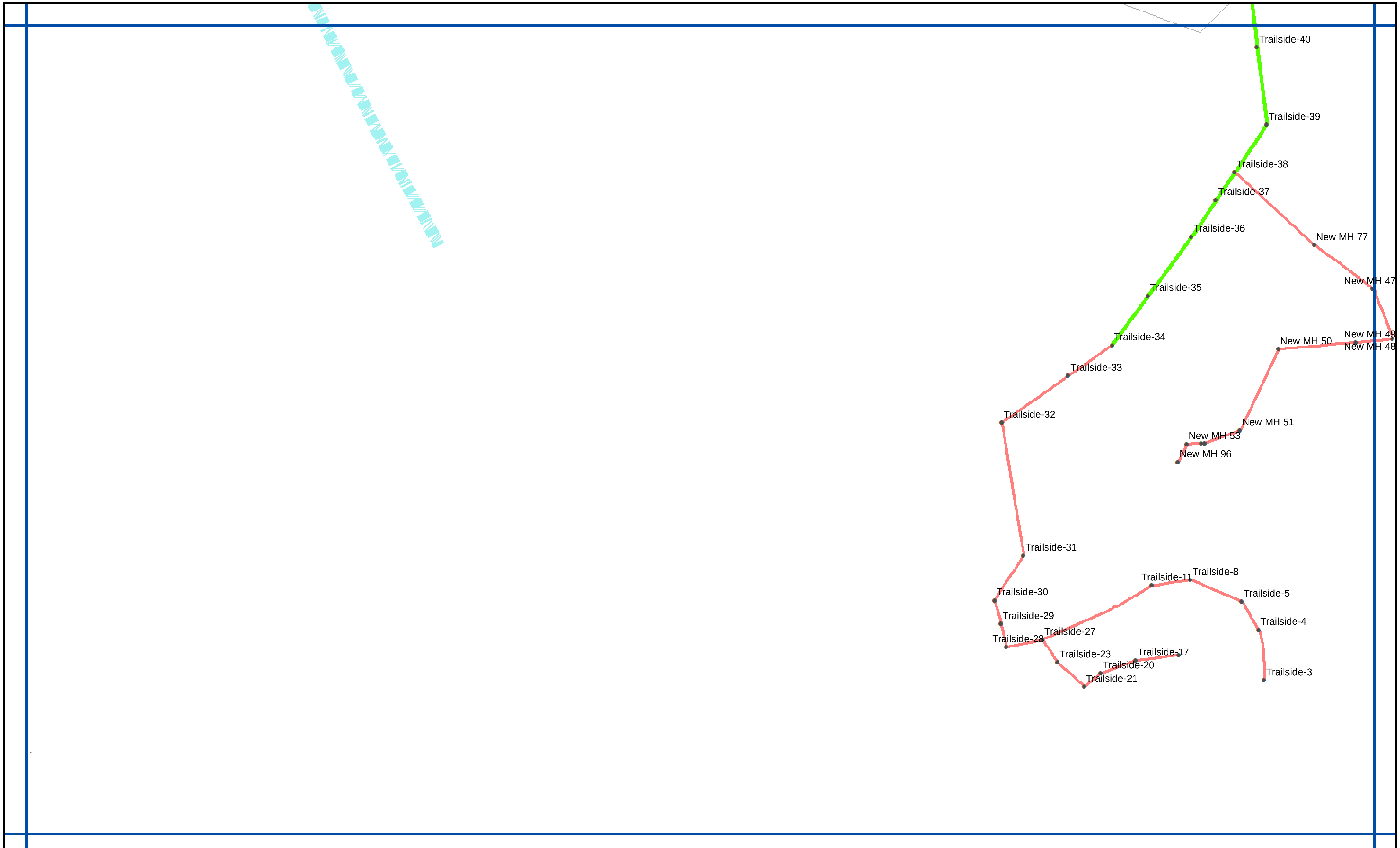
MAP GRID — ROAD — MANHOLE — 6" — 10"

PARCEL — STREAM — < 6" — 8" — 12"

1" = 200'

200 0 200 400

Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: N5

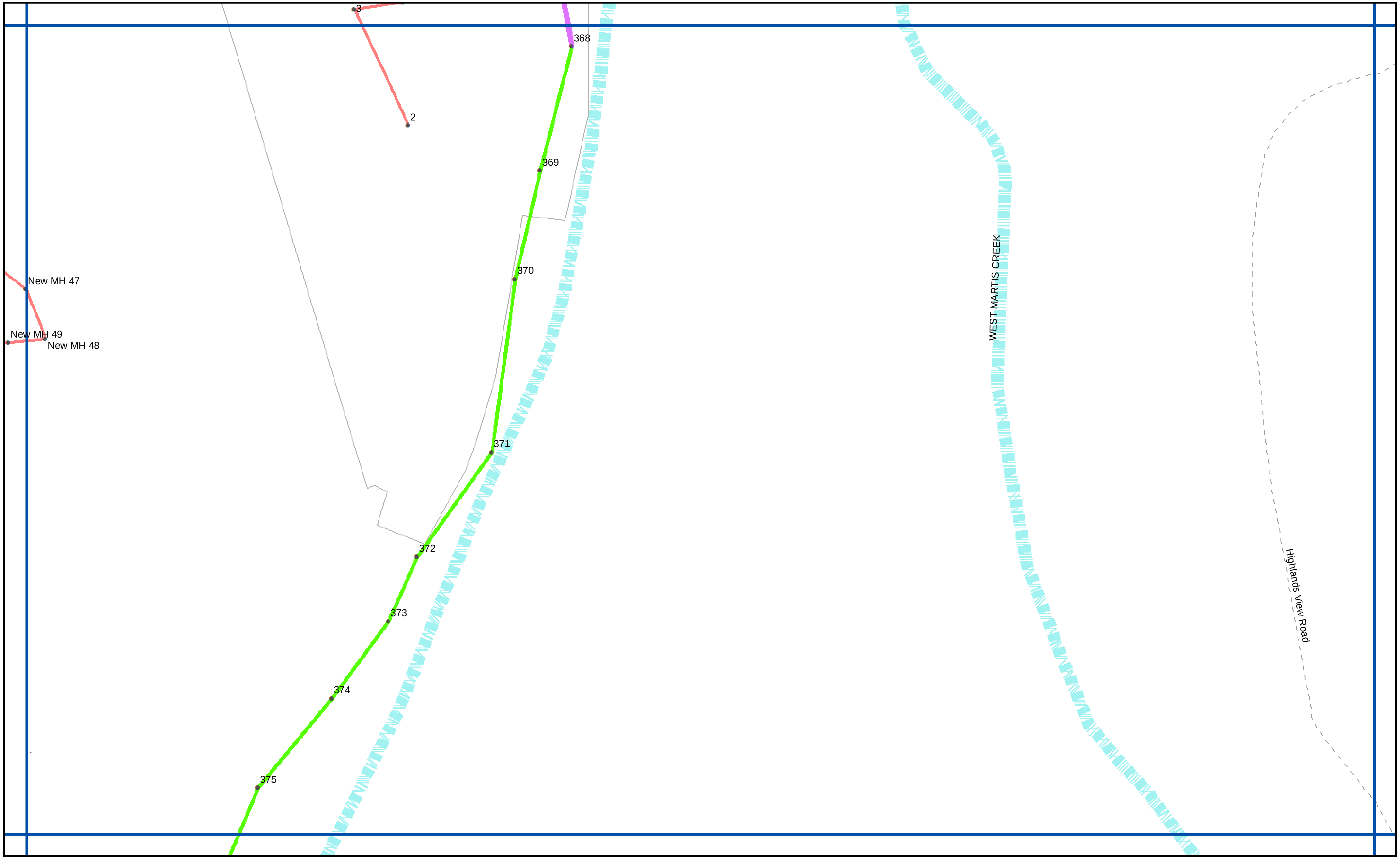
MAP SYMBOLS

MAP GRID — ROAD — MANHOLE — 6" — 10"
PARCEL — STREAM — < 6" — 8" — 12"

1" = 200'

200 0 200 400

Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

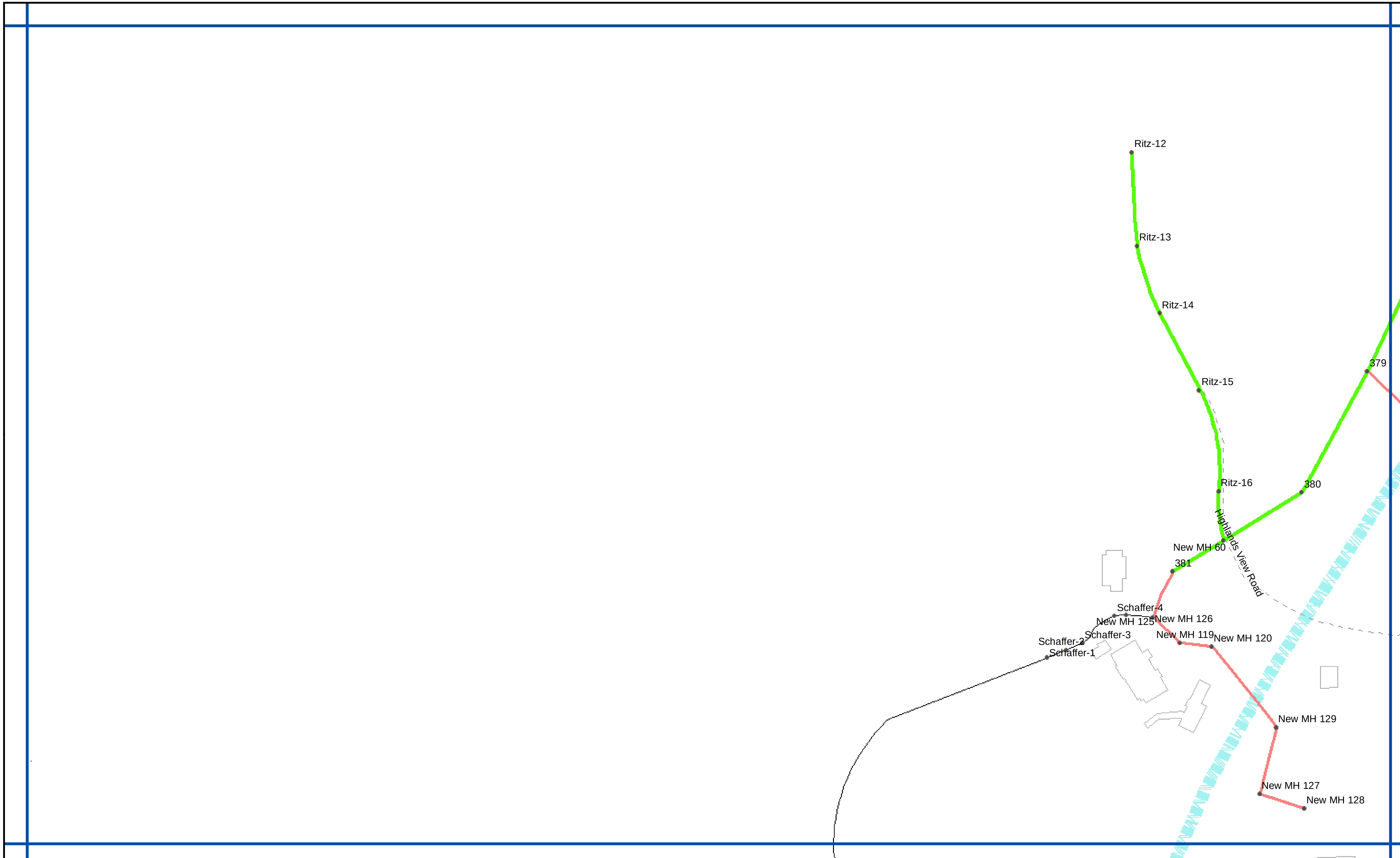
MAP: N6

MAP SYMBOLS

MAP GRID — ROAD — MANHOLE — 6" — 10"
PARCEL — STREAM — < 6" — 8" — 12"

1" = 200'

200 0 200 400
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

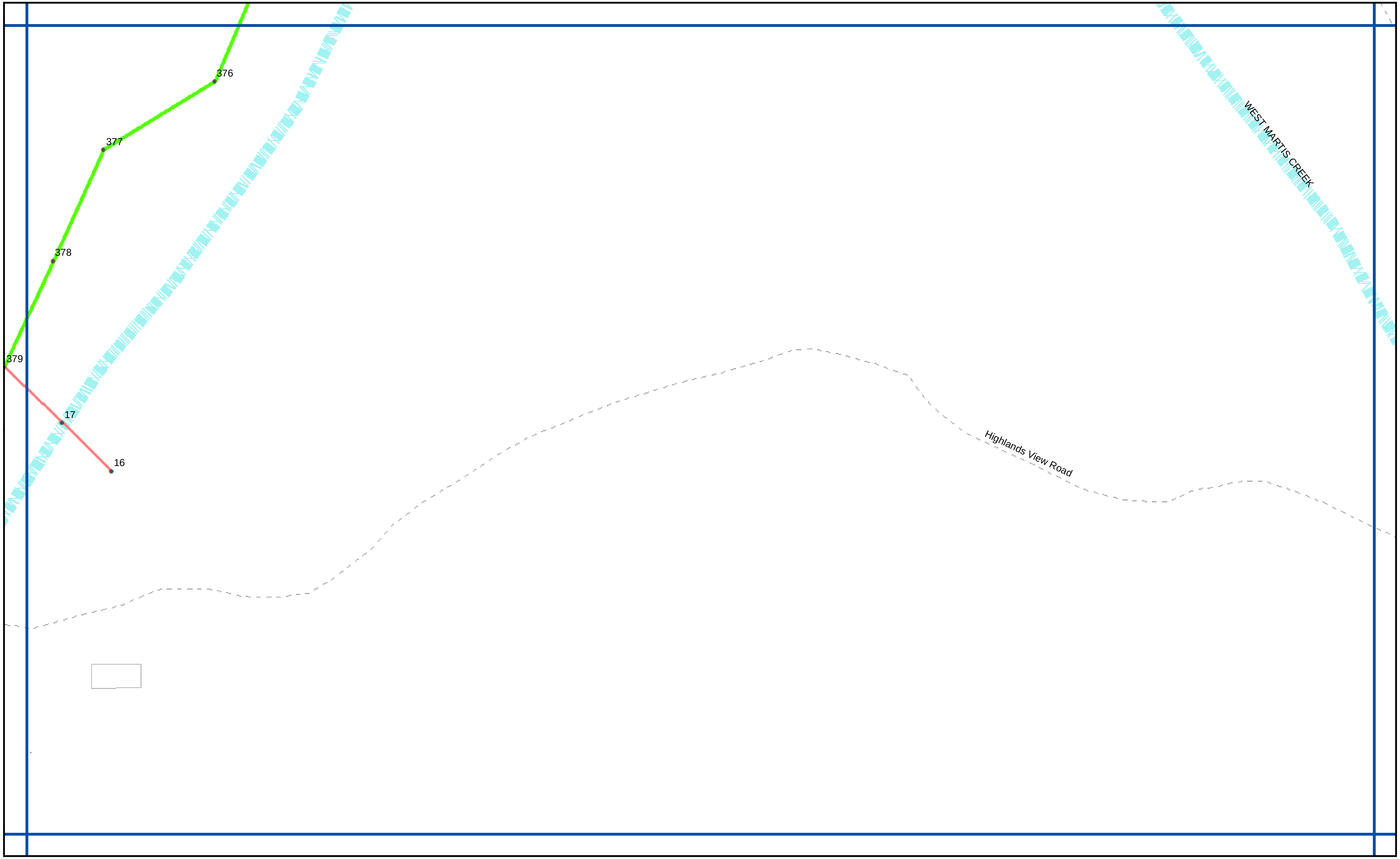
MAP: O5

MAP SYMBOLS

MAP GRID · ROAD · MANHOLE · 6" · 10"
PARCEL · STREAM · < 6" · 8" · 12"

1" = 200'

200 0 200 400
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: O6

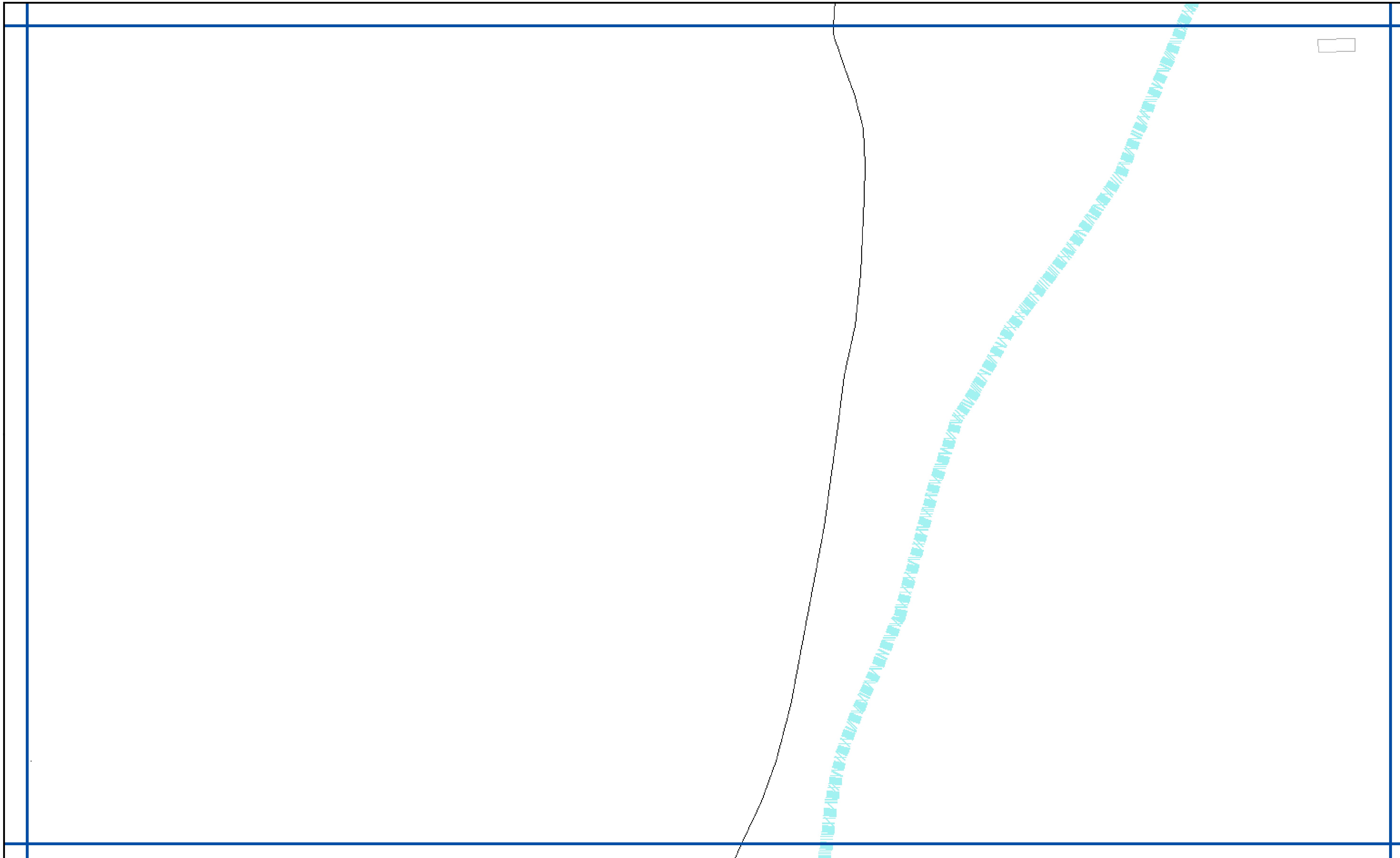
MAP SYMBOLS

MAP GRID
ROAD
MANHOLE
6"
10"
PARCEL
STREAM
< 6"
8"
12"

1" = 200'

200 0 200 400

Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

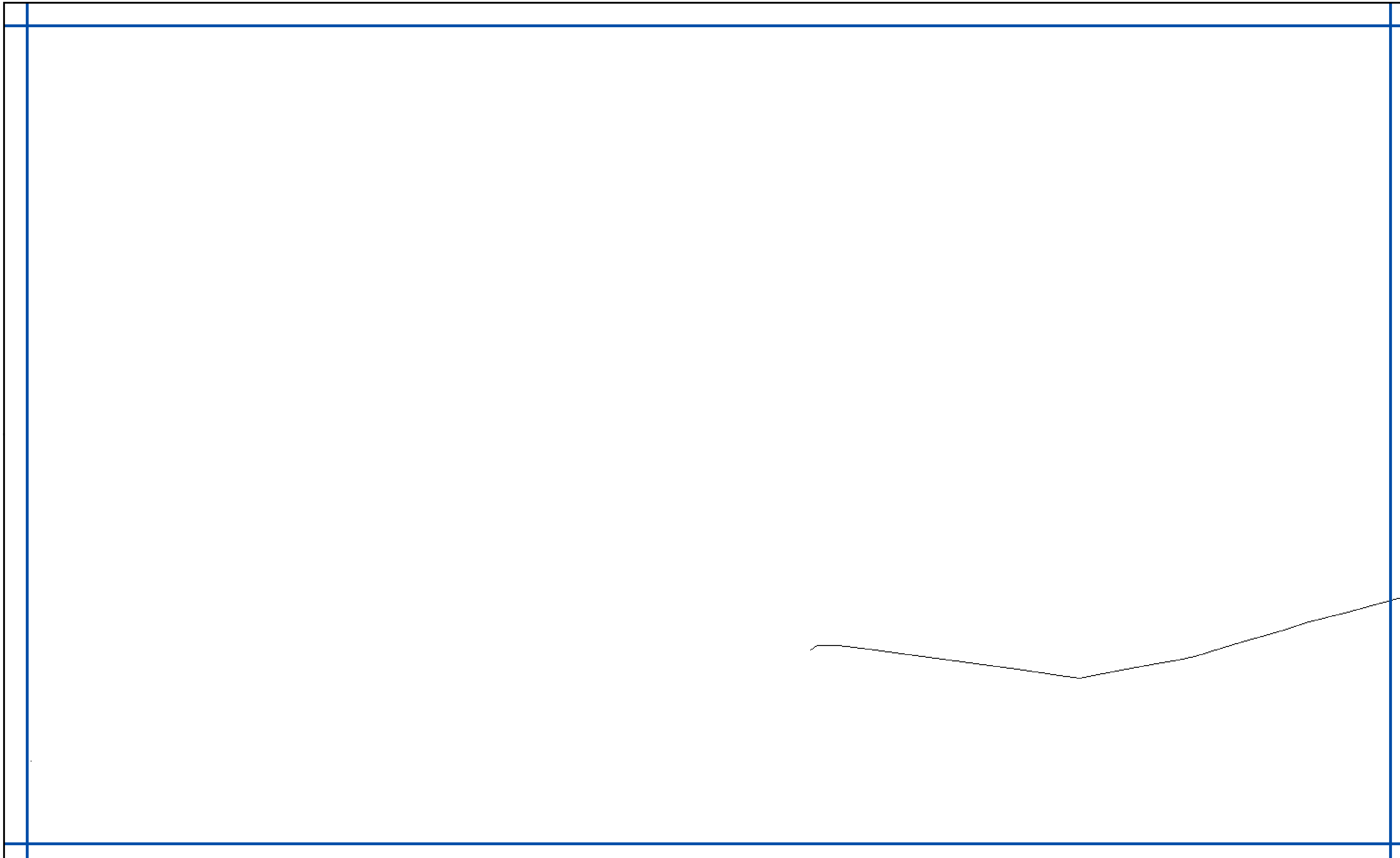
MAP: P5

MAP SYMBOLS

MAP GRID · ROAD · MANHOLE · 6" · 10"
PARCEL · STREAM · < 6" · 8" · 12"

1" = 200'

200 0 200 400
Scale Feet



NORTHSTAR CSD
SEWER SYSTEM

MAP: Q4

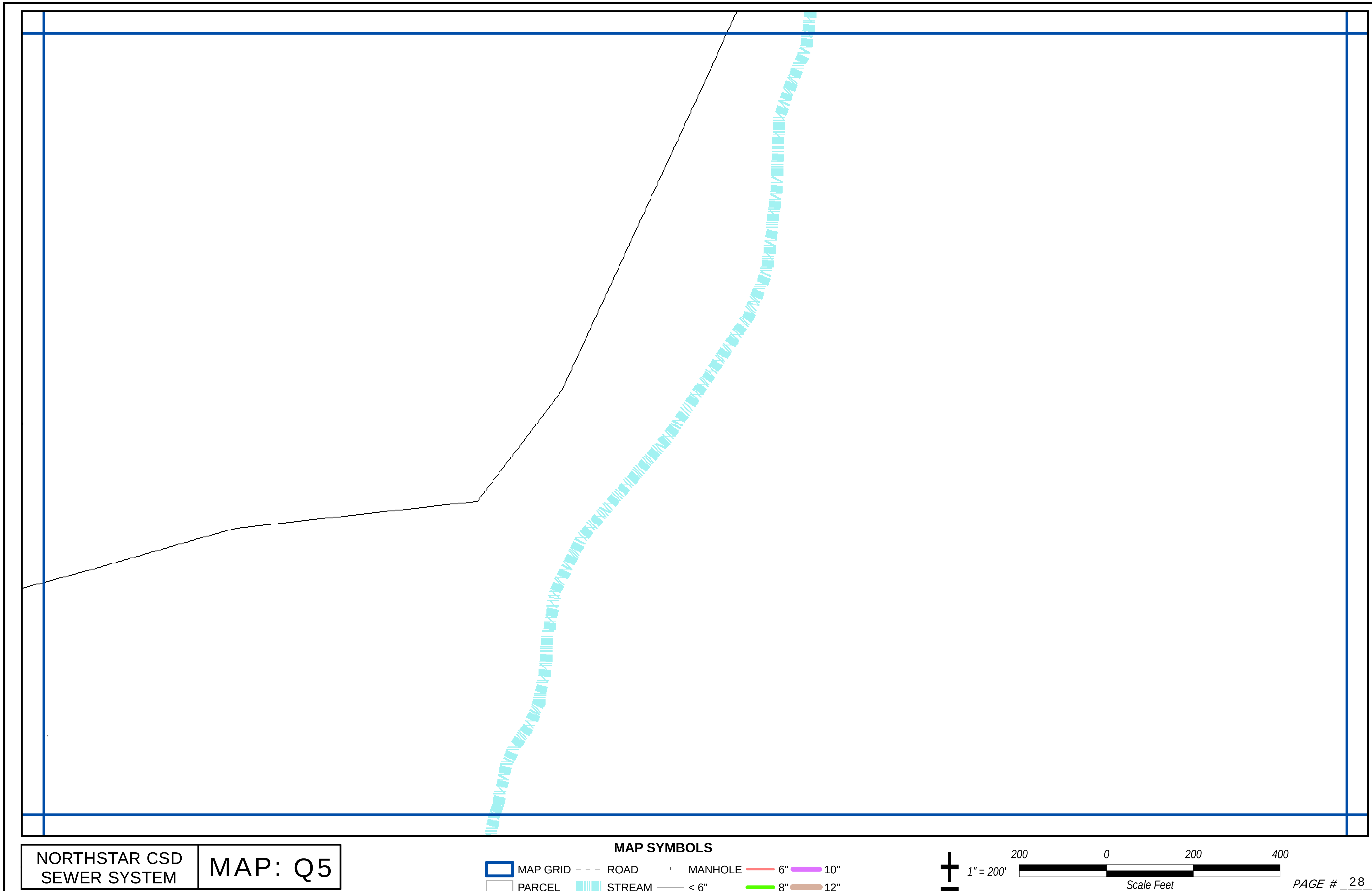
MAP SYMBOLS

MAP GRID	ROAD	MANHOLE	6"	10"	
PARCEL	STREAM	< 6"	8"	12"	

1" = 200'

200 0 200 400

Scale Feet


NORTHSTAR CSD
SEWER SYSTEM
MAP: Q5
MAP SYMBOLS
MAP GRID
ROAD
MANHOLE
6"
10"
PARCEL
STREAM
< 6"
8"
12"
1" = 200'
200
0
200
400
Scale Feet
PAGE # 28

Appendix B

Model Pipe Attributes

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
1	384	6690.33	6642.11	6	235.2	2.37	PVC	0.009
2	3	6441.96	6434.53	6	285	0.69	ACP	0.011
3	4	6434.53	6411.88	6	110	1.95	ACP	0.011
4	367	6411.88	6370.23	6	355	1.47	ACP	0.011
5	6	6152.8	6146.93	8	107.9	2.15	ACP	0.011
6	241	6146.93	6135.93	8	344.1	1.65	ACP	0.011
7	6	6161.83	6146.93	8	430.1	1.72	ACP	0.011
8	10	6188.85	6182.75	8	166.5	1.77	ACP	0.011
9	10	6196.51	6182.75	8	137.5	2.92	ACP	0.011
10	12	6182.75	6177.64	8	103.4	2.05	ACP	0.011
11	5	6175.14	6152.8	8	355	2.32	ACP	0.011
12	11	6177.64	6175.14	8	80.6	1.63	ACP	0.011
13	12	6188.73	6177.64	8	236.2	2	ACP	0.011
14	13	6205.53	6188.73	8	153	3.06	ACP	0.011
15	14	6229.34	6205.53	8	315	2.54	ACP	0.011
16	17	6731.24	6708.91	6	153	1.2	CIP	0.015
17	379	6708.91	6701.04	6	180	0.66	CIP	0.015
19	23	5935.19	5911.41	6	326.7	1.16	ACP	0.011
20	19	5941.46	5935.19	6	218	0.73	ACP	0.011
21	22	5893.46	5892.6	6	141.4	0.33	ACP	0.011
22	25	5892.32	5866.25	6	110.9	2.08	ACP	0.011
23	24	5911.41	5896.33	6	170.1	1.28	ACP	0.011
24	26	5896.33	5894.62	6	297.9	0.32	ACP	0.011
25	113	5866.25	5853.82	6	332.2	0.83	ACP	0.011
26	21	5894.62	5893.49	6	181.4	0.34	ACP	0.011
27	28	5920.3	5904.26	6	287.7	1.01	ACP	0.011
28	29	5904.26	5896	6	215.5	0.84	ACP	0.011
29	31	5896	5881	6	266.9	1.02	ACP	0.011
30	25	5875.44	5866.25	6	385.2	0.66	ACP	0.011
31	30	5881	5875.44	6	147	0.83	ACP	0.011
32	33	5937.68	5932.49	6	286.8	0.58	ACP	0.011
33	31	5932.49	5881	6	202	2.16	ACP	0.011
34	33	5942.44	5932.49	6	223.2	0.91	ACP	0.011
35	34	5943.84	5942.44	6	414.5	0.25	ACP	0.011
36	27	5925.8	5920.3	6	221.4	0.68	ACP	0.011

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
37	36	5949.68	5925.8	6	309.5	1.19	ACP	0.011
38	37	5953	5949.68	6	311.1	0.44	ACP	0.011
39	35	5956.6	5943.84	6	204	1.07	ACP	0.011
40	42	5992.57	5980.26	6	336.9	0.82	ACP	0.011
41	39	5968.91	5956.6	6	388	0.76	ACP	0.011
42	41	5980.26	5968.91	6	280.2	0.86	ACP	0.011
43	40	5996.91	5992.57	6	156	0.72	ACP	0.011
44	38	5968.37	5953	6	426.7	0.81	ACP	0.011
45	43	6013.2	5996.91	6	335.7	0.94	ACP	0.011
46	44	5982.27	5968.37	6	255	1	ACP	0.011
47	46	5985.56	5982.27	6	157	0.62	ACP	0.011
48	47	6008.21	5985.56	6	403.4	1.02	ACP	0.011
49	45	6027.24	6013.2	6	211.8	1.1	ACP	0.011
50	49	6034.63	6027.24	6	254.7	0.73	ACP	0.011
51	234	6070.99	6070.73	6	146	0.18	ACP	0.011
52	51	6089.49	6070.99	6	153	1.49	ACP	0.011
53	54	6102.37	6089.21	6	217.2	1.06	ACP	0.011
54	55	6089.21	6073.55	6	238	1.1	ACP	0.011
55	56	6073.55	6048.2	6	400.9	1.08	ACP	0.011
56	67	6048.2	6018.07	6	390.6	1.19	ACP	0.011
57	65	6062.48	6034.63	6	300	1.31	ACP	0.011
58	59	6099.56	6071.3	6	367.1	1.19	ACP	0.011
59	57	6071.3	6062.48	6	417.7	0.62	ACP	0.011
61	62	6066.84	6050.18	6	253	1.1	ACP	0.011
62	63	6050.18	6047.46	6	308	0.4	ACP	0.011
63	64	6047.46	6027.5	6	246	1.22	ACP	0.011
64	66	6027.5	6015.16	6	180	1.12	ACP	0.011
65	66	6034.63	6015.16	6	248.4	1.2	ACP	0.011
66	48	6015.16	6008.21	6	207	0.79	ACP	0.011
67	66	6018.07	6015.16	6	165.9	0.57	ACP	0.011
68	74	6114.42	6094.06	6	385	0.99	ACP	0.011
69	70	6135.92	6119.29	6	261	1.08	ACP	0.011
70	71	6119.29	6096.83	6	290	1.19	ACP	0.011
71	72	6096.83	6074.76	6	385	1.03	ACP	0.011
72	79	6074.76	6055.73	6	316.7	1.05	ACP	0.011

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
73	76	6055.16	6041.26	6	338.6	0.87	ACP	0.011
74	75	6094.06	6082.5	6	256.3	0.91	ACP	0.011
75	73	6082.5	6055.16	6	388.6	1.14	ACP	0.011
76	77	6041.26	6031.32	6	98	1.37	ACP	0.011
77	80	6027.32	6025.95	6	192.3	0.36	ACP	0.011
78	98	6010.94	5988.63	6	184	1.49	ACP	0.011
79	80	6055.73	6032.45	6	256	1.29	ACP	0.011
80	83	6025.95	6025.58	6	113	0.25	ACP	0.011
81	83	6059.51	6031	6	310.4	1.3	ACP	0.011
82	98	6003.18	5988.63	6	211.6	1.12	ACP	0.011
83	82	6025.58	6003.18	6	396.1	1.02	ACP	0.011
84	238	6132.22	6131.53	6	65.3	0.44	ACP	0.011
85	87	6166.18	6141.3	6	102	2.12	ACP	0.011
86	87	6153.09	6141.3	6	276.5	0.89	ACP	0.011
87	84	6141.3	6132.27	6	246	0.82	ACP	0.011
88	86	6167.97	6153.09	6	181.9	1.23	ACP	0.011
89	85	6170.81	6166.18	6	113	0.87	ACP	0.011
90	89	6179.17	6170.81	6	253	0.78	ACP	0.011
91	96	6166.51	6159.03	6	258.3	0.73	ACP	0.011
92	95	6168.66	6165.21	6	232	0.52	ACP	0.011
93	92	6186.47	6168.66	6	246	1.15	ACP	0.011
94	93	6192.54	6186.47	6	379	0.54	ACP	0.011
95	96	6156.21	6154.94	6	38.2	0.78	ACP	0.011
96	235	6154.94	6145.55	6	253.5	0.83	ACP	0.011
97	100	5961.42	5933.63	6	463.2	1.05	ACP	0.011
98	99	5988.63	5964.02	6	403.9	1.06	ACP	0.011
99	101	5964.02	5931.14	6	399.5	1.23	ACP	0.011
100	101	5933.55	5931.14	6	220.6	0.45	ACP	0.011
101	102	5931.09	5928.1	6	386.9	0.38	ACP	0.011
102	130	5928.1	5915.95	6	391	0.76	ACP	0.011
103	104	5905.66	5903.44	6	111.2	0.61	ACP	0.011
104	119	5903.44	5894.99	6	387.1	0.63	ACP	0.011
105	106	5888.92	5888.64	6	405.3	0.11	ACP	0.011
106	128	5884.56	5869.04	6	181	1.26	ACP	0.011
107	267 Pump Station	5848.79	5842	10	11.1	13.06	ACP	0.011

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
108	107	5849.39	5848.79	10	46.8	1.9	ACP	0.011
109	108	5849.83	5849.39	10	370.1	0.58	ACP	0.011
110	109	5850.8	5849.83	10	386.3	0.84	ACP	0.011
111	110	5851.8	5850.8	10	399.7	0.84	ACP	0.011
112	111	5852.8	5851.8	10	399.8	0.84	ACP	0.011
113	112	5853.82	5852.8	10	409	0.84	ACP	0.011
114	113	5854.66	5853.82	8	264.7	0.52	ACP	0.011
115	114	5857.03	5854.66	8	366.7	0.74	ACP	0.011
116	115	5857.64	5857.03	8	411.6	0.36	ACP	0.011
117	120	5932.75	5897.96	6	365	1.32	ACP	0.011
118	129	5967.7	5941.89	6	401.6	1.09	ACP	0.011
119	122	5894.99	5878.89	6	399.5	0.86	ACP	0.011
120	121	5897.96	5894.4	6	157.2	0.65	ACP	0.011
121	123	5894.4	5884.53	6	125	1.2	ACP	0.011
122	123	5878.89	5877.94	6	191	0.3	ACP	0.011
123	124	5877.94	5857.82	6	296.6	1.12	ACP	0.011
124	116	5857.82	5857.64	8	420.2	0.19	ACP	0.011
125	124	5859.17	5857.82	8	223.6	0.72	ACP	0.011
126	127	5881.36	5867.03	6	234.4	1.06	ACP	0.011
127	125	5861.28	5859.17	8	400.6	0.67	ACP	0.011
128	127	5862.21	5861.28	8	402.8	0.44	ACP	0.011
129	130	5941.89	5915.95	6	302.7	1.26	ACP	0.011
130	120	5915.95	5897.96	6	397	0.91	ACP	0.011
131	118	5985.16	5967.7	6	237	1.16	ACP	0.011
132	148	5896.86	5890.6	6	212	0.74	ACP	0.011
133	147	5891.78	5888.02	6	105	0.81	ACP	0.011
134	152	5878.15	5870.22	6	208	0.84	ACP	0.011
135	151	5881.96	5879.72	6	200	0.45	ACP	0.011
136	New MH 46	5912.95	5901.05	6	170.9	1.13	ACP	0.011
137	153	5912.96	5902.79	6	232.6	0.9	ACP	0.011
138	139	5980.76	5970.87	6	188	0.98	ACP	0.011
139	154	5970.87	5948.67	6	418.4	0.99	ACP	0.011
140	141	5955.3	5943.2	6	357	0.79	ACP	0.011
141	142	5943.2	5920.07	6	442	0.98	ACP	0.011
142	153	5920.07	5902.79	6	208.9	1.23	ACP	0.011

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
143	128	5863.77	5862.21	8	192.7	0.83	ACP	0.011
144	143	5864.47	5863.77	6	79.3	0.4	ACP	0.011
145	144	5885.98	5864.47	6	170	1.53	ACP	0.011
146	144	5866.98	5864.47	6	378	0.35	ACP	0.011
147	149	5888.02	5880.89	6	343.9	0.62	ACP	0.011
148	149	5890.6	5880.89	6	165	1.04	ACP	0.011
149	151	5880.89	5879.72	6	131	0.41	ACP	0.011
150	146	5869.49	5866.98	6	393	0.34	ACP	0.011
151	152	5879.72	5874.63	6	36	1.61	ACP	0.011
152	150	5870.22	5869.49	6	139.3	0.31	ACP	0.011
153	148	5902.79	5890.6	6	138.1	1.27	ACP	0.011
154	142	5948.67	5920.07	6	205	1.6	ACP	0.011
156	Gate Valve	6063.3	5943.4	6	1236.2	1.34	ACP	0.011
157	156	6068.63	6063.3	6	219.3	0.67	ACP	0.011
158	157	6084.21	6068.63	6	215.4	1.15	ACP	0.011
159	158	6132.95	6084.21	6	452.4	1.41	ACP	0.011
160	157	6148.6	6068.63	6	237.1	2.49	ACP	0.011
161	160	6183.95	6148.6	6	265.5	1.56	ACP	0.011
162	165	6318.14	6312.36	6	161.7	0.81	ACP	0.011
163	162	6336.19	6318.14	6	149.9	1.49	ACP	0.011
164	166	6340.84	6340.01	6	137.7	0.33	ACP	0.011
165	170	6312.36	6278.51	6	305.7	1.43	ACP	0.011
166	167	6340.01	6324.93	6	184.3	1.23	ACP	0.011
167	168	6324.93	6310.96	6	194.9	1.15	ACP	0.011
168	169	6310.96	6295.33	6	183.8	1.25	ACP	0.011
169	170	6295.33	6278.51	6	177.1	1.32	ACP	0.011
170	171	6278.51	6250.31	6	171.7	1.74	ACP	0.011
171	172	6250.31	6227.8	6	70.2	2.43	ACP	0.011
172	173	6227.8	6206.77	6	235.9	1.28	ACP	0.011
173	161	6206.77	6183.95	6	218	1.39	ACP	0.011
174	173	6211.67	6206.77	6	148.5	0.78	ACP	0.011
175	174	6217.54	6211.67	6	128.2	0.92	ACP	0.011
176	175	6229.43	6217.54	6	241.8	0.95	ACP	0.011
177	159	6168.91	6132.95	6	494.3	1.16	ACP	0.011
178	177	6169.11	6168.91	6	248.1	0.12	ACP	0.011

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
179	181	6216.63	6205.55	6	236.3	0.93	ACP	0.011
180	176	6239.02	6229.43	6	333.6	0.73	ACP	0.011
181	183	6205.55	6200.85	6	179.3	0.69	ACP	0.011
182	178	6169.44	6169.11	6	301.5	0.14	ACP	0.011
183	184	6200.85	6170.47	6	79.2	2.66	ACP	0.011
184	182	6170.47	6169.44	6	218.3	0.29	ACP	0.011
185	187	6226.74	6203.22	6	389.4	1.05	ACP	0.011
186	184	6170.87	6170.47	6	297.9	0.16	ACP	0.011
187	188	6203.22	6177.16	6	169	1.68	ACP	0.011
188	186	6177.16	6170.87	6	198.4	0.76	ACP	0.011
189	188	6177.48	6177.16	6	198	0.17	ACP	0.011
190	187	6212.62	6203.22	6	157.4	1.05	ACP	0.011
191	189	6179.44	6177.48	6	150.2	0.49	ACP	0.011
192	191	6196.38	6179.44	6	156	1.41	ACP	0.011
193	190	6225.16	6212.62	6	158.3	1.21	ACP	0.011
194	192	6201.59	6196.38	6	106.1	0.95	ACP	0.011
195	193	6231.53	6225.16	6	182.7	0.8	ACP	0.011
196	194	6206.27	6201.59	6	325.8	0.51	ACP	0.011
197	195	6231.68	6231.53	6	298.2	0.1	ACP	0.011
198	197	6247.23	6231.68	6	375.8	0.87	ACP	0.011
199	198	6257.76	6247.23	6	116.6	1.29	ACP	0.011
200	199	6270.26	6257.76	6	313.5	0.86	ACP	0.011
201	199	6262.93	6257.76	6	148.3	0.8	ACP	0.011
202	201	6266.28	6262.93	6	258.5	0.49	ACP	0.011
203	202	6267.02	6266.38	6	48.7	0.49	ACP	0.011
204	203	6299.73	6267.12	6	159.7	1.94	ACP	0.011
205	204	6315.9	6299.73	6	207.4	1.2	ACP	0.011
206	205	6331.58	6315.9	6	169.8	1.3	ACP	0.011
207	208	6374.14	6350.68	6	438.6	0.99	ACP	0.011
208	209	6350.68	6332.15	6	202.5	1.3	ACP	0.011
209	210	6332.15	6294.88	6	184.1	1.93	ACP	0.011
210	211/IH Pump Wet Well	6294.88	6269.88	6	146.3	1.77	ACP	0.011
212	211/IH Pump Wet Well	6279.3	6269.88	6	73.6	1.53	ACP	0.011
213	212	6282.43	6279.3	6	208.8	0.52	ACP	0.011
214	212	6317.63	6279.3	6	321.8	1.48	ACP	0.011

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
215	216	6334.69	6322.19	6	329.3	0.84	ACP	0.011
216	218	6322.19	6294.96	6	251.3	1.41	ACP	0.011
217	200	6277.58	6270.26	6	236.7	0.75	ACP	0.011
218	217	6294.96	6277.58	6	213.6	1.22	ACP	0.011
219	218	6307.82	6294.96	6	211.8	1.06	ACP	0.011
220	219	6319.52	6307.82	6	204.3	1.03	ACP	0.011
221	222	6348.74	6328.72	8	159.1	3.27	ACP	0.011
222	223	6328.72	6319.77	8	52.4	3.81	ACP	0.011
223	224	6319.77	6315.28	8	139.3	1.66	ACP	0.011
224	225	6315.28	6311.47	8	181.2	1.34	ACP	0.011
225	256	6311.47	6309.38	8	172.8	1.02	ACP	0.011
226	225	6328.7	6311.47	6	76.2	2.04	ACP	0.011
227	221	6365.5	6348.74	6	174	1.33	ACP	0.011
228	221	6353.49	6348.74	6	245.8	0.6	ACP	0.011
229	230	6328.09	6321.76	6	94.8	1.11	ACP	0.011
230	232	6321.76	6303.24	6	234.5	1.2	ACP	0.011
231	200	6292.21	6270.26	6	290.9	1.18	ACP	0.011
232	231	6303.24	6292.21	6	153.5	1.15	ACP	0.011
233	232	6313.88	6303.24	6	121.4	1.27	ACP	0.011
234	Siphon Inlet	6070.73	6059.02	12	226.7	6.19	ACP	0.011
235	238	6145.55	6131.53	6	482.3	0.73	ACP	0.011
236	234	6097.79	6070.73	12	443.8	6.72	ACP	0.011
237	236	6115.86	6097.79	12	490.8	5.22	ACP	0.011
238	239	6131.38	6130.64	6	251.9	0.23	ACP	0.011
239	240	6130.64	6129.82	6	72.8	0.33	CIP	0.015
240	237	6129.82	6115.86	12	138.3	6.34	CIP	0.015
241	240	6135.93	6129.82	12	117.4	4.55	CIP	0.015
242	241	6158.16	6135.93	12	247.3	5.98	CIP	0.015
243	242	6176.22	6158.16	12	198.7	8.21	ACP	0.011
244	250	6280.86	6269.58	8	398.5	1.55	ACP	0.011
245	244	6295.24	6280.86	8	59.7	4.53	ACP	0.011
246	245	6296.96	6295.24	8	44.6	1.81	ACP	0.011
247	243	6210.46	6176.22	12	257.7	7.28	CIP	0.015
248	247	6210.5	6210.46	12	12.3	1.14	CIP	0.015
249	247	6238.26	6210.54	10	180.9	4.81	CIP	0.015

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
250	249	6269.58	6238.26	10	130	6.03	CIP	0.015
251	250	6292.56	6269.58	10	97.4	5.96	CIP	0.015
252	251	6309.52	6292.56	10	116.4	4.69	CIP	0.015
253	246	6316.74	6296.96	6	212.9	1.31	ACP	0.011
254	252	6341.19	6309.52	10	152.9	5.59	CIP	0.015
255	245	6308.15	6295.24	8	121	3.02	ACP	0.011
256	255	6309.25	6308.27	8	173.9	0.69	ACP	0.011
257	254	6345.19	6341.19	10	312.5	1.89	ACP	0.011
258	253	6328.87	6316.74	6	301	0.86	ACP	0.011
259	233	6333.99	6313.88	6	260.9	1.19	ACP	0.011
260	259	6340.17	6333.99	6	161.6	0.84	ACP	0.011
261	257	6348.73	6345.19	10	284.9	1.87	ACP	0.011
262	261	6351.48	6348.73	8	206.5	1.3	PVC	0.009
263	262	6358.87	6351.48	8	304.2	1.76	PVC	0.009
264	263	6383.47	6358.87	8	345.5	3.01	PVC	0.009
265	266	6453.96	6453.6	6	382.6	0.16	PVC	0.009
266	270	6453.6	6439.37	6	380.9	1.01	PVC	0.009
267	264	6395.36	6383.47	8	245.6	2.48	PVC	0.009
268	267	6414.85	6395.36	8	244.9	3.18	PVC	0.009
269	268	6419.14	6414.85	6	34.9	1.84	PVC	0.009
270	269	6439.22	6419.14	6	69.9	2.81	PVC	0.009
271	268	6417.33	6414.85	8	231.5	1.17	PVC	0.009
272	270	6440.48	6439.37	6	217.2	0.37	PVC	0.009
273	271	6418.3	6417.33	8	184.6	0.82	PVC	0.009
274	272	6452.76	6440.88	6	263.4	1.11	PVC	0.009
275	273	6419.55	6418.3	8	399.8	0.63	PVC	0.009
276	275	6420.89	6419.55	8	196	0.93	PVC	0.009
277	265	6456.89	6453.96	6	394.2	0.45	PVC	0.009
278	277	6458.85	6456.93	6	393.7	0.37	PVC	0.009
279	280	6455.8	6442.93	6	338.2	1.02	PVC	0.009
280	316	6442.93	6440.7	6	228.9	0.52	PVC	0.009
281	315	6489.81	6469.38	6	194.3	1.7	PVC	0.009
282	283	6512.4	6502.15	6	366.1	0.88	PVC	0.009
283	284	6502.15	6470.23	6	398.3	1.48	PVC	0.009
284	274	6470.23	6452.76	6	357.9	1.16	PVC	0.009

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
285	287	6457.65	6442.14	6	170.2	1.58	PVC	0.009
286	276	6437.21	6420.99	8	138.1	3.87	PVC	0.009
287	286	6442.14	6437.21	8	127.8	2.22	PVC	0.009
288	289	6492.77	6473.62	6	203	1.61	PVC	0.009
289	287	6473.62	6442.14	8	190.5	4.59	PVC	0.009
290	289	6484.89	6473.62	8	69.9	4.53	PVC	0.009
291	290	6491.67	6484.89	8	148.3	2.41	PVC	0.009
292	289	6474.45	6473.62	6	257.1	0.3	PVC	0.009
293	291	6502.73	6491.67	6	323.8	0.97	PVC	0.009
294	292	6475.89	6474.65	6	157.3	0.47	PVC	0.009
295	294	6478.25	6475.94	6	298.2	0.46	PVC	0.009
296	305	6509.26	6502.63	6	242.3	0.87	PVC	0.009
297	295	6481.26	6478.25	6	355.5	0.48	PVC	0.009
298	301	6594.07	6559.5	6	198	2.19	PVC	0.009
299	301	6560.47	6559.5	6	245.8	0.33	PVC	0.009
300	298	6598.05	6594.07	6	138	0.89	PVC	0.009
301	302	6559.5	6558.36	6	316	0.31	PVC	0.009
302	306	6558.28	6557.32	6	207.9	0.36	PVC	0.009
303	298	6605.57	6594.07	6	281.3	1.06	PVC	0.009
304	311	6585.75	6555.57	8	168.3	4.78	PVC	0.009
305	297	6502.63	6481.26	6	142.6	2.03	PVC	0.009
306	312	6557.28	6556.2	6	378.2	0.28	PVC	0.009
307	291	6522.89	6491.67	8	305.2	3.61	PVC	0.009
308	307	6534.88	6522.89	8	201.2	2.75	PVC	0.009
309	308	6551.93	6534.88	8	103.5	4.58	PVC	0.009
310	311	6566.75	6555.57	6	138.5	1.49	PVC	0.009
311	309	6555.57	6551.93	8	60.7	2.76	PVC	0.009
312	311	6556.2	6555.57	6	204.9	0.29	PVC	0.009
313	304	6605.52	6585.75	6	305.4	1.33	PVC	0.009
314	304	6593.92	6585.75	6	205.3	1.05	PVC	0.009
315	317	6469.38	6463.02	6	195.6	0.94	PVC	0.009
316	318	6440.7	6426.26	6	201.4	1.4	PVC	0.009
317	322	6463.02	6461.64	6	295.7	0.36	PVC	0.009
318	319	6426.26	6421.14	6	216.8	0.81	PVC	0.009
319	320	6420.97	6420.15	6	140.4	0.4	PVC	0.009

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
320	357	6419.95	6419.03	8	282.9	0.64	PVC	0.009
321	356	6459.01	6450.91	6	317.8	0.84	PVC	0.009
322	319	6461.64	6421.14	6	193.9	2.39	PVC	0.009
323	322	6476.51	6461.64	6	188.1	1.47	PVC	0.009
324	323	6482.59	6476.51	6	133.1	1.12	PVC	0.009
325	324	6496.9	6482.59	6	269.9	1.21	PVC	0.009
326	355	6508.49	6500.88	6	288.4	0.85	PVC	0.009
327	323	6499.01	6476.51	6	271.1	1.51	PVC	0.009
328	327	6508.07	6499.01	6	202.2	1.11	PVC	0.009
329	328	6522.06	6508.07	6	228	1.3	PVC	0.009
330	326	6545.7	6508.49	6	211.1	2.2	PVC	0.009
331	248	6211.88	6210.5	12	382.6	2	PVC	0.009
332	New MH 59	6213.46	6213.21	12	160.1	0.79	CIP	0.015
333	332	6218.91	6213.55	12	294.3	3.67	ACP	0.011
334	333	6240.78	6218.91	10	320	4.38	ACP	0.011
335	334	6246.51	6240.78	10	82	4.42	ACP	0.011
336	335	6247.97	6246.51	10	158	1.61	ACP	0.011
337	336	6251.59	6247.97	10	158.2	2.53	ACP	0.011
338	337	6282.83	6251.59	10	295.3	3.99	CIP	0.015
339	340	6304.06	6301.54	8	97.4	1.48	ACP	0.011
340	341	6301.54	6295.04	10	241.9	2.74	ACP	0.011
341	338	6295.04	6282.83	10	214.5	3.99	ACP	0.011
342	343	6332.19	6321.41	10	121.8	4.98	ACP	0.011
343	344	6321.41	6307.46	10	190.1	4.53	ACP	0.011
344	341	6307.46	6295.04	10	248.7	3.74	ACP	0.011
345	344	6314.16	6307.46	6	141.5	1.14	PVC	0.009
346	347	6315.94	6312.5	6	217.8	0.54	ACP	0.011
347	348	6312.34	6310.2	6	64.1	0.78	ACP	0.011
348	339	6309.9	6304.06	8	172.3	1.7	ACP	0.011
349	348	6321.85	6310.2	8	210.7	2.65	PVC	0.009
350	349	6335.23	6322.4	8	229.6	2.67	PVC	0.009
351	350	6336.85	6335.23	8	116.8	1.33	PVC	0.009
352	351	6340.84	6336.85	8	42	3.48	PVC	0.009
353	361	6444.56	6443.37	6	243.4	0.37	PVC	0.009
354	363	6563.24	6562.83	6	306.7	0.19	PVC	0.009

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
355	362	6500.88	6492.21	6	290.9	0.9	PVC	0.009
356	353	6450.91	6444.56	6	296.3	0.77	PVC	0.009
357	360	6419.03	6412.62	8	336.6	1.56	PVC	0.009
360	New MH 61	6412.62	6406.84	8	63.2	3.41	PVC	0.009
361	360	6443.37	6412.62	8	244.2	4	PVC	0.009
362	364	6492.21	6490.85	6	260	0.38	PVC	0.009
363	365	6562.83	6555.26	6	333	0.79	PVC	0.009
364	361	6490.85	6443.37	8	221.1	5.23	PVC	0.009
365	364	6555.26	6490.85	6	243.3	2.7	PVC	0.009
366	364	6507.19	6490.85	8	214.2	3.12	PVC	0.009
367	342	6370.23	6332.19	10	452.5	3.56	CIP	0.015
368	367	6390	6370.23	10	215.5	3.72	CIP	0.015
369	368	6415.98	6390	8	285.5	2.79	ACP	0.011
370	369	6439.15	6415.98	8	246.9	2.83	ACP	0.011
371	370	6480.41	6439.15	8	389.8	2.2	CIP	0.015
372	371	6511.41	6480.41	8	285.5	2.23	CIP	0.015
373	372	6525.45	6511.41	8	157.8	2.02	CIP	0.015
374	373	6552.62	6525.45	8	212.5	2.42	CIP	0.015
375	374	6582.5	6552.62	8	258.5	2.3	CIP	0.015
376	375	6605.53	6582.5	8	247	2.07	CIP	0.015
377	376	6641.75	6605.53	8	289.6	2.39	CIP	0.015
378	377	6678.02	6641.75	8	272	2.47	CIP	0.015
379	378	6701.04	6678.02	8	260	2.01	CIP	0.015
380	379	6746.17	6701.04	8	303	2.61	CIP	0.015
381	New MH 60	6796.04	6776.39	8	131.3	2.62	CIP	0.015
382	383	6631.28	6626.95	6	297.7	0.63	PVC	0.009
383	304	6626.95	6585.75	6	215.8	2.29	PVC	0.009
384	383	6642.11	6626.95	6	187.5	1.49	PVC	0.009
385	386	6664.45	6657.57	6	125.9	1.22	PVC	0.009
386	387	6657.57	6654.93	6	302.5	0.49	PVC	0.009
387	384	6654.93	6642.11	6	396.2	0.94	PVC	0.009
388	1	6706.07	6690.33	6	405.1	1.03	PVC	0.009
389	382	6666.39	6631.28	6	245.2	1.98	PVC	0.009
267 PS Lag Outfall	155	5836.92	5562.1	8	11479	1.05	CIP	0.015
267 PS Lead Outfall	155	5837	5562.1	12	11479	3.09	CIP	0.015

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
Gate Valve	267 PS Lag Outfall	5943.4	5836.92	8	4435.4	1.05	CIP	0.015
Gate Valve	Gate Valve 2	5943.4	5943.08	6	5.2	0.9	UNKN	0.013
Gate Valve 2	267 PS Lead Outfall	5943.08	5837	12	4430.1	3.09	CIP	0.015
New MH 119	New MH 126	6811.64	6811.41	6	82.7	0.28	PVC	0.009
New MH 120	New MH 119	6813.06	6811.64	6	70.7	0.74	PVC	0.009
New MH 121	Pipe Downsize	6308.64	6302.82	4	101.6	0.43	PVC	0.009
New MH 123	New MH 52	6770.1	6769.18	6	8	1.77	PVC	0.009
New MH 124	352	6361.01	6340.93	8	317	2.84	PVC	0.009
New MH 125	New MH 126	6812.7	6811.41	4	62	0.26	PVC	0.009
New MH 126	381	6811.41	6796.04	6	110.2	1.6	ACP	0.011
New MH 127	New MH 129	6829.95	6816.36	6	151.3	1.57	PVC	0.009
New MH 128	New MH 127	6831.59	6829.95	6	103.3	0.66	PVC	0.009
New MH 129	New MH 120	6816.36	6813.06	6	227.5	0.63	PVC	0.009
New MH 46	135	5901.05	5881.96	6	205.9	1.31	ACP	0.011
New MH 47	New MH 77	6718.52	6699.24	6	163.6	1.8	PVC	0.009
New MH 48	New MH 47	6729.06	6718.62	6	120.2	1.54	PVC	0.009
New MH 49	New MH 48	6735.37	6729.16	6	83.3	1.43	PVC	0.009
New MH 50	New MH 49	6740.38	6735.47	6	173	0.88	PVC	0.009
New MH 51	New MH 50	6761.64	6740.48	6	199.3	1.71	PVC	0.009
New MH 52	New MH 51	6769.08	6761.74	6	84.3	1.55	PVC	0.009
New MH 53	New MH 123	6773.06	6770.2	6	32.6	1.55	PVC	0.009
New MH 59	331	6212.89	6211.96	12	86	2.08	CIP	0.015
New MH 60	380	6775.93	6746.17	8	202.3	2.6	CIP	0.015
New MH 61	New MH 62	6406.84	6381.09	8	181.9	4.25	PVC	0.009
New MH 62	New MH 124	6380.99	6361.11	8	157.3	4.01	PVC	0.009
New MH 66	57	6064.84	6062.48	6	114	0.62	ACP	0.011
New MH 67	New MH 66	6071.95	6064.84	6	163.2	0.89	ACP	0.011
New MH 68	New MH 67	6077.95	6072.05	6	56	1.7	PVC	0.009
New MH 69	New MH 68	6082.27	6078.05	6	110.7	1.02	PVC	0.009
New MH 70	New MH 69	6082.27	6082.27	6	191.4	1.77	PVC	0.009
New MH 77	Trailside-38	6699.14	6644.96	6	240	2.49	PVC	0.009
New MH 78	New MH 59	6242.89	6217.93	8	300	3.25	PVC	0.009
New MH 79	New MH 78	6259.63	6242.89	8	212.3	3.17	PVC	0.009
New MH 80	New MH 79	6275.9	6259.73	8	234.6	2.96	PVC	0.009
New MH 81	New MH 80	6278.85	6276	8	98.6	1.92	PVC	0.009

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
New MH 82	New MH 81	6298.9	6278.95	8	289.4	2.96	PVC	0.009
New MH 83	New MH 82	6304.09	6299	8	22.8	5.34	PVC	0.009
New MH 84	New MH 83	6320.58	6304.09	8	173.8	3.48	PVC	0.009
New MH 85	New MH 84	6333	6320.58	8	72.6	4.67	PVC	0.009
New MH 86	New MH 85	6335.38	6333	8	117.4	1.61	PVC	0.009
New MH 87	New MH 86	6338.28	6335.38	8	143.7	1.6	PVC	0.009
New MH 88	New MH 84	6326.64	6320.58	8	153.6	2.24	PVC	0.009
New MH 89	New MH 90	6365.81	6349.16	8	267.2	2.82	PVC	0.009
New MH 90	New MH 88	6349.16	6326.64	8	121.5	4.86	PVC	0.009
New MH 91	New MH 92	6321.61	6317.41	6	164.3	0.84	PVC	0.009
New MH 92	New MH 94	6317.41	6305.62	6	98.8	1.81	PVC	0.009
New MH 93	New MH 94	6308.04	6305.62	6	66.8	1	PVC	0.009
New MH 94	New MH 83	6305.62	6304.09	6	190.9	0.47	PVC	0.009
New MH 95	New MH 80	6288.14	6276	8	167.8	3.04	PVC	0.009
New MH 96	New MH 53	6777.5	6773.16	6	45.3	1.62	PVC	0.009
Pipe Downsize	New MH 95	6302.82	6288.24	8	256.7	2.69	PVC	0.009
Ritz-12	Ritz-13	6854.01	6837.89	8	206.6	3.15	PVC	0.009
Ritz-13	Ritz-14	6837.89	6826.08	8	157.9	3.09	PVC	0.009
Ritz-14	Ritz-15	6825.98	6809.5	8	190.3	3.32	PVC	0.009
Ritz-15	Ritz-16	6809.4	6786.82	8	229.6	3.54	PVC	0.009
Ritz-16	New MH 60	6786.72	6776.39	8	109.6	3.46	PVC	0.009
Schaffer-1	Schaffer-2	6832.16	6830.92	4	46.5	0.29	PVC	0.009
Schaffer-2	Schaffer-3	6830.92	6830.66	4	37.1	0.15	PVC	0.009
Schaffer-3	Schaffer-4	6830.66	6822.21	4	95.6	0.53	PVC	0.009
Schaffer-4	New MH 125	6822.21	6812.7	4	21.3	1.19	PVC	0.009
Siphon Inlet	Gate Valve	6059.02	5943.4	8	2032.8	1.61	CIP	0.015
Siphon Inlet	Gate Valve 2	6059.02	5943.08	12	2038.3	4.76	CIP	0.015
Trailside-11	Trailside-27	6823.39	6817.42	6	273.3	0.77	PVC	0.009
Trailside-16	Trailside-17	6844.55	6838.5	6	97	1.31	PVC	0.009
Trailside-17	Trailside-20	6838.07	6835.72	6	82.6	0.88	PVC	0.009
Trailside-20	Trailside-21	6834.94	6834.66	6	47.6	0.4	PVC	0.009
Trailside-21	Trailside-23	6834.1	6828.8	6	80.8	1.34	PVC	0.009
Trailside-23	Trailside-27	6822.6	6817.42	6	60.6	1.53	PVC	0.009
Trailside-27	Trailside-28	6817.39	6815.47	6	81.6	0.8	PVC	0.009
Trailside-28	Trailside-29	6815.27	6808.74	6	52.9	1.84	PVC	0.009

Model Pipe Attributes

US Node ID	DS Node ID	US Invert Level (feet)	DS Invert Level (feet)	Diameter (inches)	Length (feet)	Full Pipe Capacity (Mgal/d)	Conduit Material	Roughness (Mannings)
Trailside-29	Trailside-30	6805.94	6805.71	6	55.4	0.34	PVC	0.009
Trailside-3	Trailside-4	6845.57	6844.17	6	113.9	0.58	PVC	0.009
Trailside-30	Trailside-31	6805.57	6795.9	6	118.3	1.5	PVC	0.009
Trailside-31	Trailside-32	6795.8	6767.19	6	299.8	1.62	PVC	0.009
Trailside-32	Trailside-33	6767.01	6746.4	6	181.7	1.76	PVC	0.009
Trailside-33	Trailside-34	6745.93	6737.21	6	118.1	1.42	PVC	0.009
Trailside-34	Trailside-35	6737.21	6717.07	8	136.1	4.34	PVC	0.009
Trailside-35	Trailside-36	6716.93	6681.35	8	163.8	5.26	PVC	0.009
Trailside-36	Trailside-37	6681.19	6651.54	8	97.9	6.21	PVC	0.009
Trailside-37	Trailside-38	6651.06	6644.96	8	73.9	3.24	PVC	0.009
Trailside-38	Trailside-39	6644.83	6625.51	8	128.2	4.38	PVC	0.009
Trailside-39	Trailside-40	6625.24	6562.09	8	173.3	6.81	PVC	0.009
Trailside-4	Trailside-5	6843.89	6838.85	6	73	1.38	PVC	0.009
Trailside-40	Trailside-41	6561.83	6545.27	8	121.8	4.16	PVC	0.009
Trailside-41	366	6545.17	6507.19	8	192.6	5.01	PVC	0.009
Trailside-5	Trailside-8	6838.74	6826.07	6	124.3	1.67	PVC	0.009
Trailside-8	Trailside-11	6825.97	6823.49	6	86.1	0.89	PVC	0.009

Appendix C

Model Results for Existing Level of Development: Average Dry Weather Flow, December 2007 Storm Event, And 10-Year Design Storm

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
1	384	2.37	0.0031	0.0099	0.0097	2,386
2	3	0.69	0	0	0	698
3	4	1.95	0	0	0	1,971
4	367	1.47	0	0	0	1,486
5	6	2.15	0.0325	0.0432	0.0426	2,131
6	241	1.65	0.0465	0.0624	0.0615	1,606
7	6	1.72	0	0	0	1,739
8	10	1.77	0	0	0	1,789
9	10	2.92	0	0	0	2,952
10	12	2.05	0	0	0	2,073
11	5	2.32	0.0325	0.0432	0.0426	2,302
12	11	1.63	0.0325	0.0432	0.0426	1,605
13	12	2	0	0	0	2,022
14	13	3.06	0	0	0	3,094
15	14	2.54	0	0	0	2,568
16	17	1.2	0	0	0	1,213
17	379	0.66	0	0	0	667
19	23	1.16	0.0017	0.0033	0.003	1,170
20	19	0.73	0	0	0	738
21	22	0.33	0.0059	0.0115	0.0107	323
22	25	2.08	0.0059	0.0115	0.0107	2,092
23	24	1.28	0.0052	0.0102	0.0095	1,284
24	26	0.32	0.0059	0.0115	0.0107	313
25	113	0.83	0.0811	0.1355	0.1255	712
26	21	0.34	0.0059	0.0115	0.0107	333
27	28	1.01	0.0589	0.0915	0.0855	935
28	29	0.84	0.0603	0.0942	0.0879	760
29	31	1.02	0.0604	0.0946	0.0882	942
30	25	0.66	0.0752	0.124	0.1149	551
31	30	0.83	0.0752	0.124	0.1149	723
32	33	0.58	0.0017	0.0033	0.0031	583
33	31	2.16	0.0114	0.0228	0.0212	2,162
34	33	0.91	0.0097	0.0195	0.0182	902

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
35	34	0.25	0.0083	0.0166	0.0155	237
36	27	0.68	0.0589	0.0915	0.0856	601
37	36	1.19	0.0572	0.0883	0.0827	1,119
38	37	0.44	0.0555	0.085	0.0798	364
39	35	1.07	0.0066	0.0134	0.0125	1,069
40	42	0.82	0.0031	0.0066	0.0061	823
41	39	0.76	0.0048	0.0099	0.0092	759
42	41	0.86	0.0048	0.0099	0.0092	860
43	40	0.72	0.0031	0.0066	0.0061	722
44	38	0.81	0.0538	0.0814	0.0766	741
45	43	0.94	0.0017	0.0038	0.0036	947
46	44	1	0.052	0.078	0.0735	937
47	46	0.62	0.052	0.078	0.0736	552
48	47	1.02	0.0503	0.0748	0.0706	960
49	45	1.1	0	0	0	1,112
50	49	0.73	0	0	0	738
51	234	0.18	0.0022	0.0047	0.0045	177
52	51	1.49	0	0	0	1,506
53	54	1.06	0.0017	0.0036	0.0034	1,068
54	55	1.1	0.0035	0.0072	0.0067	1,105
55	56	1.08	0.0035	0.0072	0.0067	1,085
56	67	1.19	0.0069	0.0141	0.0132	1,190
57	65	1.31	0.0369	0.0474	0.0462	1,278
58	59	1.19	0	0	0	1,203
59	57	0.62	0.0017	0.0034	0.0031	624
61	62	1.1	0	0	0	1,112
62	63	0.4	0.0017	0.0034	0.0032	401
63	64	1.22	0.0035	0.0068	0.0064	1,227
64	66	1.12	0.0035	0.0068	0.0064	1,126
65	66	1.2	0.0369	0.0474	0.0462	1,166
66	48	0.79	0.0503	0.0748	0.0707	727
67	66	0.57	0.0083	0.017	0.0159	560
68	74	0.99	0	0	0	1,001

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
69	70	1.08	0.0021	0.0041	0.0037	1,088
70	71	1.19	0.0021	0.0041	0.0037	1,199
71	72	1.03	0.0042	0.008	0.0072	1,034
72	79	1.05	0.0063	0.0121	0.0109	1,051
73	76	0.87	0.0042	0.0078	0.0071	872
74	75	0.91	0	0	0	920
75	73	1.14	0.0021	0.0041	0.0037	1,149
76	77	1.37	0.0042	0.0078	0.007	1,378
77	80	0.36	0.0067	0.0124	0.0112	353
78	98	1.49	0	0	0	1,506
79	80	1.29	0.0083	0.0157	0.0142	1,290
80	83	0.25	0.0171	0.0321	0.0289	224
81	83	1.3	0.0021	0.0042	0.0038	1,310
82	98	1.12	0.0229	0.044	0.0394	1,092
83	82	1.02	0.0229	0.044	0.0395	991
84	238	0.44	0.0028	0.0054	0.0053	439
85	87	2.12	0.0012	0.0023	0.0022	2,141
86	87	0.89	0	0	0	900
87	84	0.82	0.0028	0.0054	0.0053	824
88	86	1.23	0	0	0	1,244
89	85	0.87	0.0012	0.0023	0.0022	877
90	89	0.78	0	0	0	789
91	96	0.73	0	0	0	738
92	95	0.52	0.0031	0.0057	0.0056	520
93	92	1.15	0.0016	0.0028	0.0027	1,160
94	93	0.54	0	0	0	546
95	96	0.78	0.0062	0.0114	0.0111	777
96	235	0.83	0.0078	0.0144	0.014	825
97	100	1.05	0	0	0	1,062
98	99	1.06	0.025	0.0481	0.0431	1,028
99	101	1.23	0.0271	0.0522	0.0467	1,196
100	101	0.45	0.0042	0.0076	0.0069	448
101	102	0.38	0.0333	0.0637	0.057	327

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
102	130	0.76	0.0354	0.0676	0.0603	707
103	104	0.61	0	0	0	617
104	119	0.63	0	0	0	637
105	106	0.11	0.0021	0.0037	0.0034	108
106	128	1.26	0.0062	0.0115	0.0104	1,263
107	267 Pump Station	13.06	0.1753	0.3116	0.2832	12,917
108	107	1.9	0.1733	0.3116	0.2826	1,635
109	108	0.58	0.1733	0.3117	0.2826	301
110	109	0.84	0.1733	0.3117	0.2826	564
111	110	0.84	0.1733	0.3117	0.2826	564
112	111	0.84	0.1734	0.3117	0.2826	564
113	112	0.84	0.1732	0.3115	0.2825	564
114	113	0.52	0.0922	0.1761	0.1571	367
115	114	0.74	0.0922	0.1761	0.1571	589
116	115	0.36	0.0922	0.1761	0.1571	205
117	120	1.32	0	0	0	1,335
118	129	1.09	0.0008	0.0017	0.0015	1,100
119	122	0.86	0.0021	0.0037	0.0034	866
120	121	0.65	0.0445	0.0851	0.0759	580
121	123	1.2	0.0462	0.088	0.0786	1,134
122	123	0.3	0.0042	0.0075	0.0068	296
123	124	1.12	0.0524	0.0993	0.0887	1,043
124	116	0.19	0.0922	0.1761	0.1572	33
125	124	0.72	0.0374	0.0715	0.0638	663
126	127	1.06	0	0	0	1,072
127	125	0.67	0.0374	0.0715	0.0638	613
128	127	0.44	0.0358	0.0681	0.0608	383
129	130	1.26	0.0008	0.0017	0.0015	1,272
130	120	0.91	0.0424	0.0812	0.0725	847
131	118	1.16	0	0	0	1,173
132	148	0.74	0	0	0	748
133	147	0.81	0	0	0	819
134	152	0.84	0	0	0	849

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
135	151	0.45	0.0021	0.0047	0.0042	451
136	New MH 46	1.13	0	0	0	1,142
137	153	0.9	0	0	0	910
138	139	0.98	0.0013	0.0021	0.002	989
139	154	0.99	0.0033	0.0057	0.0052	996
140	141	0.79	0	0	0	799
141	142	0.98	0	0	0	991
142	153	1.23	0.0092	0.0164	0.015	1,228
143	128	0.83	0.0275	0.0525	0.0469	792
144	143	0.4	0.0275	0.0525	0.0469	357
145	144	1.53	0	0	0	1,547
146	144	0.35	0.0229	0.044	0.0394	314
147	149	0.62	0.0021	0.0043	0.0038	623
148	149	1.04	0.0133	0.0244	0.0221	1,029
149	151	0.41	0.0171	0.0318	0.0287	385
150	146	0.34	0.0229	0.044	0.0395	304
151	152	1.61	0.0208	0.0398	0.0358	1,592
152	150	0.31	0.0208	0.0398	0.0358	277
153	148	1.27	0.0113	0.0205	0.0186	1,265
154	142	1.6	0.0071	0.0123	0.0112	1,606
156	Gate Valve	1.34	0.286	0.3457	0.3382	1,013
157	156	0.67	0.2866	0.3461	0.3382	335
158	157	1.15	0.2718	0.3167	0.3109	848
159	158	1.41	0.2724	0.3169	0.3108	1,111
160	157	2.49	0.0158	0.0311	0.0284	2,489
161	160	1.56	0.0158	0.0311	0.0284	1,548
162	165	0.81	0	0	0	819
163	162	1.49	0	0	0	1,506
164	166	0.33	0	0	0	334
165	170	1.43	0.0016	0.0031	0.0028	1,443
166	167	1.23	0.0016	0.003	0.0027	1,241
167	168	1.15	0.0016	0.003	0.0027	1,160
168	169	1.25	0.0032	0.0062	0.0056	1,258

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
169	170	1.32	0.0032	0.0062	0.0056	1,329
170	171	1.74	0.0079	0.0157	0.0143	1,745
171	172	2.43	0.0088	0.0177	0.0162	2,440
172	173	1.28	0.0088	0.0177	0.0162	1,278
173	161	1.39	0.0158	0.0311	0.0284	1,377
174	173	0.78	0.0063	0.0122	0.0111	777
175	174	0.92	0.0032	0.006	0.0055	925
176	175	0.95	0.0016	0.003	0.0027	958
177	159	1.16	0.2725	0.3174	0.3113	858
178	177	0.12	0.2728	0.3173	0.3115	-194
179	181	0.93	0	0	0	940
180	176	0.73	0	0	0	738
181	183	0.69	0.0016	0.003	0.0027	695
182	178	0.14	0.2758	0.3204	0.3148	-177
183	184	2.66	0.0016	0.003	0.0027	2,687
184	182	0.29	0.2919	0.3306	0.3253	-36
185	187	1.05	0.0016	0.003	0.0027	1,059
186	184	0.16	0.3066	0.3488	0.3439	-186
187	188	1.68	0.3353	0.3808	0.3736	1,321
188	186	0.76	0.3412	0.3923	0.3845	380
189	188	0.17	0.0032	0.0061	0.0056	166
190	187	1.05	0.3293	0.3689	0.3625	695
191	189	0.49	0.0032	0.0061	0.0056	490
192	191	1.41	0.0032	0.0061	0.0056	1,420
193	190	1.21	0.3294	0.3689	0.3626	857
194	192	0.95	0.0032	0.0061	0.0056	955
195	193	0.8	0.3294	0.3689	0.3626	442
196	194	0.51	0.0016	0.003	0.0027	513
197	195	0.1	0.328	0.366	0.3599	-263
198	197	0.87	0.3363	0.3684	0.3628	513
199	198	1.29	0.3354	0.3675	0.3624	938
200	199	0.86	0.3211	0.3461	0.3419	524
201	199	0.8	0.011	0.0184	0.0165	792

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
202	201	0.49	0.0092	0.0147	0.0131	482
203	202	0.49	0.0092	0.0147	0.0131	482
204	203	1.94	0	0	0	1,961
205	204	1.2	0	0	0	1,213
206	205	1.3	0	0	0	1,314
207	208	0.99	0	0	0	1,001
208	209	1.3	0	0	0	1,314
209	210	1.93	0	0	0	1,951
210	211/IH Pump Wet Well	1.77	0	0	0	1,789
212	211/IH Pump Wet Well	1.53	0	0	0	1,547
213	212	0.52	0	0	0	526
214	212	1.48	0	0	0	1,496
215	216	0.84	0.2954	0.298	0.2974	549
216	218	1.41	0.3084	0.3163	0.3152	1,107
217	200	0.75	0.3122	0.3244	0.3227	432
218	217	1.22	0.3067	0.318	0.3164	914
219	218	1.06	0.0032	0.0066	0.0061	1,065
220	219	1.03	0.0016	0.0033	0.003	1,038
221	222	3.27	0	0	0	3,306
222	223	3.81	0	0	0	3,852
223	224	1.66	0	0	0	1,678
224	225	1.34	0	0	0	1,355
225	256	1.02	0.0181	0.0225	0.0223	1,009
226	225	2.04	0	0	0	2,062
227	221	1.33	0	0	0	1,345
228	221	0.6	0	0	0	607
229	230	1.11	0	0	0	1,122
230	232	1.2	0.0016	0.0032	0.0029	1,210
231	200	1.18	0.0092	0.0183	0.0167	1,176
232	231	1.15	0.006	0.0122	0.0111	1,151
233	232	1.27	0.0032	0.0063	0.0058	1,278
234	Siphon Inlet	6.19	0.3673	0.5391	0.5359	5,716
235	238	0.73	0.009	0.0181	0.0176	720

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
236	234	6.72	0.3653	0.5347	0.5314	6,257
237	236	5.22	0.3653	0.5348	0.5314	4,740
238	239	0.23	0.0131	0.0258	0.0251	207
239	240	0.33	0.0131	0.0258	0.0251	308
240	237	6.34	0.3653	0.5348	0.5314	5,872
241	240	4.55	0.353	0.5104	0.5063	4,088
242	241	5.98	0.3093	0.4508	0.4454	5,595
243	242	8.21	0.3093	0.4508	0.4454	7,850
244	250	1.55	0.0334	0.0431	0.0426	1,524
245	244	4.53	0.0197	0.0256	0.0252	4,554
246	245	1.81	0.0016	0.003	0.0029	1,827
247	243	7.28	0.3091	0.4505	0.445	6,910
248	247	1.14	0.2344	0.3085	0.3057	843
249	247	4.81	0.0796	0.1507	0.147	4,714
250	249	6.03	0.0796	0.1507	0.147	5,948
251	250	5.96	0.0386	0.0973	0.0946	5,930
252	251	4.69	0.0386	0.0973	0.0946	4,646
253	246	1.31	0.0016	0.003	0.0029	1,321
254	252	5.59	0.0386	0.0973	0.0946	5,556
255	245	3.02	0.0181	0.0225	0.0223	3,031
256	255	0.69	0.0181	0.0225	0.0223	675
257	254	1.89	0.0386	0.0973	0.0946	1,815
258	253	0.86	0	0	0	869
259	233	1.19	0	0	0	1,203
260	259	0.84	0	0	0	849
261	257	1.87	0.0386	0.0973	0.0946	1,795
262	261	1.3	0.0386	0.0973	0.0946	1,219
263	262	1.76	0.0386	0.0973	0.0946	1,684
264	263	3.01	0.0386	0.0973	0.0946	2,947
265	266	0.16	0.0028	0.0063	0.0062	155
266	270	1.01	0.0044	0.01	0.0097	1,011
267	264	2.48	0.4444	0.5451	0.0946	2,412
268	267	3.18	0.0386	0.0973	0.0946	3,119

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
269	268	1.84	0.0103	0.0231	0.0224	1,838
270	269	2.81	0.0103	0.0231	0.0224	2,818
271	268	1.17	0.0284	0.0742	0.0723	1,110
272	270	0.37	0.0047	0.0103	0.01	364
273	271	0.82	0.0284	0.0742	0.0723	756
274	272	1.11	0.0031	0.0068	0.0066	1,116
275	273	0.63	0.0284	0.0742	0.0723	564
276	275	0.93	0.0265	0.0695	0.0676	872
277	265	0.45	0.0012	0.0028	0.0027	452
278	277	0.37	0	0	0	374
279	280	1.02	0	0	0	1,031
280	316	0.52	0	0	0	526
281	315	1.7	0	0	0	1,719
282	283	0.88	0	0	0	890
283	284	1.48	0.0016	0.0034	0.0033	1,493
284	274	1.16	0.0031	0.0068	0.0066	1,166
285	287	1.58	0	0	0	1,597
286	276	3.87	0.0265	0.0695	0.0676	3,844
287	286	2.22	0.0265	0.0695	0.0676	2,176
288	289	1.61	0	0	0	1,628
289	287	4.59	0.0249	0.0654	0.0636	4,576
290	289	4.53	0.0178	0.0472	0.046	4,533
291	290	2.41	0.0178	0.0472	0.046	2,390
292	289	0.3	0.0047	0.0117	0.0114	292
293	291	0.97	0.0012	0.0033	0.0032	977
294	292	0.47	0.0047	0.0117	0.0114	464
295	294	0.46	0.0047	0.0117	0.0114	454
296	305	0.87	0.0016	0.0037	0.0036	876
297	295	0.48	0.0047	0.0117	0.0114	474
298	301	2.19	0	0	0	2,214
299	301	0.33	0	0	0	334
300	298	0.89	0	0	0	900
301	302	0.31	0.0016	0.0037	0.0036	310

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
302	306	0.36	0.0016	0.0037	0.0036	360
303	298	1.06	0	0	0	1,072
304	311	4.78	0.0062	0.0188	0.0184	4,814
305	297	2.03	0.0031	0.0077	0.0075	2,045
306	312	0.28	0.0031	0.0074	0.0072	276
307	291	3.61	0.0137	0.037	0.0361	3,613
308	307	2.75	0.0115	0.0312	0.0304	2,750
309	308	4.58	0.0115	0.0312	0.0304	4,600
310	311	1.49	0.0006	0.0015	0.0014	1,505
311	309	2.76	0.0115	0.0312	0.0304	2,760
312	311	0.29	0.0031	0.0074	0.0072	286
313	304	1.33	0	0	0	1,345
314	304	1.05	0	0	0	1,062
315	317	0.94	0.0025	0.0063	0.0059	944
316	318	1.4	0	0	0	1,415
317	322	0.36	0.0042	0.0106	0.01	354
318	319	0.81	0	0	0	819
319	320	0.4	0.0115	0.029	0.0271	377
320	357	0.64	0.0133	0.0331	0.0309	616
321	356	0.84	0	0	0	849
322	319	2.39	0.0115	0.029	0.0271	2,389
323	322	1.47	0.0056	0.0142	0.0133	1,473
324	323	1.12	0.0014	0.0034	0.0032	1,129
325	324	1.21	0	0	0	1,223
326	355	0.85	0.0011	0.0027	0.0025	857
327	323	1.51	0.0042	0.0109	0.0102	1,516
328	327	1.11	0.0018	0.0047	0.0044	1,118
329	328	1.3	0.0018	0.0047	0.0044	1,310
330	326	2.2	0	0	0	2,224
331	248	2	0.2345	0.3087	0.3058	1,713
332	New MH 59	0.79	0.2346	0.3088	0.306	489
333	332	3.67	0.2255	0.2938	0.2923	3,415
334	333	4.38	0.2255	0.2939	0.2923	4,133

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
335	334	4.42	0.2255	0.2939	0.2923	4,173
336	335	1.61	0.2255	0.2939	0.2924	1,332
337	336	2.53	0.2255	0.294	0.2924	2,262
338	337	3.99	0.2256	0.2941	0.2925	3,738
339	340	1.48	0.1032	0.1625	0.152	1,343
340	341	2.74	0.1032	0.1625	0.152	2,616
341	338	3.99	0.2256	0.2941	0.2926	3,738
342	343	4.98	0.1224	0.1421	0.1427	4,891
343	344	4.53	0.1224	0.1421	0.1427	4,436
344	341	3.74	0.1224	0.1421	0.1426	3,637
345	344	1.14	0	0	0	1,153
346	347	0.54	0	0	0	546
347	348	0.78	0	0	0	789
348	339	1.7	0.1032	0.1625	0.152	1,565
349	348	2.65	0.0301	0.0754	0.0704	2,608
350	349	2.67	0.0301	0.0754	0.0704	2,628
351	350	1.33	0.0301	0.0754	0.0704	1,273
352	351	3.48	0.0301	0.0754	0.0704	3,447
353	361	0.37	0.0035	0.0087	0.0082	366
354	363	0.19	0	0	0	192
355	362	0.9	0.0011	0.0027	0.0025	907
356	353	0.77	0.0018	0.0044	0.0041	774
357	360	1.56	0.0133	0.0331	0.0309	1,546
360	New MH 61	3.41	0.0301	0.0754	0.0704	3,376
361	360	4	0.015	0.0376	0.0351	4,009
362	364	0.38	0.001	0.0027	0.0025	382
363	365	0.79	0.0035	0.0097	0.0091	789
364	361	5.23	0.0101	0.0253	0.0237	5,264
365	364	2.7	0.0053	0.0143	0.0135	2,716
366	364	3.12	0.0021	0.0028	0.0027	3,152
367	342	3.56	0.1224	0.1422	0.1428	3,455
368	367	3.72	0.072	0.0728	0.0728	3,687
369	368	2.79	0.072	0.0728	0.0728	2,747

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
370	369	2.83	0.072	0.0728	0.0728	2,788
371	370	2.2	0.072	0.0728	0.0728	2,151
372	371	2.23	0.072	0.0728	0.0728	2,181
373	372	2.02	0.072	0.0728	0.0728	1,969
374	373	2.42	0.072	0.0728	0.0728	2,373
375	374	2.3	0.072	0.0728	0.0728	2,252
376	375	2.07	0.072	0.0728	0.0728	2,019
377	376	2.39	0.072	0.0728	0.0728	2,343
378	377	2.47	0.072	0.0728	0.0728	2,424
379	378	2.01	0.072	0.0728	0.0728	1,959
380	379	2.61	0.072	0.0728	0.0728	2,565
381	New MH 60	2.62	0.072	0.0728	0.0728	2,575
382	383	0.63	0.0016	0.0052	0.0051	632
383	304	2.29	0.0047	0.0151	0.0148	2,300
384	383	1.49	0.0031	0.0099	0.0097	1,497
385	386	1.22	0	0	0	1,233
386	387	0.49	0	0	0	495
387	384	0.94	0	0	0	950
388	1	1.03	0.0016	0.0045	0.0044	1,037
389	382	1.98	0	0	0	2,002
267 PS Lag Outfall	155	1.05	0.7058	0.9296	0.5223	534
267 PS Lead Outfall	155	3.09	0.0386	0.0973	0.8845	2,230
Gate Valve	267 PS Lag Outfall	1.05	0.4238	0.6125	0.2322	827
Gate Valve	Gate Valve 2	0.9	0.1854	0.2459	0.3294	577
Gate Valve 2	267 PS Lead Outfall	3.09	0.2585	0.3419	0.5689	2,549
New MH 119	New MH 126	0.28	0.0004	0.0007	0.0007	282
New MH 120	New MH 119	0.74	0.0004	0.0007	0.0007	747
New MH 121	Pipe Downsize	0.43	0	0	0	435
New MH 123	New MH 52	1.77	0	0	0	1,789
New MH 124	352	2.84	0.0301	0.0754	0.0704	2,800
New MH 125	New MH 126	0.26	0.0709	0.0712	0.0712	191
New MH 126	381	1.6	0.0719	0.0726	0.0726	1,544
New MH 127	New MH 129	1.57	0.0001	0.0002	0.0002	1,587

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
New MH 128	New MH 127	0.66	0.0001	0.0002	0.0002	667
New MH 129	New MH 120	0.63	0.0004	0.0007	0.0007	636
New MH 46	135	1.31	0	0	0	1,324
New MH 47	New MH 77	1.8	0	0	0	1,820
New MH 48	New MH 47	1.54	0	0	0	1,557
New MH 49	New MH 48	1.43	0	0	0	1,446
New MH 50	New MH 49	0.88	0	0	0	890
New MH 51	New MH 50	1.71	0	0	0	1,729
New MH 52	New MH 51	1.55	0	0	0	1,567
New MH 53	New MH 123	1.55	0	0	0	1,567
New MH 59	331	2.08	0.2345	0.3087	0.3058	1,794
New MH 60	380	2.6	0.072	0.0728	0.0728	2,555
New MH 61	New MH 62	4.25	0.0301	0.0754	0.0704	4,226
New MH 62	New MH 124	4.01	0.0301	0.0754	0.0704	3,983
New MH 66	57	0.62	0.0334	0.0404	0.04	586
New MH 67	New MH 66	0.89	0.0334	0.0404	0.04	859
New MH 68	New MH 67	1.7	0.0334	0.0404	0.04	1,678
New MH 69	New MH 68	1.02	0.0333	0.0401	0.0398	991
New MH 70	New MH 69	1.77	0.0333	0.0402	0.0398	1,749
New MH 77	Trailside-38	2.49	0	0	0	2,517
New MH 78	New MH 59	3.25	0	0	0	3,286
New MH 79	New MH 78	3.17	0	0	0	3,205
New MH 80	New MH 79	2.96	0	0	0	2,993
New MH 81	New MH 80	1.92	0	0	0	1,941
New MH 82	New MH 81	2.96	0	0	0	2,993
New MH 83	New MH 82	5.34	0	0	0	5,399
New MH 84	New MH 83	3.48	0	0	0	3,518
New MH 85	New MH 84	4.67	0	0	0	4,721
New MH 86	New MH 85	1.61	0	0	0	1,628
New MH 87	New MH 86	1.6	0	0	0	1,618
New MH 88	New MH 84	2.24	0	0	0	2,265
New MH 89	New MH 90	2.82	0	0	0	2,851
New MH 90	New MH 88	4.86	0	0	0	4,913

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
New MH 91	New MH 92	0.84	0	0	0	849
New MH 92	New MH 94	1.81	0	0	0	1,830
New MH 93	New MH 94	1	0	0	0	1,011
New MH 94	New MH 83	0.47	0	0	0	475
New MH 95	New MH 80	3.04	0	0	0	3,073
New MH 96	New MH 53	1.62	0	0	0	1,638
Pipe Downsize	New MH 95	2.69	0	0	0	2,720
Ritz-12	Ritz-13	3.15	0	0	0	3,185
Ritz-13	Ritz-14	3.09	0	0	0	3,124
Ritz-14	Ritz-15	3.32	0	0	0	3,357
Ritz-15	Ritz-16	3.54	0	0	0	3,579
Ritz-16	New MH 60	3.46	0	0	0	3,498
Schaffer-1	Schaffer-2	0.29	0.07	0.07	0.07	222
Schaffer-2	Schaffer-3	0.15	0.0702	0.0702	0.0702	81
Schaffer-3	Schaffer-4	0.53	0.07	0.07	0.07	465
Schaffer-4	New MH 125	1.19	0.0709	0.0712	0.0712	1,131
Siphon Inlet	Gate Valve	1.61	0.182	0.2609	0.2594	1,365
Siphon Inlet	Gate Valve 2	4.76	0.1853	0.2782	0.2765	4,533
Trailside-11	Trailside-27	0.77	0	0	0	778
Trailside-16	Trailside-17	1.31	0	0	0	1,324
Trailside-17	Trailside-20	0.88	0	0	0	890
Trailside-20	Trailside-21	0.4	0	0	0	404
Trailside-21	Trailside-23	1.34	0	0	0	1,355
Trailside-23	Trailside-27	1.53	0.0021	0.0028	0.0027	1,544
Trailside-27	Trailside-28	0.8	0.0021	0.0028	0.0027	806
Trailside-28	Trailside-29	1.84	0.0021	0.0028	0.0027	1,858
Trailside-29	Trailside-30	0.34	0.0021	0.0028	0.0027	341
Trailside-3	Trailside-4	0.58	0	0	0	586
Trailside-30	Trailside-31	1.5	0.0021	0.0028	0.0027	1,514
Trailside-31	Trailside-32	1.62	0.0021	0.0028	0.0027	1,635
Trailside-32	Trailside-33	1.76	0.0021	0.0028	0.0027	1,777
Trailside-33	Trailside-34	1.42	0.0021	0.0028	0.0027	1,433
Trailside-34	Trailside-35	4.34	0.0021	0.0028	0.0027	4,385

Model Results for Existing Level of Development:
ADWF, December 2007 Storm Event, and 10-Year Design Storm

US Node ID	DS Node ID	Full Pipe Capacity (Mgal/d)	Peak ADWF (Mgal/d)	Dec. 2005 Peak Flow (Mgal/d)	10-Year Peak Flow (Mgal/d)	Remaining Pipe Capacity During Design Storm (EDU)
Trailside-35	Trailside-36	5.26	0.0021	0.0028	0.0027	5,315
Trailside-36	Trailside-37	6.21	0.0021	0.0028	0.0027	6,276
Trailside-37	Trailside-38	3.24	0.0021	0.0028	0.0027	3,273
Trailside-38	Trailside-39	4.38	0.0021	0.0028	0.0027	4,425
Trailside-39	Trailside-40	6.81	0.0021	0.0028	0.0027	6,882
Trailside-4	Trailside-5	1.38	0	0	0	1,395
Trailside-40	Trailside-41	4.16	0.0021	0.0028	0.0027	4,203
Trailside-41	366	5.01	0.0021	0.0028	0.0027	5,062
Trailside-5	Trailside-8	1.67	0	0	0	1,688
Trailside-8	Trailside-11	0.89	0	0	0	900

ELEMENT 9: MONITORING, MEASUREMENT, AND PROGRAM MODIFICATIONS

This section of the SSMP describes NCSD's procedures for monitoring, measurement, and program modifications.

9.1 Regulatory Requirements for the Monitoring, Measurement, and Program Modifications Element

The SWRCB requirements for the monitoring, measurement, and program modifications element are as follows:

1. Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities;
2. Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP;
3. Assess the success of the preventative maintenance program;
4. Update program elements, as appropriate, based on monitoring or performance evaluations; and
5. Identify and illustrate SSO trends, including: frequency, location, and volume.

9.2 Performance Measures

The indicators that NCSD will use to measure the performance of its sanitary sewer system and the effectiveness of its SSMP are:

- Total number of SSOs;
- Number of SSOs for each cause (roots, grease, debris, pipe failure, capacity, lift station failure, and other);
- Portion of sewage contained compared to total volume spilled;
- Volume of spilled sewage discharged to surface water; and
- Planned to actual performance for preventive maintenance.

9.3 Historical Performance Data

SSOs have been tracked through CIWQS since April 4, 2006. NCSD has had seven SSO discharges on its sanitary sewer system between 4-3-06 and 4-7-23, and none reached drainage channels or surface waters. The District has approximately 32.71 miles of pipe. The following is a summary of annual ratios of SSOs per 100 miles of pipe. These ratios are very low, as can be expected with only seven SSOs in the past sixteen years.

2006 – 0.0 per 100 miles
2007 – 0.0 per 100 miles
2008 – 6.2 per 100 miles (Two SSOs while cleaning the siphon mains)
2009 – 0.0 per 100 miles
2010 – 3.1 per 100 miles (One SSO on 8-19-10)
2011 – 0.0 per 100 miles

2012 – 3.1 per 100 miles (One SSO on 6-11-12)
2013 – 3.1 per 100 miles (One SSO on 12-22-13)
2014 – 0.0 per 100 miles
2015 – 0.0 per 100 miles
2016 – 0.0 per 100 miles
2017 – 3.1 per 100 miles (One SSO on 4-1-17)
2018 – 0.0 per 100 miles
2019 – 0.0 per 100 miles
2020 – 0.0 per 100 miles
2021 – 0.0 per 100 miles
2022 – 0.0 per 100 miles
2023 – 3.1 per 100 miles (One SSO on 4-3-23)
2024 – 0.0 per 100 miles

Two of the seven SSOs were related to pigging operations on the siphon lines in fall 2008. The connection manhole at the tie in to TSD sewer collection system was not able to handle flows generated when pigging the lines. For current pigging operations, engineering considerations have been made to prevent this manhole from getting inundated. Summaries of the other SSOs are as follows:

- 8-19-2010 – Estimated spill volume = 400 gallons, blockage in line at SS Main #676. This main is located in Northstar Drive downstream of SSMH #238. All spill volume was contained – there was no discharge to waters of the state. The source of the backup was determined to be general debris. This section of the main will be increased to an annual cleaning frequency moving forward.
- 6-11-2012 – Estimated spill volume = 250 gallons, blockage in the line SS Main #668. This main is located in the golf course just downstream of SSMH #44. It is most easily accessed through the open space between 321 and 323 Skidder Trail. All spill volume was contained – there was no discharge to waters of the state. The source of the backup was determined to be general debris, and this section of main will be increased to an annual cleaning frequency moving forward.
- 12-22-2013 – A cleanout cap was missing in the Mill Camp Development, and it is suspected that a youth inserted debris inside. Estimated spill volume = 200 gallons.
- 4-1-2017 - Estimated spill volume = 100 gallons, blockage in SS Main #14. This is the main serving Employee Housing and it’s likely grease was the culprit. This main will be bumped up to a four-year cleaning schedule.
- 4-3-2023 – Estimated spill volume = 7,690 gallons, blockage in the SS Main #757. This main is located behind 1023 Martis. The obstruction was determined to be roots in the line near SSMH 161. This Main has been bumped up to an annual maintenance schedule.

9.4 Assess Preventative Maintenance Program

As indicated in Element 4 of NCSD’s SSMP, NCSD’s preventative maintenance program consists of CCTV inspection and cleaning of the sanitary sewer system. CCTV inspection of the sanitary sewer system is performed at a frequency of every seven years. Cleaning the gravity mains takes place every five years. The siphon mains are pigged every six years flushed once between pigging operations.

Because very few SSOs have been experienced to date, the assessment of NCSD's preventative maintenance program is based on whether the severity and frequency of root intrusion, sediment accumulation, corrosion, and other defects remain at acceptable levels.

In 2008 the District the District purchased a sewer inspection camera and began rating sewer mains according to NASSCO's Pipeline Assessment and Certification Program (PACP). Upon initial inspection, three specific sewer main locations were observed that warranted rehabilitation. Two were areas where sags in the pipe were observed creating full flow conditions. The third was a rolled gasket at a stabbed joint in PVC pipe. Repairs to the mains in these three locations were made immediately by staff upon observation (within a few weeks in each instance).

9.5 Update Program Elements

The intent of this section is to update NCSD's SSMP elements as a result of monitoring and performance requirements. To comply with this requirement, NCSD will update the SSMP if the frequency and severity of root intrusion, sediment accumulation, corrosion, and other defects rises to unacceptable levels. Furthermore, as SSO discharges occur in the future, NCSD will update the SSMP to correct any deficiencies.

In addition to updating SSMP elements based on monitoring and performance requirements, NCSD will periodically update the SSMP to ensure the document remains current. This task may include updating the following:

• NCSD's legal authority documents, as necessary.

• Equipment inventories.

• Staff personnel references.

• Other sections as required.

9.6 Identify and Illustrate SSO Trends

The seven system SSOs tracked to date do not show much of a trend. If more SSO discharges occur, NCSD will identify and illustrate SSO trends.

ELEMENT 10: SSMP PROGRAM AUDITS

This section of the SSMP describes the requirements for and compliance with SSMP Program Audits.

10.1 Regulatory Requirements for the SSMP Program Audits Element

The SWRCB has the following requirements for SSMP Program Audits: As part of the SSMP, the NCSD will conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits will occur every two years and a report will be prepared and kept on file. The audit will focus on evaluating the effectiveness of the SSMP and the Enrollee's compliance with the SSMP requirements identified in SWRCB Order No. 2006-0003-DWQ, including identification of any deficiencies in the SSMP and steps to correct them.

10.2 Compliance with SSMP Program Audits

This SSMP preparation consisted of an audit of the District's current programs and procedures. The SWRCB requirements state that the internal audits shall be appropriate to the size of the system and the number of SSO discharges. Few SSO discharges have been observed on NCSD's sanitary sewer system to date. If SSO discharges do not occur in the future, it will be assumed that the implementation of NCSD's SSMP is effective. If SSO discharges do occur in the future, steps will be taken to identify any deficiencies in the SSMP and the deficiencies will be corrected.

An audit of the SSMP will be conducted every two years unless deficiencies warrant more frequent audits. At a minimum, the SSMP will be reviewed to assess whether the following aspects of the SSMP are satisfactory:

• The SSMP goals are appropriate.

• The organization description is up to date and appropriate.

• NCSD's legal authority documents are current and effective.

• The operations and maintenance program includes current maps and drawings; an appropriate frequency and scope for CCTV and cleaning; an appropriate and effective rehabilitation and replacement plan; an appropriate level of staff training; and a sufficient inventory of equipment and replacement parts.

• The design and performance provisions, including design and construction standards and inspection and testing procedures, are appropriate and effective.

• The overflow emergency response plan is current, effective, and meets all regulatory requirements.

• The system evaluation and capacity assurance plan and associated CIP are up to date and effective and the schedule for sanitary sewer system improvements is appropriate.

• The monitoring, measurement, and program modifications effort provides effective feedback on the SSMP program.

• The communications plan with the public provides an appropriate level of outreach.

Element 10 Appendix
SSMP Audit Checklist
2025 Program Audit

N·C·S·D
Northstar Community Services District
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NCSD Sewer System Management Plan Audit
Prepared by Josh Detwiler and Eric Martin
March 7, 2025

Purpose:
The District's SSMP is to be reviewed every two years to evaluate the effectiveness of the SSMP and compliance with the SSMP requirements identified in SWRCB Order No. 2006-0003-DWQ.

Findings:

• The SSMP goals are appropriate.

• The organization description has been updated and is appropriate.

• NCSD's legal authority documents are current and effective.

• The operations and maintenance program includes current maps and drawings; an appropriate frequency and scope for CCTV and cleaning; an appropriate and effective rehabilitation and replacement plan; an appropriate level of staff training; and a sufficient inventory of equipment and replacement parts.

• The design and performance provisions, including design and construction standards and inspection and testing procedures, are appropriate and effective.

• The overflow emergency response plan has been updated and is now current, effective, and meets all regulatory requirements.

• The system evaluation and capacity assurance plan and associated CIP are up to date and effective and the schedule for sanitary sewer system improvements is appropriate.

• The monitoring, measurement, and program modifications effort provides effective feedback on the SSMP program.

• The communications plan with the public is providing an appropriate level of outreach.

Eric Martin, Director of Public Works

Section 10 Appendix: SSMP Audit Checklist

Element 1 - Goals		Yes	No
A	Are the goals stated in the SSMP still appropriate and accurate?	X	

Element 2 - Organization		Yes	No
A	Is the Contact Information current?	X	
B	Is Organization Chart in of the SSMP current?	X	
C	Is the chain of communication for reporting and responding to SSOs accurate and up-to-date?	X	

Element 3 - Legal Authority		Yes	No
Does the SSMP contain excerpts from the current NCSD Sewer Ordinance documenting the legal authority to:		X	
A	Prevent illicit discharges?	X	
B	Require proper design and construction of sewers and connections?	X	
C	Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the District?	X	
D	Limit discharges of fats, oil and grease?	X	
E	Enforce any violation of its sewer ordinances?	X	

Element 4 - Operations and Maintenance		Yes	No
Collection System Maps			
A	Does the SSMP reference the current process and procedures for maintaining the District's sanitary sewer system maps?	X	
B	Are the District's sanitary sewer system maps complete, current, and sufficiently detailed?	X	
Resources and Budget			
C	Does the District allocate sufficient funds for the effective operation, maintenance, and repair of the sewer system and is the current budget structure documented in the SSMP?	X	
Prioritized Preventive Maintenance			
D	Does the SSMP describe current preventive maintenance activities and the system for prioritizing the cleaning of sewer lines?	X	
E	Based upon the SSO information in CIWQS, are the District's preventive maintenance activities sufficient and effective in minimizing SSOs and blockages?	X	
Scheduled Inspections and Condition Assessments			
F	Is there an ongoing condition assessment program sufficient to develop a capital improvement program addressing the proper management and protection of infrastructure assets? Are the current components of this program documented in the SSMP?	X	
Contingency Equipment and Replacement Inventory			
G	Does the SSMP list the major equipment currently used in the operation and maintenance of the sewer system and document the procedures for inventory management?	X	
H	Are contingency equipment and replacement parts sufficient to respond to emergencies and properly conduct regular maintenance?	X	
Training			
H	Are the training records current?	X	

I	Does the SSMP document current training expectations and programs within the District's Operations Department?	X	

Element 5 - Design and Performance Standards		Yes	No
A	Does the SSMP contain current design and construction standards for the installation of new sanitary sewer systems, lift stations and other appurtenances and for the rehabilitation and repair of existing sanitary sewer systems?	X	
B	Does the SSMP document current procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and the rehabilitation and repair of existing sewer lines?	X	

Element 6 - Overflow and Emergency Response Plan		Yes	No
A	Does the District's Overflow Emergency Response Plan establish procedures for the emergency response, notification, and reporting of sanitary sewer overflows (SSOs)?	X	
B	Are staff and contractor personnel appropriately trained on the procedures of the Overflow Emergency Response Plan?	X	
C	Is the SSO Response Procedure accurate?	X	
D	Are the SSO External Reporting Requirements and Contact Information current?	X	
E	Is the After Hours and Emergency Contact Information current and complete?	X	
F	Is the Overflow Emergency Response Plan effective in handling SSOs in order to protect public health and the environment?	X	

Element 7 - Fats, Oils, and Grease (FOG) Control Program		Yes	No
A	Does the Fats, Oils, and Grease (FOG) Control Program include efforts to educate the public on the proper handling and disposal of FOG?	X	
B	Does the District's FOG Control Program identify sections of the sewer system subject to FOG blockages, establish a cleaning schedule and address source control measures to minimize these blockages?	X	
C	Are requirements for grease removal devices, best management practices (BMP), record keeping, and reporting established in the District's FOG Control Program?	X	
D	Is the current FOG Control Program effective in minimizing blockages of sewer lines resulting from discharges of FOG to the system?	X	

Element 8 - System Evaluation and Capacity Assurance Plan		Yes	No
A	Does the Sanitary Sewer Master Plan evaluate hydraulic deficiencies in the system, establish sufficient design criteria and recommend both short-term and long-term capacity enhancement and provement projects?	X	
B	Does the District's capital improvement program (CIP) establish a schedule of approximate completion dates for both short-term and long-term improvements and is the schedule reviewed and updated to reflect current budgetary capabilities and activity accomplishment?	X	

Element 9 - Monitoring, Measurement, and Program Modifications		Yes	No
A	Does the SSMP accurately portray the methods of tracking and reporting selected performance indicators?	X	

B	Is the District able to sufficiently evaluate the effectiveness of SSMP elements based on relevant information?	X	

Element 10 - SSMP Audits		Yes	No
A	Were the results of prior SSMP Audits recorded in a written report?	X	
B	Were the actions recommended in the SSMP Audit report(s) implemented?	X	

Element 11 - Communication Program		Yes	No
A	Does the District effectively communicate with the public and other agencies about the development and implementation of the SSMP and continue to address any feedback?	X	

If any of the above have been answered "No", in the box below discuss what will be done to correct the defiency and a timeline for doing so:			
A	For all boxes checked "No", the SSMP and/or attachment(s) have been updated to addess the specific deficiency.	X	

ELEMENT 11: COMMUNICATIONS PROGRAM

This section of the SSMP describes NCSD's communication program with the public.

11.1 Regulatory Requirements for the Communications Program Element

The SWRCB requirements for the communications program element are as follows:

> The Enrollee (NCSD) shall communicate on a regular basis with the public on the development, implementation, and performance of the SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented. The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

11.2 Communications Program

NCSD makes its SSMP available to the public on NCSD's website (www.northstarcsd.org), and invited public comments both online and at a Board of Directors meeting held on March 19, 2025. NCSD's SSMP will remain on NCSD's website as the SSMP is implemented and updated. NCSD will address public comments as appropriate. Comments or regulatory changes that require SSMP updates will be incorporated in the next revision cycle.

Sewer System Management Plan

Training Sign In Sheet - April 1, 2025

Name	Signature

Sewer System Management Plan
Training Sign In Sheet - April 10, 2025

Name	Signature
Eric Martin	
Jeremy Teto Contardi	
GARRETT CARVOLTH	
Devin Welsh	
Conan Savage	
Steve Crush	
Brendan Driscoll	
Chris Raymer	
Travis Dwyer	
JOSH DETWILER	
SHAUN EVANS	
CHRIS Bott	