

DECEMBER 2014

Stormwater Master Plan For Central City

Colorado Department of Public Health and Environment
WQIF Grant
No. OEFAAWQC14000021



JVA, Inc.
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679 /
JVA Project No. 1910.22c

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
Introduction	1
Roadway, Stormwater and Drainage Infrastructure Overview	1
Sustainability	2
Capital Improvement Plan	2
Regulatory Compliance	2
System Management Requirements	2
SECTION 1 INTRODUCTION	3
Background.....	3
Project Purpose And Goals	5
SECTION 2 PLANNING CONDITIONS	6
Local And Regional Government Coordination	6
Development Trends	6
SECTION 3 STORMWATER QUALITY, DRAINAGE, AND ROADWAYS	8
Existing Stormwater and Drainage Infrastructure	8
List of Problem Areas.....	9
Stormwater Quality, Drainage, and Roadway Improvements	10
SECTION 4 CAPITAL IMPROVEMENT PLAN	12
Near Term Improvements	12
Long Term Improvements	16
SECTION 5 SUSTAINABILITY	17
Preliminary List for Sustainable Design Information & Recommendations/options	17
SECTION 6 FUNDING OPTIONS	18
State Revolving Fund – Low Interest Loans	18
Department of Local Affairs (DOLA).....	19
Colorado Water Resources & Power Development Authority Grant Assistance Program (GAP) for Small Systems	20
Colorado Department of Transportation (CDOT)	21
Water Quality Improvement Fund (WQIF) Grants	21



SECTION 7 REGULATORY COMPLIANCE & SYSTEM MANAGEMENT REQUIREMENTS22
 Regulatory Compliance 22
 Roadway and Drainage System Management Requirements 22
SECTION 8 SYSTEM MAINTENANCE24
 Stormwater Infrastructure Maintenance..... 24
SECTION 9 REFERENCE DOCUMENTS.....25

LIST OF TABLES

Table 1: Summary of Near Term Stormwater Drainage and Roadway System
 Capital Improvements..... 12

APPENDICES

- Appendix A – Drainage Basin Drawings
- Appendix B – National Soil Survey Map
- Appendix C – NOAA Precipitation Frequency Estimates
- Appendix D – Existing Stormwater Infrastructure
- Appendix E – Improvement Project Figures
- Appendix F – Cost Estimates
- Appendix G – NPL Fact Sheet



EXECUTIVE SUMMARY

INTRODUCTION

This Stormwater Master Plan (MP or Plan) examines the current inventory and condition, and recommended improvements for Central City's (City) infrastructure as it pertains to stormwater infrastructure and management, erosion control and roadway infrastructure. This community wide Plan will be utilized to determine the City's planning, financing, and implementation well into the future. These recommendations will focus on near term (0-5 years) priorities but will also discuss long term concerns. In keeping with the City's ideals and goals of employing sustainable, low impact development, this Plan will address meeting these goals and incorporate as many "natural elements" as possible. Furthermore, this Plan will incorporate the overall theme of the Central City Comprehensive Plan.

Each area of the City has its own unique infrastructure concerns and needs. These areas of interest include Nevada Street, Spring Street, Gregory Street and the 6th High Street areas. The MP will recommend the overall improvements for the City's infrastructure as well as the unique considerations relative to each of these areas within City limits.

ROADWAY, STORMWATER AND DRAINAGE INFRASTRUCTURE OVERVIEW

The City is made up of two separate major drainage basins. The main basin is approximately 2,200 acres and directs runoff towards the city center. The second basin, approximately 1,900 acres, collects and redirects water to a water supply reservoir to the north. Runoff flows from the secondary basin do not affect the main downtown area. The majority of runoff is considered overland and sheet flow in nature with areas of concentrated flows. Runoff flows with the main developed area are collected in inlets and directed towards Gregory Gulch via storm piping and flumes. Drawings that show drainage basin delineations are provided in Appendix A.

Streetscapes, Stormwater Management and Erosion Control are significant operational and environmental water quality issues for the City. The major roadway, the Central City Parkway, contributes substantial runoff and erosion control issues through the City due to its lack of stormwater infrastructure and construction through historic tailings piles. Steep grades, high groundwater, and soil composition are all natural elements that contribute to the stormwater and erosion control issues as well.

Several stormwater best management practices (BMPs) are recommended to mitigate runoff issues and flooding, and also to enhance stormwater quality of these basins. The improvements to the stormwater systems and the roadways are directly correlated through the ability to control direction and quantity of runoff.



SUSTAINABILITY

Environmental conservation is of great importance to the City. Many steps have been taken in the planning process and adopted by the City government to ensure the City is progressing in the direction of environmental stewardship. Documents referring to these intentions include the Standards and Specifications for Construction Activities and the Central City Comprehensive Plan.

All aspects of the recommended improvements in the MP will consider the environmental impacts to determine the most appropriate sustainable solution for the City's infrastructure. The regulatory requirements of both the Urban Drainage Flood Control District (UDFCD) and Colorado Department of Public Health and Environment (CDPHE) will be incorporated in the proposed improvements plans.

CAPITAL IMPROVEMENT PLAN

The capital improvement projects are categorized into near term and long term. The near term improvement projects time frame is identified as 2014 to 2019, while longer term projects will focus on maintenance of stormwater infrastructure and identification of new problem areas. Estimated project costs have been developed for each improvement project recommended in this Plan and are provided in Appendix F. The improvement projects are estimated to cost a total of \$2,085,153.

REGULATORY COMPLIANCE

The Capital improvement projects identified in this report are required to comply with regulatory agencies such as the Colorado Department of Public Health and Environment (CDPHE), the Colorado Department of Transportation (CDOT), the Urban Drainage and Flood Control District (UDFCD), Boulder County, and Central City.

SYSTEM MANAGEMENT REQUIREMENTS

The infrastructure system improvements will include a Stormwater and Erosion Control Maintenance Schedule. All structures and construction recommended by this MP will have a suggested maintenance schedule which includes requirements to maintain their functionality.



SECTION 1 INTRODUCTION

BACKGROUND

Central City has a population of approximately 670, and a total land area of approximately 1.9 square miles at an elevation of 8,510 feet above sea level. The City is intersected by the Central City Parkway and is located approximately 10.2 miles east of the Continental Divide.

The topography of the area is considered hilly to mountainous. Steep hillsides form interconnected valleys and gulches which collect runoff flows toward the Gregory Gulch which runs through the town center.

Soils in the area vary from within the City to the upper reaches of its watershed. The Natural Resources Conservation Service (NRCS) provides soil information through their Web Soil Survey database. The Survey classifies soils into 4 groups and 3 dual-class groups according to their runoff potential, and defines them as such:

Group A: Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C: Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or lay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

According to the NCRS the vast majority of surface soils in the city are classified as Group D with a high potential for runoff. Soils in the bottom of Eureka Gulch are also mainly classified as



Group D. The high imperviousness of these areas contributes to large runoff events during and after storms.

As you go further up from the valley floor, soils have less runoff potential as they consist mainly of gravelly sandy loams. It is also shown that there are several mine complexes whose surface soils have the ability to retain larger amounts of water during a storm before runoff occurs. However, what runoff does come from these areas has a higher possibility to contain high levels of metals or other substances that can degrade water quality.

A map showing the boundaries of each soil type is included in Appendix B.

Central City is located in the high Rockies where rainstorms can be short and intense. According to NOAA Atlas 14 precipitation frequency estimates a 10-minute, 2-year storm will bring 0.33 inches of rain (Appendix C). Short duration, high intensity storms such as this have the potential to produce large amounts of runoff at high velocity due to the steep rocky slopes surrounding the City. This runoff generates large amounts of erosion and sediment transport, including tailings from remaining waste piles that degrade water quality of runoff.

Central City has been dealing with a degradation of stormwater and drainage infrastructure in recent years. Improvements are necessary to accommodate regulatory requirements as well as basic needs of the City. These improvements will need to address efficiencies in infrastructure systems in order to accommodate today's needs and the City's goals for long term planning. This MP is meant to address these needs by prioritizing the rehabilitation, repairs, and replacement programs over the next five years. A Capital Improvement Plan has been developed in order to prioritize the City's financing and resources to address these improvements based on regulatory requirements as well as the City's goals.

From the stormwater drainage perspective, the City has limited BMPs available for managing stormwater and repairing road washouts. The steep slopes that surround the community, the lack of adequate stormwater infrastructure, and the vast majority of unpaved roadways in these drainage areas contribute to significant erosion issues and degradation of water quality and roadway conditions during and after storm events.

Historically, there has been a large amount of mining activity throughout the City, its watershed basins, and the surrounding area. Many tailings piles and abandoned mine sites from this active mining period remain. These waste sites are a source of pollutants that are transported during storm runoff. The elevated levels of metals in the local waterway caused the area and its surrounding drainage basins to be placed on the National Priorities List (NPL), or Superfund list, in 1983 as well as the Colorado 303(d) list of impaired water bodies in 2006. The Environmental Protection Agency (EPA) and CDPHE have since coordinated several improvement projects to enhance the water quality of Clear Creek. Many of these projects have



Tailings pile without erosion control.



been located within the City and its watershed including Nevada and Eureka Gulches. As these types of projects will continue to be completed in the future, this MP recommends all major stormwater improvements be coordinated with the EPA and CDPHE as to not have new City infrastructure interfere with ongoing or future projects.

PROJECT PURPOSE AND GOALS

The purpose of this Plan is to provide a comprehensive review and analysis of the existing stormwater drainage systems, to recommend improvements to ensure current and future demands are met, and to maintain the City's sustainability goals.

This Plan provides further detailed information of where the critical repairs in the City's infrastructure is most warranted and what alternatives would be best suited for the City. This Plan also prioritizes the environmental, fiscal, and operation and maintenance impacts over the next five years' worth of projects as well as recommendations for long term development.

The improvements suggested in this Plan will incorporate regulatory impacts, sustainability based on BMPs, operations and maintenance, and cost estimates which will be prioritized into a Capital Improvements Plan (CIP).

A brief summary of each scope task is summarized below with a detailed description provided in later sections of this Plan.

- ***Inventory and Analysis of Existing Infrastructure*** – A comprehensive evaluation of the existing facilities related to stormwater drainage infrastructure.
- ***Proposed System Improvements*** – Recommended improvements to the existing infrastructure analyzed in the above section. Alternatives will be evaluated to determine the most environmentally conscious, economical, and sustainable solution in accordance with the City's goals
- ***Capital Improvement Plan*** – Conceptual level cost estimates will be included as part of the capital improvement plan for projects identified in the planning efforts. Projects are prioritized for near term improvements (0-5 years) and long term recommendations.
- ***Sustainability*** – In accordance with the City's ideals and goals, all of the proposed improvements will consider the environmental impacts and develop strategies to minimize environmental degradation.
- ***System Management Requirements*** – A summary of system requirements to maintain the highest order of efficiencies from the proposed improvements in order to accommodate future needs and generations well into the future.



SECTION 2 PLANNING CONDITIONS

LOCAL AND REGIONAL GOVERNMENT COORDINATION

Denver Regional Council of Governments (DRCOG)

The DRCOG Metro Vision 2035 Plan includes goals and policies developed to promote regional cooperation in the areas of growth and development, transportation, and environment. The plan focuses on measurable outcomes related to increased density in centers through infill and redevelopment, reduced water and fossil fuel consumption, increased protected open space, reduced greenhouse gas emissions, increased alternative transportation options, reduced single occupancy vehicles and vehicle miles traveled per capita.

Central City is recognized as a Rural Town Center in the plan. Rural Town Centers are encouraged through policies to support compact development in areas where infrastructure can be easily and efficiently provided, promote infill and redevelopment activity, and economic development and zoning designations that allow communities to become more self-sufficient through balancing employment and housing. New trends for the region include a focus on the aging population and meeting the needs of this rising demographic group with transportation, connectivity and housing.

Colorado Department of Public Health and Environment (CDPHE)

The CDPHE has been working in coordination with the Environmental Protection Agency (EPA) to improve water quality in Clear Creek under the Superfund program. This includes remediation efforts within Gregory Gulch and its surrounding basins. These efforts are ongoing and any improvement projects planned for the City should be coordinated with both the CDPHE and EPA to understand potential conflicts for all parties. An update on recent projects completed through the NPL was issued in August 2014 as a Fact Sheet, provided in Appendix G. Contacts for the team working directly on the Clear Creek projects can be found at the end of the Fact Sheet.

Section 303(d) of the federal Clean Water Act requires states to submit a list of water bodies with impaired water quality to the EPA. The CDPHE routinely analyzes samples of North Clear Creek to maintain records and meet this requirement.

DEVELOPMENT TRENDS

Existing Occupancy

The United States Census Bureau claims that as of 2012, Central City had a population of 663 with 342 total households.



Planned Growth

The US Census has shown an increase of 29 percent in the population between the years 2000 and 2010. As growth in the City is expected to continue, it is important to implement BMPs during any new construction. Proper implementation of BMPs will make it easier to manage stormwater quality and erosion in the future.



SECTION 3

STORMWATER QUALITY, DRAINAGE, AND ROADWAYS

EXISTING STORMWATER AND DRAINAGE INFRASTRUCTURE

Stormwater runoff in the City generally flows from the west, southwest, and southeast to the east through a series of gravity fed conveyances. Flows from the west are directed into an underground conveyance along Eureka Street known as the Opera Flume. Drainage from the Nevada Gulch to the southwest is conveyed under Nevada Street in a 60” HDPE pipe known as the Nevada Street Flume. Flows from the southeast are conveyed under Roworth Street in 36” reinforced concrete pipe until it joins with the Nevada Street Flume at a junction referred to as the Big T. After the two major flows from the south join at the Big T, stormwater is conveyed through the Spring Street flume into the Gregory Gulch drainage.

Throughout the history of the City, drainage infrastructure was implemented based on the needs at the time. Currently, there exists a variety in the types, materials, and ages of inlets and conveyances used. The general condition of these structures ranges from good to poor. Acidic drainage runoff has left much of the concrete and metal structures weakened or completely eroded along their inverts.

The existing stormwater system in the City has a general lack of detention or sediment control basins. This combined with a lack of inlet protection measures results in several inlets in the City taking on stormwater with high amounts of sediments and thus adversely affecting the water quality of stormwater runoff.

Limited information of existing infrastructure was provided by the City. Some assumptions were made in regards to the existing system based on site observations and Google’s satellite and street view imagery available from their online mapping software. It’s understood that there may be misinformation or missing information and this MP was completed according to the incomplete information provided and assumed. Drawings showing the existing stormwater structures are provided in Appendix D.



Lack of inlet protection allows sediments to enter storm sewer infrastructure.



During the summer of 2014, the EPA and CDPHE completed work on the Quartz Hill tailings pile located along Nevada Street in the southwest section of the City. The work included capping an exposed tailings pile with geotextile and inert rock with the intention to minimize pollutant runoff that was previously flowing into the City's stormwater infrastructure. In addition to the capping work, 1000 feet of deteriorated storm sewer beneath the tailings pile was replaced with 60" HDPE pipe. One of the major projects outlined in this MP includes extending the 60" HDPE pipe to the Big T intersection at the head of the Spring Creek Flume.

LIST OF PROBLEM AREAS

Below is a list of critical areas across the City as it relates to stormwater management, erosion control, and roadway impacts:

Downtown

1. Major settling affecting road and ground surface along Nevada Street due to eroded concrete pipe and surface drainage off Central City Parkway.
2. Deteriorating asphalt due to poor drainage along Spring Street.
3. Deteriorating asphalt and overflowing of gutters onto sidewalks due to a lack of storm sewer infrastructure along Gregory Street.
4. Erosion of tailings piles and sedimentation on Spruce Street due to lack of runoff control.

North Hill

1. Transport of tailings pile onto private property at west end of West 4th High Street due to poor drainage control.
2. Sediments covering West 6th High Street due to no underground conveyance.
3. Erosion of tailings pile above East 1st High Street due to lack of runoff control.
4. Sediment build-up and clogging of trench drains due to lack of maintenance access.
5. Sedimentation of C Street due to lack of defined drainage paths and stormwater infrastructure for proper conveyance.

In addition to the identified problem areas, the following items are general problems with the existing stormwater system in several locations:

1. Temporary and long-term degradation of water quality due to lack of inlet protection against sediments and refuse.
2. Deterioration of conveyance structures due to acidic drainage.



Acidic drainage corrodes concrete outlet structure of Opera Flume.



STORMWATER QUALITY, DRAINAGE, AND ROADWAY IMPROVEMENTS

The majority of runoff throughout the City currently flows directly into downstream conveyances with minimal water quality. The Colorado Discharge Permit System (CDPS), a state version of EPA's National Pollutant Discharge Elimination System, typically limits the discharge amount of sediments and pollutants to bodies of water within a municipalities storm drainage system. As the population of the town is less than 10,000, portions of the CDPS may not currently apply to the City. However, part of the City's Comprehensive Plan indicates a desire for sustainability and implementation of standard water quality regulations could help achieve that goal.

Several large and small municipalities along the Front Range, including Central City, have adopted portions of Urban Drainage and Flood Control District's (UDFCD) Urban Storm Drainage Criteria Manual (USDCM) as part of their regulations to help minimize impacts of development to local waterways. While a lot of the recommendations in the USDCM are more applicable to lowland areas, portions of Volume 3 of the manual regarding water quality could be implemented or adapted to keep with the City's character that would improve the quality of the nearby water resources. There are several options within the manual that provide direction for Low Impact Design (LID) that allows for the infiltration of minor storm events. At a minimum, developments larger than an acre within the City should be required to provide permanent water quality measures in the form of low gradient swales, level spreaders, water quality ponds, sand filter basins, porous landscape detention, etc.

In order to maintain the historic characteristics of the City, concrete structures and piped storm drainage systems are generally minimized where possible. In critical areas subject to localized flooding, traditional storm drainage systems that outfall to the waterways may be necessary to reduce property and road damage. However, in areas along the edges of the City, stormwater could be conveyed in roadside ditches within rights-of-way to the major drainageways. Drop structures in steep areas and low maintenance settling ponds in flatter areas could be used to minimize sediment discharge.

As drainage items in problematic areas are addressed, some of the gravel and dirt roads that serve as collectors to residential areas could be upgraded to asphalt to reduce maintenance costs. Steeper roads with limited rights-of-way could be replaced with concrete paving with inverted crowns to direct drainage down the center of the road instead of along the edges.

There is generally a large amount of sediment carried in high velocity runoff flows through the steep sections of the City. If these flows can be concentrated into detention basins before entering drop structures or pipes, sediments within the storm sewer system can be minimized. Where there is no space for construction of a detention basin, inlet protection measures can be taken at each drop structure to reduce sediments entering the storm sewer system.

Temporary efforts can be taken to keep water quality from degrading during construction activities within the City. The Colorado Department of Public Health and Environment (CDPHE) sets minimum erosion control requirements under the Colorado Discharge Permit System (CDPS) for construction activities that disturb more than an acre of land. In addition to enforcing the CDPS for these types of large developments, several local municipalities require



grading permits for smaller developments that indicate a minimum number of Best Management Practices (BMPs) that need to be implemented in order to provide erosion and sediment control. The typical minimum BMPs for areas under construction include a vehicle tracking control pad, inlet protection, concrete washout containment, perimeter control, spill prevention, and site stabilization.

Decreasing the amount of runoff accumulated during storms will in turn decrease sediment and debris transport. Several structures can be used to achieve this. Grassed swales, permeable pavers, and settling ponds all promote infiltration and should be used where possible. Detention basins, swales with shallow slopes, rip-rap and other flow inhibitors slow the rate of flow and lower the amount of sediments carried. These structures should be utilized within drainage channels to improve water quality prior to entering storm sewer infrastructure. Steep hillsides that produce sheet flow and small localized erosion channels should have drainage channels constructed perpendicular to the flow in order to slow runoff velocities and capture sediments.



SECTION 4

CAPITAL IMPROVEMENT PLAN

NEAR TERM IMPROVEMENTS

Stormwater Drainage and Roadway System Improvements

It is recommended that the following near term improvement projects for the drainage and roadway system be completed from 2014 to 2019. Each near term project listed below is in order of priority. Table 1 shows a summary of the near term drainage and roadway system improvement projects. Figures detailing the location and structures of each project are shown in Appendix E. A detailed breakdown of the cost estimates for each project is listed in Appendix F.

Table 1: Summary of Near Term Stormwater Drainage and Roadway System Capital Improvements

Project No.	Project Description	Cost
1	Big T	\$483,160
2	Spring Street	\$344,450
3	Replace Pipes/Install Liner	\$151,695
4	Detention Basins	\$70,890
5	Drainage Swales	\$144,385
6	Inlet Protection and Trash Racks	\$17,425
7	Additional Stormwater Infrastructure	\$89,448
8	Remove and Replace Trench Drains	\$57,600
9	Downtown Curb and Gutter Improvements	\$163,600
10	Paving of Local Roads	\$100,000-125,000 per year (approx. \$562,500)
Total		\$2,085,153

Project No. 1 – Big T

Project intent is to extend the existing 60” pipe under Quartz Hill to the intersection of the Nevada Flume and Spring Street storm sewer system. Project includes new pavement, drop inlets, concrete valley pans, conveyance pipes and replacement of large diameter corroded RCP with RCP with a corrosion resistant liner applied.

Years to complete: 1

Anticipated Cost: \$483,160



Project No. 2 – Spring Street

Project intent is to extend the existing 60” pipe from the Big T intersection to the Gregory Street drainage and improve the surface of Spring Street. Project includes replacing large diameter corroded concrete pipe with new pipe with corrosion resistant liner, new crowned pavement along Spring Street, curb and gutter, and drop inlets.

Years to complete: 1

Anticipated Cost: \$344,450

Project No. 3 – Replace Pipes / Install Liner

There are several concrete stormwater conveyance pipes that have been eroded from acidic runoff. It is recommended that pipes constructed with material resistant to corrosion be used to replace these pipes. An alternative to replacing some large diameter pipes is to install corrosion-resistant liner (e.g. 30-mil HDPE geomembrane) along the length of their inverts. This would require the ability to construct mechanical attachments where the liner terminates along the pipe’s spring line.

Years to complete: 2

Anticipated Cost: \$151,695

Project No. 4 – Detention Basins

Project intent is to enlarge existing detention basins and construct new detention basins at strategic locations throughout the City. These detention basins will also act as sedimentation ponds in order to improve water quality of stormwater runoff.

Years to complete: 1

Anticipated Cost: \$70,890

Project No. 5 – Drainage Swales

This project entails the construction of drainage swales to concentrate flow at strategic locations throughout the City. These swales will ideally terminate at stormwater drainage conveyances or existing natural drainage channels. To limit sediment buildup within the proposed drainage swale below existing tailings piles, we recommend installing an erosion control blanket over the existing tailings. Completion of this project will help mitigate erosion problems around the City while improving the water quality of stormwater runoff.

Years to complete: 1

Anticipated Cost: \$144,385



Tailings erode onto private property.



Project No. 6 – Inlet Protection and Trash Racks

To improve water quality of stormwater runoff, it is important to minimize the amount of sediments and debris transported into the storm sewer system. Typically, inlet protection measures are installed at the surface for easy maintenance. Due to a lack of standard inlet sizes and that most inlets are within driving lanes, catch basin silt filters and/or trash filters will be installed as needed within the catch basins. Trash racks will be installed on the inlet side of all surface accessible storm pipes. It is important to schedule regular maintenance for all inlets as sediments and debris will accumulate over time. The cost of maintenance was not included in the anticipated cost for this project.

Years to complete: 1

Anticipated Cost: \$17,425



Sediments and debris enter storm sewer through unprotected inlet.

Project No. 7 – Additional Stormwater Infrastructure

Project includes addition of stormwater conveyance structures in areas where a lack of runoff control causes sedimentation of streets and sidewalks. These areas include East 6th High Street, Gregory Street east of downtown, and C Street at the intersection with a private driveway. See drawings in Appendix E for location.

Years to complete: 1

Anticipated Cost: \$89,448

Project No. 8 – Remove and Replace Trench Drains

Several trench drains currently exist throughout the City. Their original design intentions were to convey uphill drainage across streets while collecting surface sheet flows as well. However, poor construction of these drains has reduced their functionality. Surface grates do not collect surface flows efficiently and a lack of access for maintenance allows sediments and waste to clog the outlets. It is recommended that these drains be removed and replaced with typical drop inlets and underground pipes, or concrete pans leading to inlets. Drawings in Appendix E show specific locations for these improvements.

Years to complete: 1

Anticipated Cost: \$57,600



Trench drain on Spring Street to be replaced with a concrete pan.



Project No. 9 – Downtown Curb and Gutter Improvements

Recently, the City’s historic downtown area has seen recent improvements of its stormwater management infrastructure including new curb and gutter and several inlets. However, many areas still require similar work done to maintain proper drainage control. These areas include Nevada Street, Spring Street, Gregory Street, Eureka Street, and Lawrence Street. Construction of the new curb and gutter should match the style of the recently completed work to maintain similar aesthetics. This project should be done in sections in order to maintain walkable paths through downtown during construction.

This project may conflict with future designs provided within the updated Central City Comprehensive Plan being produced by Fentress Architects. Based on an email conversation between JVA and Fentress dated October 27, 2014, Fentress may provide guidelines that address walkways and curb and gutter in their Comprehensive Plan at a later date.

Year to complete: 2

Anticipated Cost: \$163,600

Project No. 10 – Paving of Local Roads (Asphalt)

This project involves paving local roads with asphalt and a crowned or superelevated slope in order to drain the road surface into accompanying ditches or drainage infrastructure. From an email conversation with Central City’s Town Manager, the City currently has a road replacement plan subject to budget approval. The plan covers pavement replacement and anticipated costs for the following roads in the years shown:

Year 2015: Road 279 (1.5 mile stretch) – Includes curb and gutter replacement

Year 2016: St James Street
County Road
E 1st High Street

Year 2017: E 2nd, 3rd, 4th, and 5th High Streets

Year 2018: Casey Street
Spring Street

Year 2019: Gregory Street
all remaining dead end streets

Year to complete: 5

Anticipated Cost: \$100,000-125,000 per year

As the stormwater quality of the City is also being improved through EPA and CDPHE activities, projects and overall design goals are subject to change according to the ongoing design and construction of facilities and structures under the Superfund directive and by the City. Direct coordination with the EPA and CDPHE is important throughout all improvement projects in order to create and maintain a well-functioning stormwater system for the City and valley.



LONG TERM IMPROVEMENTS

Stormwater Drainage and Roadway System

Due to the current state of the City's existing stormwater infrastructure and water quality discharge within Gregory Gulch, all projects identified in this plan are of high importance and considered 'near term' improvements. Completing these projects will have an immediate effect on water quality and limit sediment transport throughout city limits. Long term stormwater improvements will focus on maintaining stormwater infrastructure and identifying new problem areas should they arise.

Maintenance of stormwater infrastructure is important for keeping a high level of water quality. Sediment and refuse buildup needs to be monitored and removed as necessary to allow structures to function properly. Section 8 of this Master Plan details maintenance procedures for proper upkeep of different structures and BMPs.

As time goes by, new problem areas within the City's stormwater system may become necessary for remediation. Culverts and conveyance structures should continue to be monitored for deterioration as the City has a history of highly acidic runoff. As concrete and metal structures are susceptible to corrosion, any structures being replaced should use alternate materials (e.g. HDPE) that are resistant to acidic runoff. Erosion of existing tailings piles throughout the City cause a detriment to the water quality of stormwater runoff. Any evidence of tailings transport during or after storms should be investigated. If tailings erosion is identified, action should be taken to stabilize the area.

The majority of downtown Central City is recognized as a historic district within the state of Colorado. Historic districts require special attention to preservation. New infrastructure within this district needs to conform or adapt to the existing styles as to not have a modern appearance juxtaposed between the historic buildings. New construction projects need to be designed in such a way that maintains the existing historic structures and does not undermine the character of the City.



SECTION 5 SUSTAINABILITY

PRELIMINARY LIST FOR SUSTAINABLE DESIGN INFORMATION & RECOMMENDATIONS/OPTIONS

- US Green Building Council - LEED (www.usgbc.org)
- Envision Sustainable Infrastructure (www.sustainableinfrastructure.org)
- Low Impact Development Center (www.lowimpactdevelopment.org)
- International Erosion Control Association (www.IECA.org)
- Stormwater Management per UFCOD Vol. III including the following (www.udfcd.org):
 - Grass Swales
 - Grass Buffers
 - Bioretention (Rain Garden or Porous Landscape Detention)
 - Extended Detention Basins
 - Sand Filters
 - Constructed Wetlands and Wetland Channels
- Alternative Pavements including recycled concrete and asphalt
- Erosion Control measures including check dams, drop structure, sedimentation basins, baffles, level spreaders.
- Dry wells and Cobble Forebays
- “Green” Streets
- Signage and Public Awareness and Education
- Pedestrian Improvements/Multimodal Paths



SECTION 6 FUNDING OPTIONS

STATE REVOLVING FUND – LOW INTEREST LOANS

The Water Pollution Control Revolving Fund (WPCRF) provides low interest loans to governmental entities for the construction of stormwater, and non-point source projects. Prioritization is given to projects that address water quality issues, especially impaired stream on 303(d) list based on Median Household Income. The WPCRF can support the following types of projects applicable to this MP:

- Stormwater Projects
- Urban Non-Point Source Project (Including Best Management Practices, Land Purchase, etc.)

Available WPCRF loan types include:

- Direct Loans: up to \$2.5 million, current APR of 0.0 percent for 20 years.
- Leveraged Loans: generally provided to investment grade borrowers with larger projects greater than \$2.5 million, bond market interest rate for 20 years (currently 3.5 - 4.0%)

The CDPHE Water Quality Control Division (WQCD), Department of Local Affairs (DOLA), and the Colorado Water Resources and Power Development Authority (Authority) jointly administer the SRF program. The WQCD performs the environmental reviews; engineering and design approvals; and overall project management. The Authority manages the finances and loan approvals. DOLA staff works with applicants on credit reviews.

There are several milestones that need to be met in order for a project to be eligible for the WPCRF.

- The entity must be included on the most current Intended Use Plan – (Complete)
- A Preliminary Engineering Report (PER) and Environmental Checklist for the project must be submitted to the WQCD Engineering Section for review a minimum of 45 days prior to the loan application.
- WQCD will provide an Environmental Determination (Categorical Exclusion or Full Environmental Assessment).



- If necessary, an Environmental Assessment (EA) shall be submitted and reviewed. If a Finding of No Significant Impact (FNSI) is determined it shall be published with a 30-day comment period.
- A public meeting must be held with a 30-day notice period, notifying the public of the project.
- PER Approval must be obtained prior to loan application.
- A Technical, Managerial, and Financial (TMF) Capacity review must be completed and submitted to the WQCD a minimum of 30 days prior to the loan application.
- The EA shall be approved prior to loan closing.

DEPARTMENT OF LOCAL AFFAIRS (DOLA)

Energy and Mineral Impact Assistance Fund (EIAF)

The purpose of the Energy and Mineral Impact Assistance Program is to assist political subdivisions that are socially and/or economically impacted by the development, processing, or energy conversion of minerals and mineral fuels. Funds come from the state severance tax on energy and mineral production and from a portion of the state's share of royalties paid to the federal government for mining and drilling of minerals and mineral fuels on federally-owned land.

The kinds of projects that are funded include, but are not limited to, water and sewer improvements, road improvements, construction/improvements to recreation centers, senior centers and other public facilities, fire protection buildings and equipment, and local government planning. The EIAF grants are categorized into Administrative Grants, Tier I, Tier II, and Tier III. Application deadlines for each category are on April 1st, August 1st, and December 1st of each year.

Administrative Grants

Administrative Grants are available for planning, preliminary engineering and architectural design projects. The application process requires the local government to submit a detailed letter to the appropriate DOLA Regional Manager, and signed by the Chief Elected Official. The letter should include information such as: the project description, budget, financial need, why the project is necessary, urgency of the project, how soon the project can begin, and how soon it can be completed. The maximum award for an Administrative Grant is \$25,000, and the total project cost should not exceed \$100,000. A dollar-for-dollar match is required for this grant.

Tier I Grants

Tier I grant funds can be used for a variety of public purposes including planning, engineering and design studies, and capital projects requiring a limited level of financial assistance. A Tier I grant awards up to \$200,000. Applications for grant consideration will be expected to include a minimum match of 25%. Larger matching amounts are generally more competitive.



Applications will be reviewed and recommended for funding by DOLA staff. The Executive Director will make funding decisions three times per year.

Tier II Grants

The Tier II grant program is intended to support a wide variety of community development projects to improve quality of life in communities. A Tier II grant awards greater than \$200,000 up to \$2,000,000. Applications for grant consideration will be expected to include a minimum match of 45%. Larger matching amounts are generally more competitive. Applications will be reviewed and recommended for funding by DOLA staff. The Executive Director will make funding decisions three times per year.

Tier III Grants

The Tier III grant program is provided to help political subdivisions with regional or multi-jurisdictional projects intended to mitigate major impacts associated with energy/mineral industries (dependent upon revenue availability). This grant is only available one cycle per year. Tier III grants award multi-million dollar, multi-year projects (\$2 million up to \$10 million in size). Expect regional/multi-jurisdictional focus.

Community Development Block Grants (CDBG)

The United States Department of Housing and Urban Development (HUD) administers the CDBG Program. The Department of Local Affairs (DOLA) administers the program for the State of Colorado. The CDBG Program is divided into thirds: housing, economic development, and public facilities projects. The primary objective of the CDBG Program is to develop viable communities by providing the following, principally to persons of low and moderate income:

- Decent housing;
- A suitable living environment; and
- Expanded economic opportunities.

COLORADO WATER RESOURCES & POWER DEVELOPMENT AUTHORITY GRANT ASSISTANCE PROGRAM (GAP) FOR SMALL SYSTEMS

The GAP is a grant program in place for small systems that are “project ready” and in need of assistance with the costs associated with constructing the designed improvements. Depending on available funds, grants in the amount of up to \$250,000 are available with a minimum 20% required match. This grant is available to communities with populations under 10,000 and MHI of less than 80% of Colorado average, or current/post project water monthly rates are equal to or greater than the state-wide average. Applications for this grant are due in June of each year.



COLORADO DEPARTMENT OF TRANSPORTATION (CDOT)

Transportation Safety Grants

The CDOT Office of Transportation Safety (OTS) offers grants to agencies, organizations, and tribal governments within the State of Colorado that provide programs, projects, services, and strategies that are intended to reduce the number of deaths and serious injuries resulting from traffic crashes on Colorado roads. Priority funding is given for projects that address key traffic safety issues in Colorado, including impaired driving and occupant protection.

WATER QUALITY IMPROVEMENT FUND (WQIF) GRANTS

The WQIF program is in place to improve water quality in Colorado by providing grant funds for water quality improvement projects using civil penalties from water quality violations. House Bill 11-1026 amended the statute to authorize grants for stormwater management training and best practices training to prevent or reduce the pollution of state waters. Grants in the amount of up to \$100,000 are available to communities with populations under 10,000 and MHI of less than 80% of Colorado. Applications for this grant are due at the end of April each year. Central City has already received a WQIF grant and is using it to fund this MP effort.



SECTION 7

REGULATORY COMPLIANCE & SYSTEM MANAGEMENT REQUIREMENTS

REGULATORY COMPLIANCE

Below are a list of the regulatory agencies affiliated with the State and Local agencies associated with Roads and Drainage Regulations to help facilitate management of existing and proposed infrastructure systems:

Roadway and Drainage System Regulations

- Colorado Department of Transportation (CDOT)
- Urban Drainage Flood Control District
- Clear Creek & Gilpin County
- Central City
- LEED and Envision Infrastructure Rating System
- Low Impact Development Center

ROADWAY AND DRAINAGE SYSTEM MANAGEMENT REQUIREMENTS

Stormwater and Erosion Control During Construction

Non-structural BMPs will be implemented to the maximum extent possible because they avert problems before they occur and reduce the need for structural BMPs. The use of non-structural BMPs will be an ongoing process directed at preventing erosion. Non-structural BMPs will consist primarily of the preservation of existing mature vegetation and trees, and the planning and scheduling of construction activities aimed at achieving the goal of minimizing erosion.

Planned structural BMPs for erosion and sediment control should be utilized during all construction projects within the City. Implementing these measures should minimize nuisance silt and sedimentation exiting construction sites and prevent clogging of existing storm sewers and street gutters.



Application of these BMPs for stormwater management for construction periods is considered temporary. Stormwater management is provided through vegetated landscaped areas, grassed swales, cobble channel protection, constructed wetlands, and the storm collection system.

Affected surface soils within the limits of disturbance of construction projects should be revegetated in order to minimize erosion. Permanent landscaping can include sodding, seeding, trees, shrubs, or other vegetative cover to open areas. Native perennial seeding should be established in open areas.



SECTION 8

SYSTEM MAINTENANCE

STORMWATER INFRASTRUCTURE MAINTENANCE

Detention ponds are typically used to control the release of stormwater to prevent concentrated flows and the potential of flooding. Ponds with controlled outflow can also reduce the velocity of runoff to allow sediments to fall out, thus improving water quality. However, these sediments need to be removed at regular intervals and after heavy storms in order to maintain functionality. Maintenance intervals vary for every detention pond based on the type of outlet structure used and the capacity for sediment buildup.

Drop inlets provide an easy way to transfer surface flows into underground conveyances. Water falls into the box through a surface inlet and continues into a connected pipe. As the velocity of the water is slowed during the transfer from inlet to pipe, some of the sediments will fall out and build up over time. Also, any debris too large for the grate orifices can become lodged and block flows. Inlets need to be inspected at regular intervals and cleaned of sediment and debris as needed. Inlets with sediment and/or trash control features need to be inspected and maintained more frequently.

Permanent conveyance pipes need to be inspected for impeded flow within the pipe and through any trash rack or similar structure. Any debris constricting stormwater flow should be removed. Pipes should also be monitored for erosion at the inlet and outlet points to ensure a stabilized channel is maintained. Concrete pipes and other pipes of corrodible materials should be inspected for damage from acidic drainage and coated with corrosion resistant coating during construction if possible. If pipes begin to show loss of structural integrity, they should be replaced or rehabilitated.

Culverts should be visually inspected to check for obstruction/debris and ponding of water. If obstructions are not cleared from the drainage path then undermining of roadways and other drainage issues can result in costly damages to surroundings. Culverts should be inspected within 48 hours after a major storm event or bi-monthly at a minimum. For preventative maintenance it is recommended that forebays are used at the inlet and outlet of the culvert. These forebays act as settling areas for sediment and obstructions before they clog the culvert. A forebay is also much easier to clean and maintain.

Erosion control blankets have lifespans depending on the material used and amount of general wear undergone at its location. It is important to follow manufacturer recommendations for proper installation and maximizing its lifespan. Typical installation includes establishing vegetation under and through the matting. Erosion control blankets should be inspected every 6 months and after major storm events for damage and movement. If the blanket has been damaged or moved to a degree where it no longer functions to retain soil, it should be repaired or replaced.



SECTION 9 REFERENCE DOCUMENTS

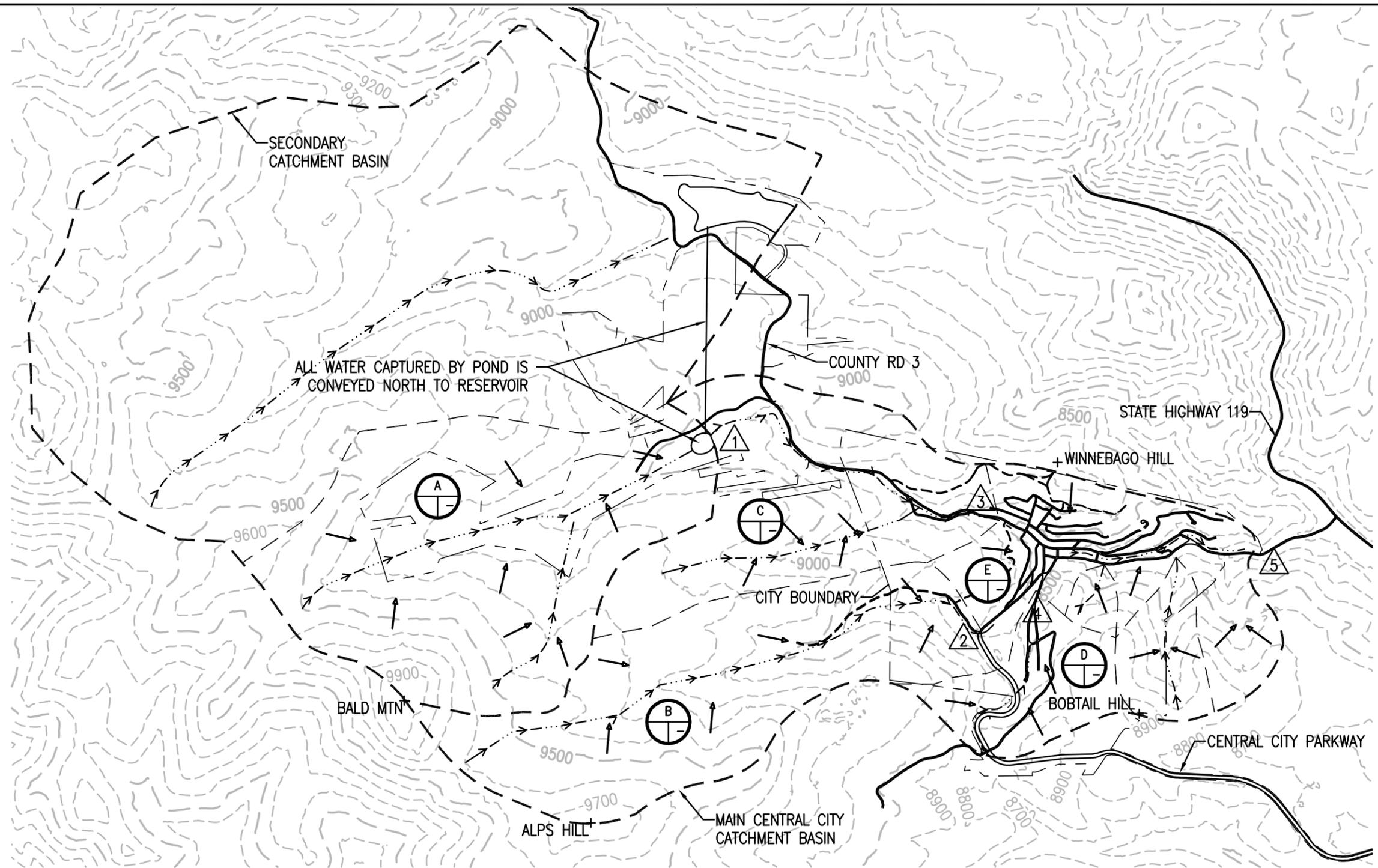
The following documents were used in reference while composing this Plan:

- Central City Business Improvement District Highway Construction Plans of South Access Road – 2013 to 2014
- City of Central, Colorado Storm Sewer Improvements, As Built Plans – 1991
- Site Investigation Reports and Photographs – 2013 to 2014



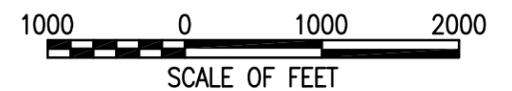
APPENDIX A

Drainage Basin Drawings



LEGEND

- TOTAL SITE BOUNDARY
- - - PROPOSED DRAINAGE BASIN BOUNDARY (MAJOR BASIN/BASIN)
- DIRECTION OF FLOW (DEVELOPED)
- △ 1 BASIN DESIGN POINT
- A DRAINAGE BASIN IDENTIFICATION BUBBLE
- A = DEVELOPED BASIN DESIGNATION
- 0.5 = 100-YR RUNOFF COEFFICIENT
- 1.0 = AREA (ACRES)
- - - 5220 EXIST INDEX CONTOUR
- - - 5221 EXIST INTERMEDIATE CONTOUR



JVA, Incorporated
 Post Office Box 1860
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Phone: 970.722.7677
 Fax: 970.722.7679
 E-mail: info@jva.com

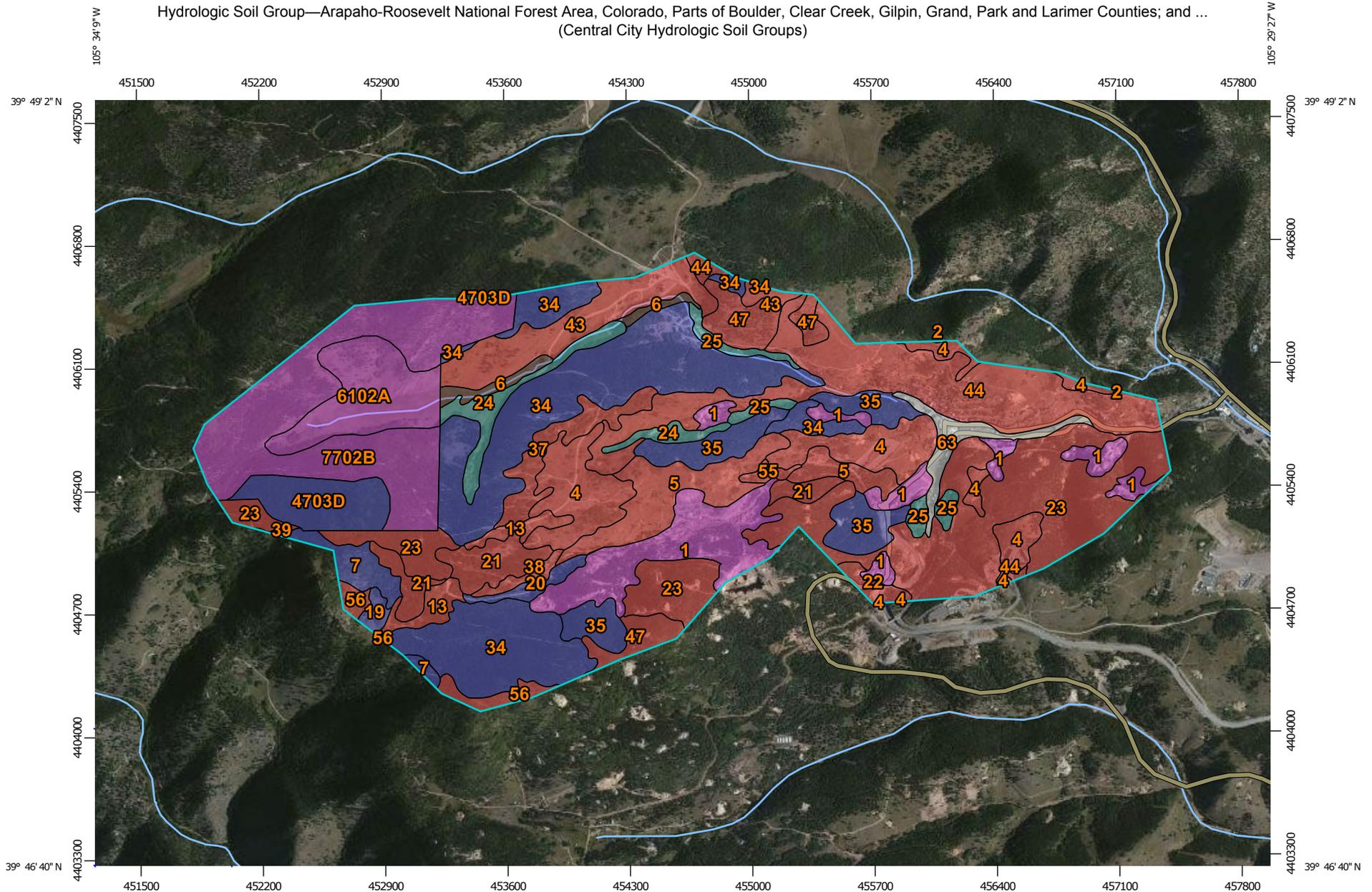


NO.	DATE	DES'D	D'WN	REVISION DESCRIPTION

APPENDIX B

National Soil Survey Map

Hydrologic Soil Group—Arapaho-Roosevelt National Forest Area, Colorado, Parts of Boulder, Clear Creek, Gilpin, Grand, Park and Larimer Counties; and ...
(Central City Hydrologic Soil Groups)



Map Scale: 1:30,700 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Arapaho-Roosevelt National Forest Area, Colorado, Parts of Boulder, Clear Creek, Gilpin, Grand, Park and Larimer Counties
Survey Area Data: Version 2, Feb 4, 2008

Soil Survey Area: Georgetown Area, Colorado, Parts of Clear Creek, Gilpin, and Park Counties
Survey Area Data: Version 7, Jan 30, 2008

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 29, 2011—Nov 18, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Arapaho-Roosevelt National Forest Area, Colorado, Parts of Boulder, Clear Creek, Gilpin, Grand, Park and Larimer Counties (CO645)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
4703D	Bullwark-Catamount families-Rock outcrop complex, 40 to 150 percent slopes	B	54.2	2.5%
6102A	Gateview family-Cryaquolls complex, 0 to 15 percent slopes	A	87.2	4.1%
7702B	Goosepeak-Catamount families, moist complex, 5 to 40 percent slopes	A	226.9	10.7%
Subtotals for Soil Survey Area			368.3	17.3%
Totals for Area of Interest			2,129.6	100.0%

Hydrologic Soil Group— Summary by Map Unit — Georgetown Area, Colorado, Parts of Clear Creek, Gilpin, and Park Counties (CO653)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Arents-Dumps, mine complex, 5 to 80 percent slopes	A	147.8	6.9%
2	Bendemeere-Tolland complex, 30 to 70 percent slopes	B	0.3	0.0%
4	Cathedral-Rock outcrop complex, 5 to 30 percent slopes	D	136.9	6.4%
5	Cathedral-Rock outcrop complex, 30 to 70 percent slopes	D	86.2	4.0%
6	Cumulic Cryaquolls, 0 to 3 percent slopes	B/D	15.5	0.7%
7	Gateview-Kittredge complex, 20 to 45 percent slopes	B	27.2	1.3%
13	Herbman-Rock outcrop complex, 9 to 15 percent slopes	D	25.1	1.2%
19	Kittredge-Guanella complex, 3 to 9 percent slopes	B	6.8	0.3%
20	Kittredge-Guanella complex, 9 to 30 percent slopes	B	11.4	0.5%

Hydrologic Soil Group— Summary by Map Unit — Georgetown Area, Colorado, Parts of Clear Creek, Gilpin, and Park Counties (CO653)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
21	Legault very gravelly sandy loam, 5 to 15 percent slopes	D	54.6	2.6%
22	Legault very gravelly sandy loam, 15 to 30 percent slopes	D	9.7	0.5%
23	Legault-Rock outcrop complex, 30 to 80 percent slopes	D	301.0	14.1%
24	Lininger-Breece gravelly sandy loams, 3 to 12 percent slopes	C	40.9	1.9%
25	Lininger-Resort complex, 5 to 15 percent slopes	C	25.1	1.2%
34	Ohman-Legault very gravelly sandy loams, 15 to 30 percent slopes	B	336.8	15.8%
35	Ohman-Legault very gravelly sandy loams, 30 to 60 percent slopes	B	93.6	4.4%
37	Raleigh very gravelly sandy loam, 9 to 15 percent slopes	D	36.1	1.7%
38	Raleigh very gravelly sandy loam, 15 to 30 percent slopes	D	8.9	0.4%
39	Raleigh very gravelly sandy loam, 30 to 50 percent slopes	D	1.6	0.1%
43	Resort very gravelly sandy loam, 3 to 10 percent slopes	D	84.5	4.0%
44	Resort very gravelly sandy loam, 10 to 30 percent slopes	D	205.4	9.6%
47	Resort-Cathedral complex, 30 to 60 percent slopes	D	55.3	2.6%
55	Rogert-Herbman-Rock outcrop complex, 30 to 70 percent slopes	D	5.3	0.3%
56	Tahana-Legault-Rock outcrop complex, 30 to 70 percent slopes	D	18.5	0.9%
63	Urban land-Breece complex, 0 to 9 percent slopes		26.5	1.2%

Hydrologic Soil Group— Summary by Map Unit — Georgetown Area, Colorado, Parts of Clear Creek, Gilpin, and Park Counties (CO653)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Subtotals for Soil Survey Area			1,761.2	82.7%
Totals for Area of Interest			2,129.6	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C

NOAA Precipitation Frequency Estimates



NOAA Atlas 14, Volume 8, Version 2
Location name: Central City, Colorado, US*
Latitude: 39.8036°, Longitude: -105.5148°
Elevation: 8666 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

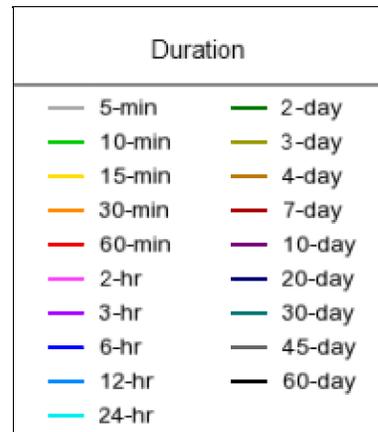
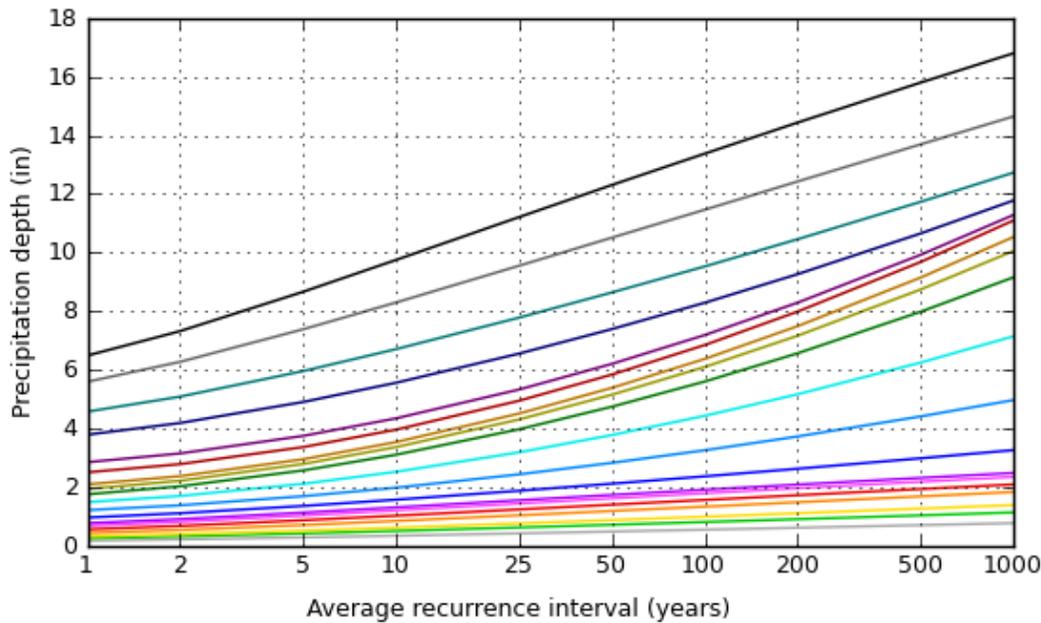
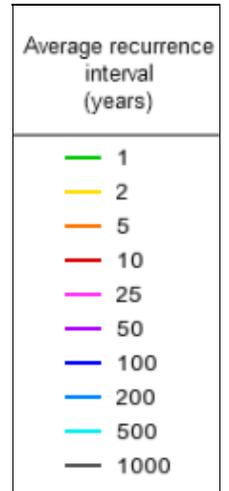
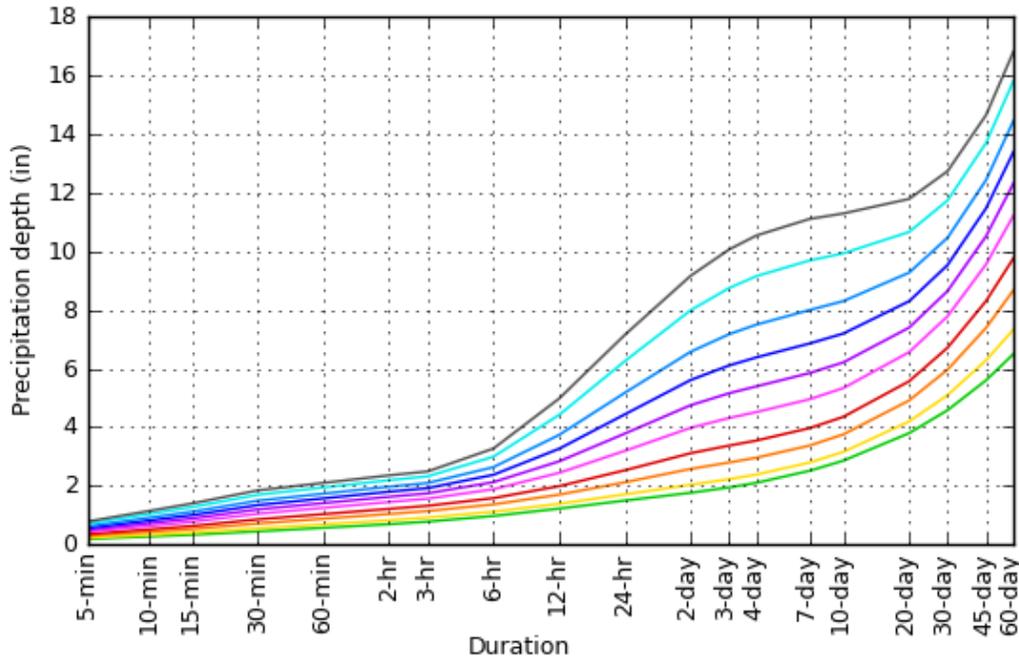
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.187 (0.144-0.242)	0.228 (0.175-0.296)	0.296 (0.227-0.385)	0.353 (0.270-0.463)	0.434 (0.321-0.590)	0.497 (0.359-0.687)	0.561 (0.393-0.798)	0.627 (0.422-0.919)	0.716 (0.464-1.08)	0.784 (0.496-1.21)
10-min	0.273 (0.211-0.355)	0.333 (0.257-0.433)	0.433 (0.332-0.564)	0.517 (0.395-0.677)	0.635 (0.470-0.865)	0.728 (0.526-1.01)	0.822 (0.575-1.17)	0.918 (0.618-1.35)	1.05 (0.680-1.59)	1.15 (0.727-1.77)
15-min	0.333 (0.257-0.432)	0.407 (0.313-0.528)	0.528 (0.405-0.688)	0.631 (0.482-0.826)	0.775 (0.573-1.05)	0.887 (0.642-1.23)	1.00 (0.701-1.42)	1.12 (0.754-1.64)	1.28 (0.829-1.93)	1.40 (0.886-2.15)
30-min	0.448 (0.346-0.582)	0.551 (0.424-0.715)	0.718 (0.551-0.936)	0.858 (0.655-1.12)	1.05 (0.774-1.42)	1.20 (0.864-1.65)	1.34 (0.940-1.91)	1.50 (1.00-2.19)	1.69 (1.10-2.56)	1.84 (1.17-2.84)
60-min	0.572 (0.441-0.742)	0.690 (0.531-0.896)	0.881 (0.676-1.15)	1.04 (0.792-1.36)	1.25 (0.921-1.69)	1.41 (1.02-1.94)	1.57 (1.10-2.23)	1.73 (1.17-2.53)	1.95 (1.26-2.93)	2.10 (1.33-3.23)
2-hr	0.695 (0.541-0.895)	0.829 (0.644-1.07)	1.04 (0.808-1.35)	1.22 (0.938-1.58)	1.45 (1.08-1.94)	1.63 (1.19-2.22)	1.80 (1.27-2.52)	1.97 (1.34-2.85)	2.19 (1.44-3.28)	2.36 (1.51-3.60)
3-hr	0.782 (0.612-1.00)	0.920 (0.720-1.18)	1.14 (0.890-1.47)	1.32 (1.02-1.71)	1.56 (1.17-2.08)	1.74 (1.28-2.36)	1.92 (1.36-2.68)	2.10 (1.43-3.02)	2.33 (1.53-3.46)	2.49 (1.60-3.79)
6-hr	0.973 (0.770-1.24)	1.12 (0.885-1.42)	1.37 (1.08-1.74)	1.58 (1.24-2.02)	1.89 (1.43-2.51)	2.13 (1.58-2.88)	2.38 (1.71-3.31)	2.64 (1.83-3.79)	2.99 (2.00-4.44)	3.27 (2.13-4.93)
12-hr	1.23 (0.979-1.54)	1.39 (1.11-1.75)	1.70 (1.35-2.15)	1.99 (1.57-2.53)	2.44 (1.90-3.28)	2.84 (2.15-3.85)	3.27 (2.39-4.56)	3.74 (2.63-5.38)	4.42 (2.99-6.55)	4.98 (3.27-7.44)
24-hr	1.50 (1.21-1.87)	1.71 (1.38-2.13)	2.12 (1.70-2.65)	2.53 (2.02-3.18)	3.19 (2.52-4.29)	3.78 (2.90-5.13)	4.44 (3.29-6.19)	5.17 (3.69-7.43)	6.25 (4.29-9.24)	7.15 (4.75-10.6)
2-day	1.76 (1.44-2.18)	2.04 (1.66-2.52)	2.58 (2.09-3.19)	3.11 (2.51-3.88)	3.98 (3.18-5.31)	4.75 (3.68-6.39)	5.61 (4.21-7.76)	6.57 (4.74-9.36)	7.99 (5.54-11.7)	9.16 (6.15-13.5)
3-day	1.95 (1.59-2.39)	2.23 (1.82-2.74)	2.80 (2.28-3.45)	3.37 (2.74-4.18)	4.31 (3.47-5.74)	5.16 (4.03-6.92)	6.11 (4.61-8.41)	7.17 (5.21-10.2)	8.74 (6.11-12.8)	10.1 (6.79-14.7)
4-day	2.10 (1.73-2.57)	2.38 (1.96-2.92)	2.96 (2.43-3.63)	3.55 (2.89-4.38)	4.52 (3.65-5.99)	5.39 (4.23-7.21)	6.38 (4.84-8.76)	7.50 (5.47-10.6)	9.15 (6.42-13.3)	10.5 (7.15-15.4)
7-day	2.51 (2.09-3.05)	2.79 (2.32-3.40)	3.37 (2.79-4.11)	3.97 (3.26-4.86)	4.95 (4.04-6.50)	5.84 (4.63-7.75)	6.85 (5.25-9.33)	7.99 (5.88-11.2)	9.68 (6.86-14.0)	11.1 (7.59-16.1)
10-day	2.86 (2.39-3.46)	3.16 (2.63-3.82)	3.75 (3.12-4.55)	4.35 (3.60-5.31)	5.33 (4.36-6.93)	6.21 (4.93-8.16)	7.19 (5.53-9.72)	8.30 (6.13-11.6)	9.93 (7.06-14.3)	11.3 (7.77-16.3)
20-day	3.80 (3.20-4.54)	4.20 (3.53-5.03)	4.91 (4.12-5.90)	5.57 (4.65-6.72)	6.56 (5.36-8.32)	7.39 (5.90-9.52)	8.29 (6.41-11.0)	9.27 (6.89-12.7)	10.7 (7.63-15.1)	11.8 (8.20-16.9)
30-day	4.58 (3.89-5.45)	5.09 (4.32-6.07)	5.96 (5.04-7.13)	6.71 (5.64-8.06)	7.79 (6.37-9.73)	8.64 (6.91-11.0)	9.53 (7.38-12.5)	10.5 (7.80-14.2)	11.7 (8.44-16.4)	12.7 (8.92-18.1)
45-day	5.60 (4.78-6.63)	6.28 (5.36-7.44)	7.39 (6.28-8.78)	8.30 (7.02-9.92)	9.55 (7.83-11.8)	10.5 (8.44-13.2)	11.5 (8.91-14.9)	12.4 (9.30-16.7)	13.7 (9.88-19.0)	14.6 (10.3-20.7)
60-day	6.49 (5.57-7.65)	7.33 (6.28-8.65)	8.67 (7.40-10.3)	9.75 (8.29-11.6)	11.2 (9.21-13.8)	12.3 (9.91-15.4)	13.4 (10.4-17.2)	14.4 (10.8-19.2)	15.8 (11.4-21.8)	16.8 (11.9-23.7)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves Latitude: 39.8036°, Longitude: -105.5148°



[Back to Top](#)

Maps & aeriels

Small scale terrain





Large scale terrain



Large scale map



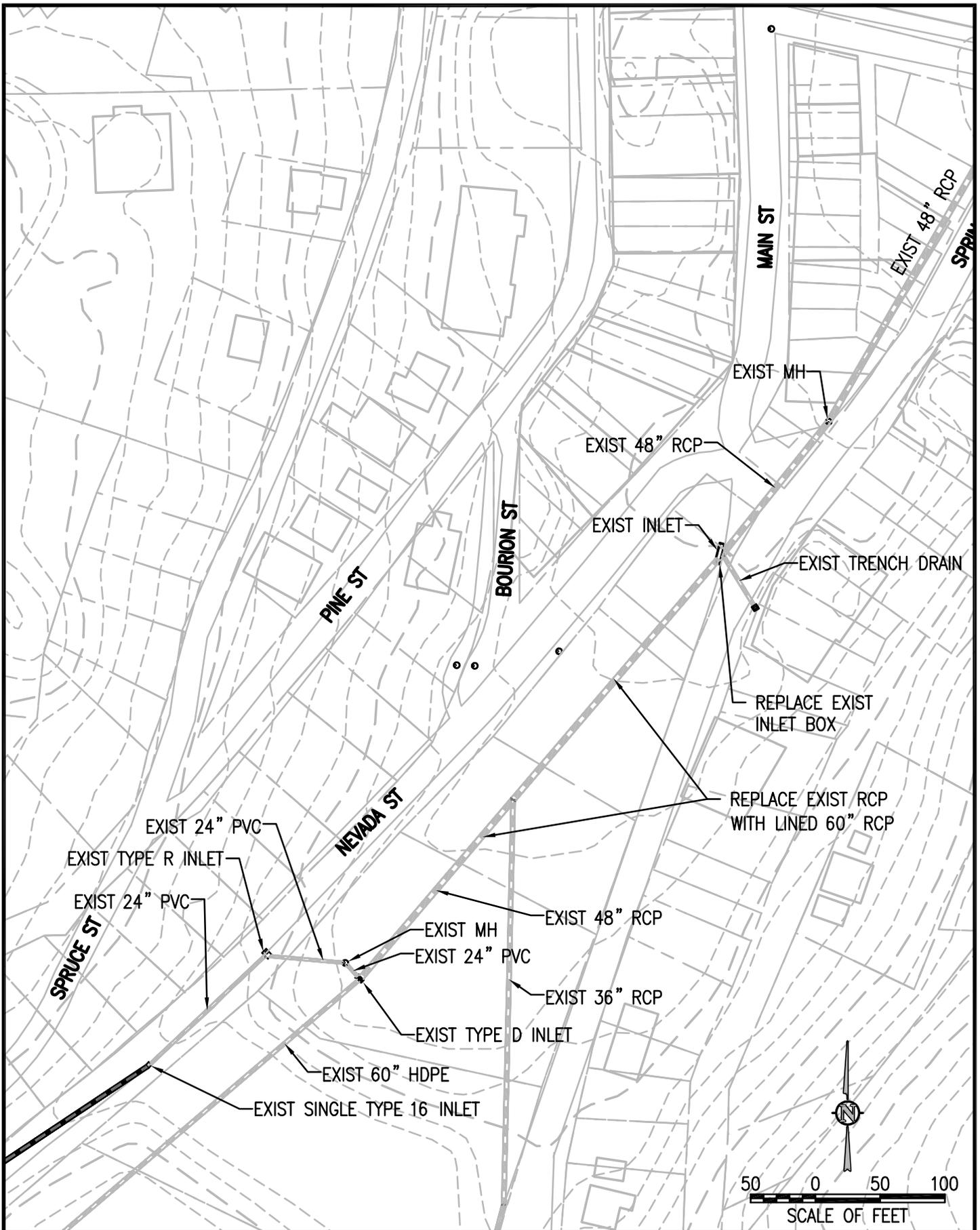
Large scale aerial

APPENDIX D

Existing Stormwater Infrastructure

APPENDIX E

Improvement Project Figures

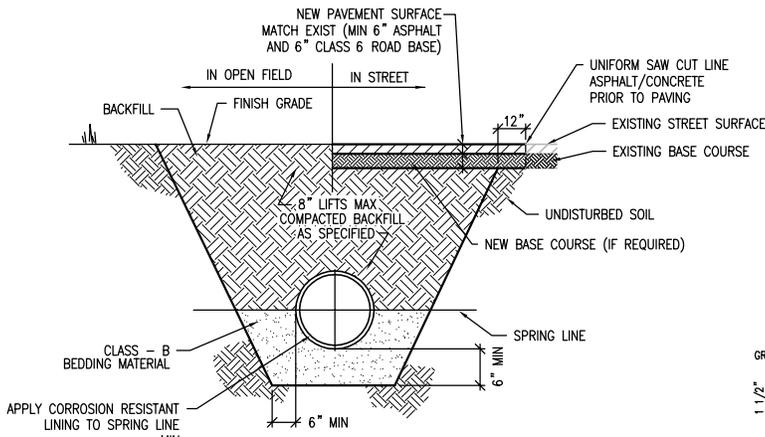


PROJECT #1 - BIG T 1

CENTRAL CITY WQIF
12/16/2014



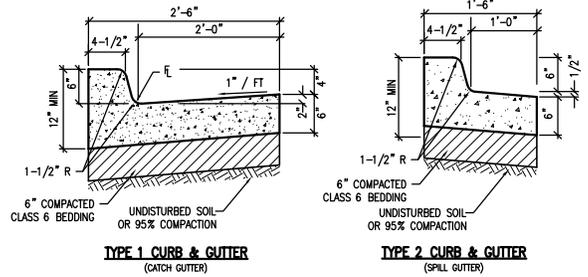
JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com



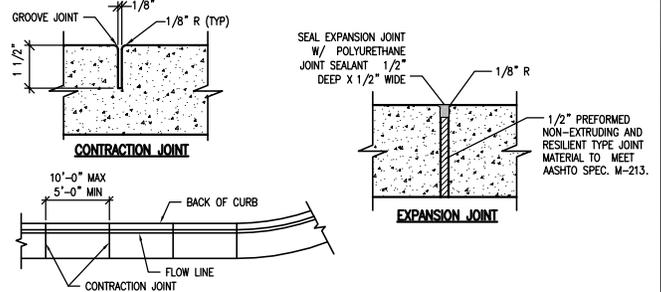
REINFORCED CONCRETE PIPE

NOTES:

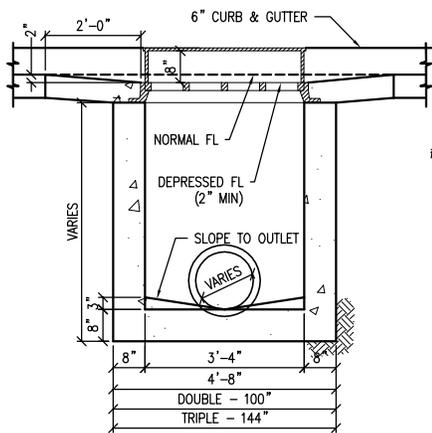
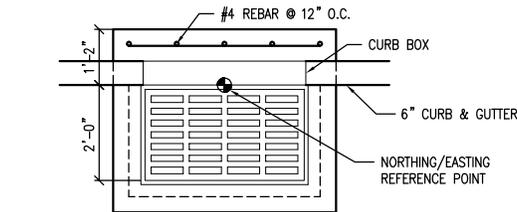
1. IF UNSTABLE MATERIALS ARE FOUND IN TRENCH BOTTOM, OVEREXCAVATE PER SPEC OR AS REQUIRED.
2. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES.
3. MINIMUM COVER 18" BELOW FINAL GRADE.



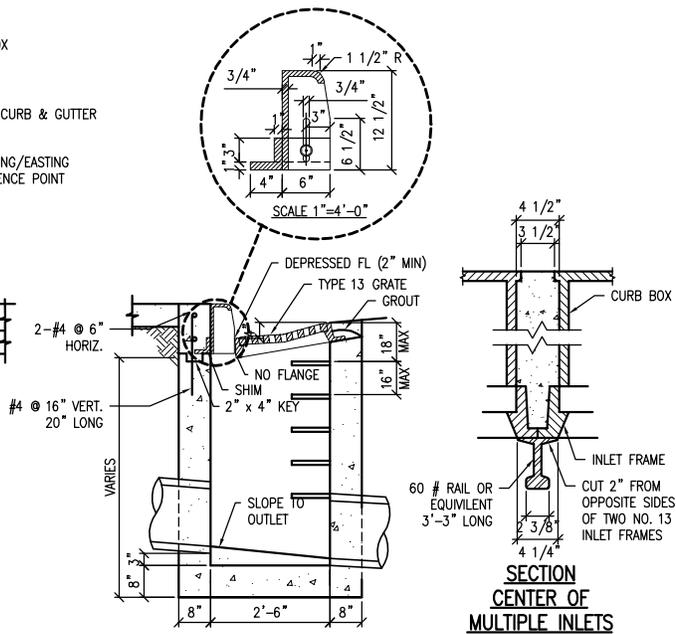
CURB & GUTTER (TYPE 1 & 2)



STORM SEWER PIPE BEDDING DETAIL (SEE CENTRAL CITY STANDARD DETAILS FIG 15)



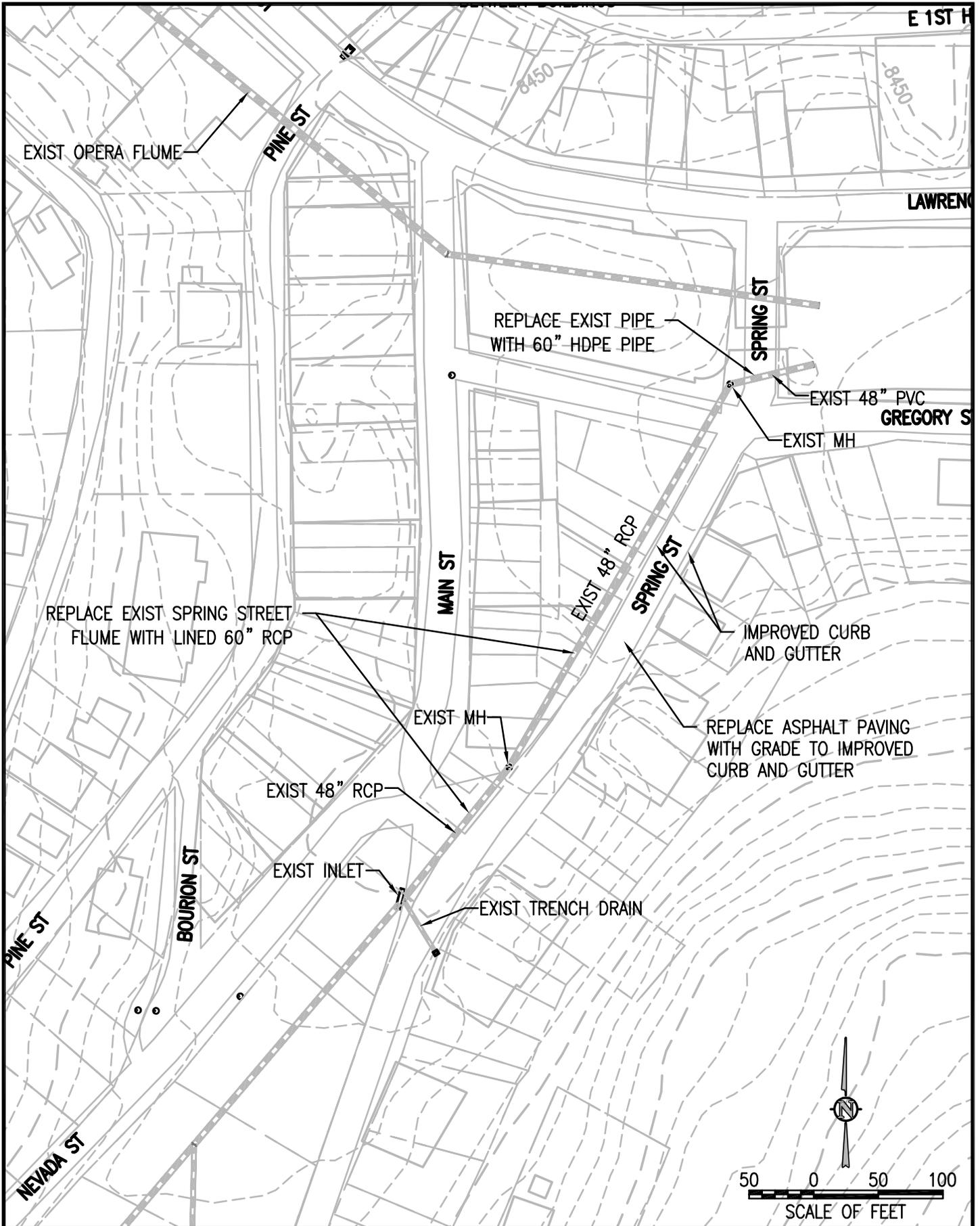
CURB AND GUTTER DETAIL (SEE CENTRAL CITY STANDARD DETAILS FIG 4)



NOTES:

1. INLET STRUCTURES SHALL ALSO INCLUDE 2'-0" CURB & GUTTER TRANSITION SECTION AT EACH END OF INLET PLUS SIDEWALK SECTIONS WHERE REQ'D BEHIND INLET STRUCTURE AND TRANSITION SECTIONS
2. FLOOR SLOPE MAY BE POURED MONOLITHIC WITH BASE
3. OUTLET PIPE(S) TO BE SET FLUSH WITH INSIDE FACE OF INLET WALL
4. UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS OR OTHERWISE APPROVED, ALL No 13 COMBINATION INLETS SHALL BE CONSTRUCTED WITH AN ADJUSTABLE CI CURB BOX
5. STD INLET DEPTHS AND PIPE SIZE ARE NOTED ON THE FOLLOWING TABLE. DEVIATIONS FROM THESE MIN REQUIREMENTS SHALL BE SUBSTANTIATED WITH APPROPRIATE HYDRAULIC ANALYSIS
6. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL
7. NORTHING/EASTING REFERENCE POINT TO BE AT FLOWLINE AT MIDPOINT OF INLET. FLOWLINE ELEVATIONS SHOWN ON PLANS REFER TO NORMAL FLOWLINE. DEPRESS AND TRANSITION FLOWLINE AT OPENING AND ADJACENT TO CURB AND GUTTER AS SHOWN.

COMBINATION INLET DETAIL (SEE CENTRAL CITY STANDARD DETAILS FIG 18)

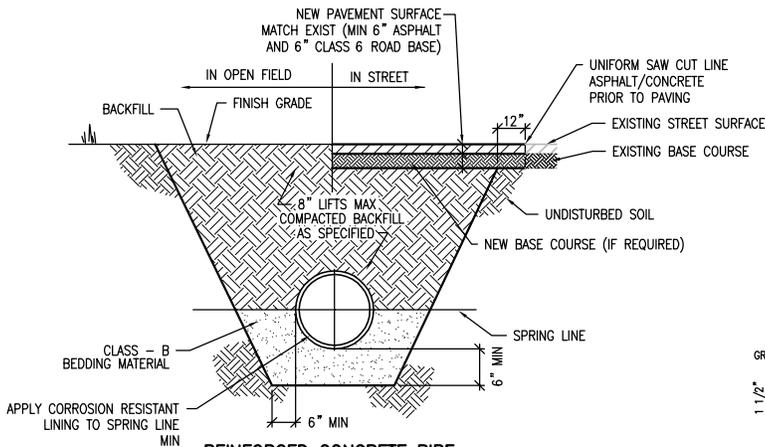


PROJECT #2 - SPRING STREET 1

CENTRAL CITY WQIF
12/16/2014



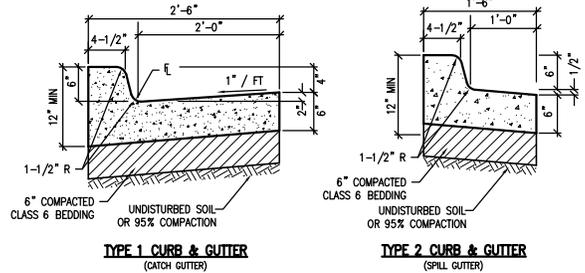
JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com



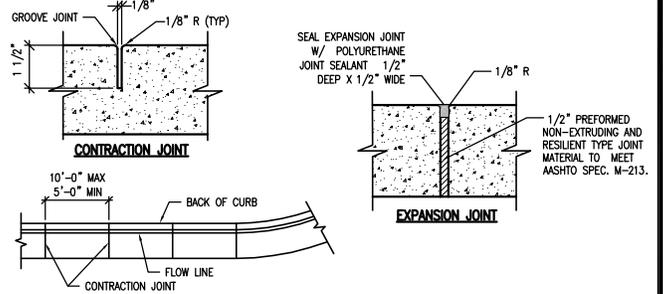
REINFORCED CONCRETE PIPE

NOTES:

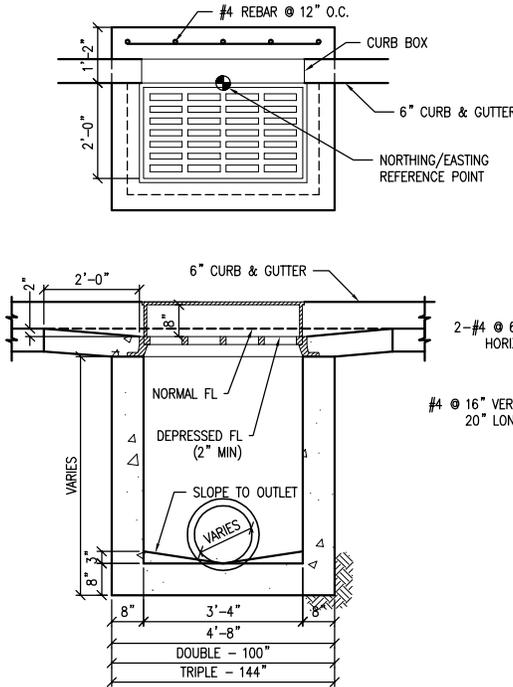
1. IF UNSTABLE MATERIALS ARE FOUND IN TRENCH BOTTOM, OVEREXCAVATE PER SPEC OR AS REQUIRED.
2. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES.
3. MINIMUM COVER 18" BELOW FINAL GRADE.



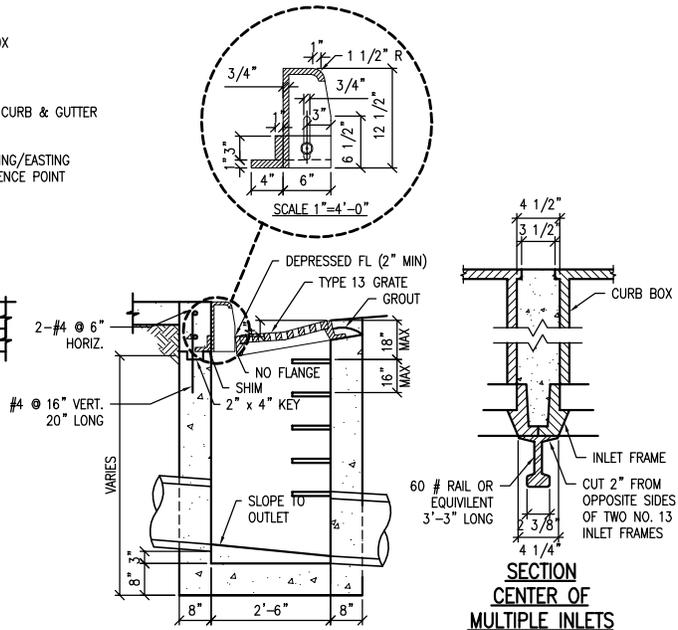
CURB & GUTTER (TYPE 1 & 2)



STORM SEWER PIPE BEDDING DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 15)



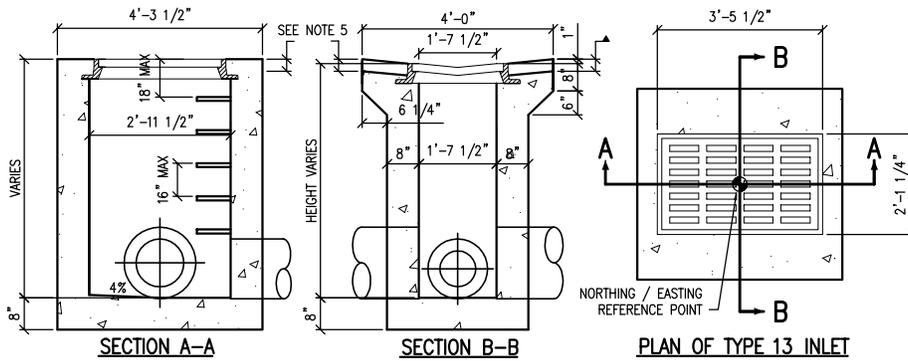
CURB AND GUTTER DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 4)



NOTES:

1. INLET STRUCTURES SHALL ALSO INCLUDE 2'-0" CURB & GUTTER TRANSITION SECTION AT EACH END OF INLET PLUS SIDEWALK SECTIONS WHERE REQ'D BEHIND INLET STRUCTURE AND TRANSITION SECTIONS
2. FLOOR SLOPE MAY BE POURED MONOLITHIC WITH BASE
3. OUTLET PIPE(S) TO BE SET FLUSH WITH INSIDE FACE OF INLET WALL
4. UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS OR OTHERWISE APPROVED, ALL No 13 COMBINATION INLETS SHALL BE CONSTRUCTED WITH AN ADJUSTABLE CI CURB BOX
5. STD INLET DEPTHS AND PIPE SIZE ARE NOTED ON THE FOLLOWING TABLE. DEVIATIONS FROM THESE MIN REQUIREMENTS SHALL BE SUBSTANTIATED WITH APPROPRIATE HYDRAULIC ANALYSIS
6. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL
7. NORTHING/EASTING REFERENCE POINT TO BE AT FLOWLINE AT MIDPOINT OF INLET. FLOWLINE ELEVATIONS SHOWN ON PLANS REFER TO NORMAL FLOWLINE. DEPRESS AND TRANSITION FLOWLINE AT OPENING AND ADJACENT TO CURB AND GUTTER AS SHOWN.

COMBINATION INLET DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 18)

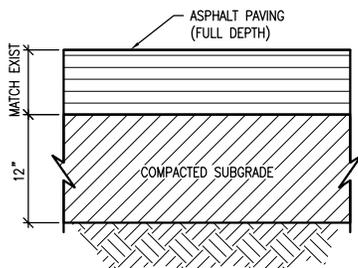


NOTES:

1. CONCRETE SHALL BE CDOT CLASS A OR B. INLET MAY BE CAST-IN-PLACE, PRECAST AND CONFORMING TO ASTM C-478
2. CAST-IN-PLACE CONCRETE WALLS EDGES SHALL BE CHAMFERED 3/4"
3. ALL WALLS AND BASE SHALL BE REINFORCED WITH #4'S @ 8" OC EACH WAY REINFORCING BARS SHALL BE DEFORMED AND SHALL HAVE A 2" MINIMUM CLEARANCE
4. STEPS SHALL BE PROVIDED WHEN INLET HEIGHT EXCEEDS 3'-6" AND SHALL BE IN ACCORDANCE WITH AASHTO M 199
5. ALL GRATES AND FRAMES SHALL BE GRAY OR DUCTILE CAST IRON CONFORMING TO CDOT 712.06. GRATES AND FRAMES SHALL BE DESIGNED TO WITHSTAND HS 20 LOADING
6. SEE PLAN DETAILS FOR LOCATION AND SIZE OF PIPE
7. WHEN BITUMINOUS MATERIAL IS TO EXTEND TO THE EDGE OF THE GRATING FRAME, CONCRETE MAY BE DEPRESSED
8. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL

TYPE 13 FIELD INLET DETAIL

NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 17)

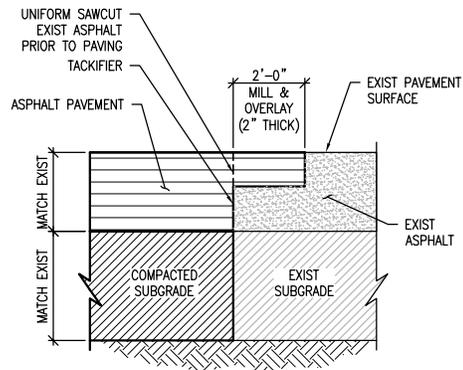


NOTES:

1. COMPACT SUBGRADE TO 95% STD PROCTOR (ASTM D-698) 2% ABOVE OPTIMUM MOISTURE CONTENT

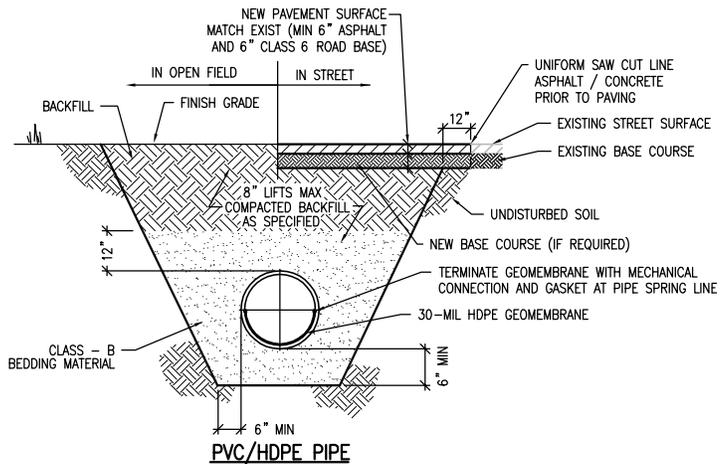
ASPHALT PAVING SECTION DETAIL

NTS



ASPHALT "T" PATCH DETAIL

NTS



NOTES:

1. IF UNSTABLE MATERIALS ARE FOUND IN TRENCH BOTTOM, OVEREXCAVATE PER SPEC OR AS REQUIRED.
2. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES.
3. MINIMUM COVER 18" BELOW FINAL GRADE.

STORM SEWER PIPE BEDDING DETAIL 

NTS

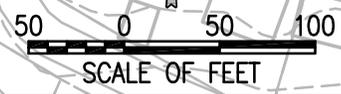
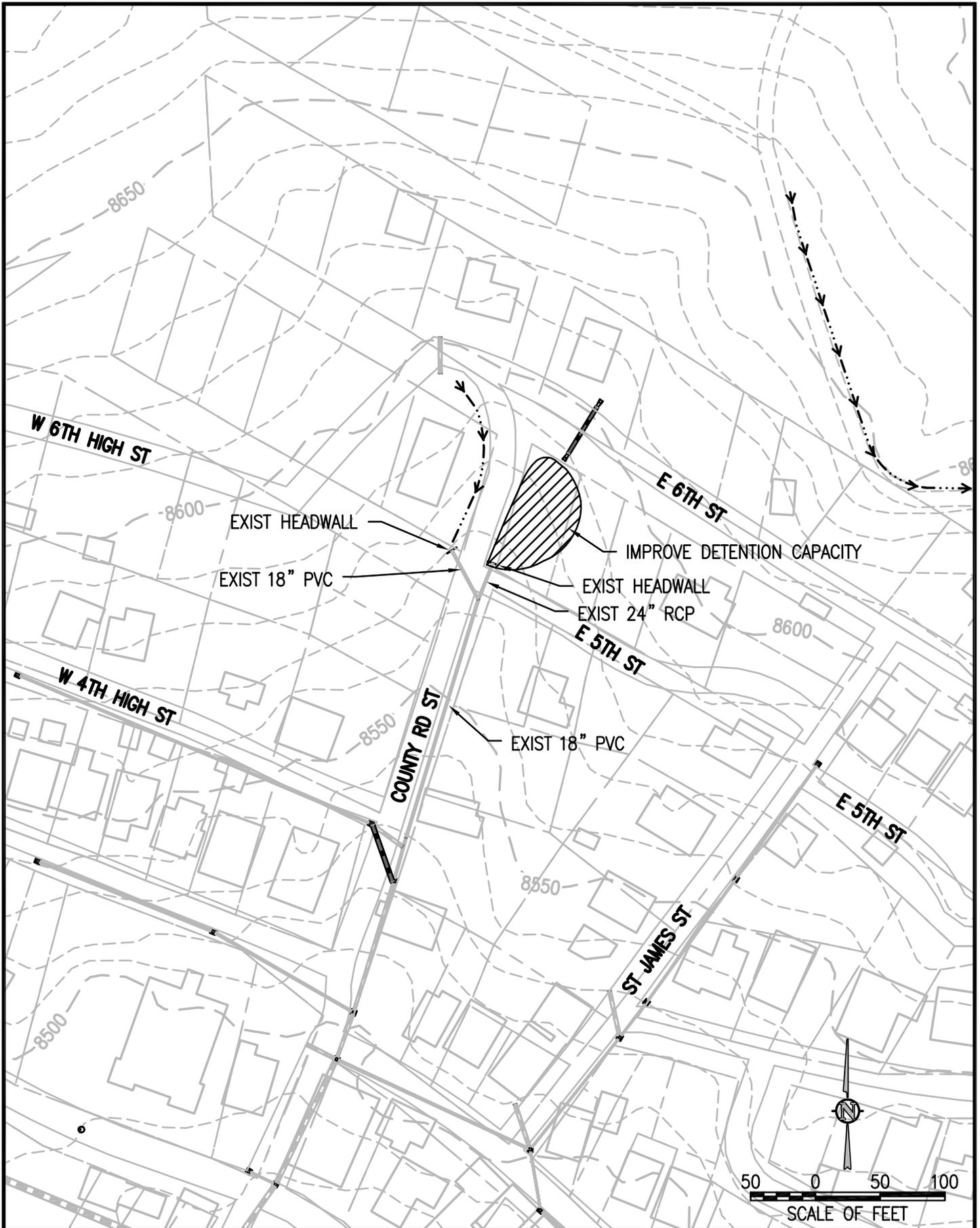
PROJECT #3 - REPLACE PIPES / INSTALL LINER D1

CENTRAL CITY WQIF

12/16/2014



JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

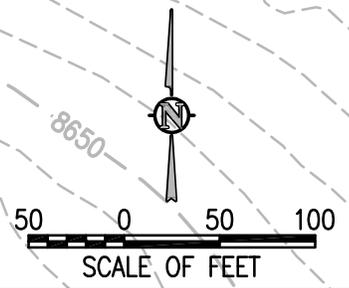
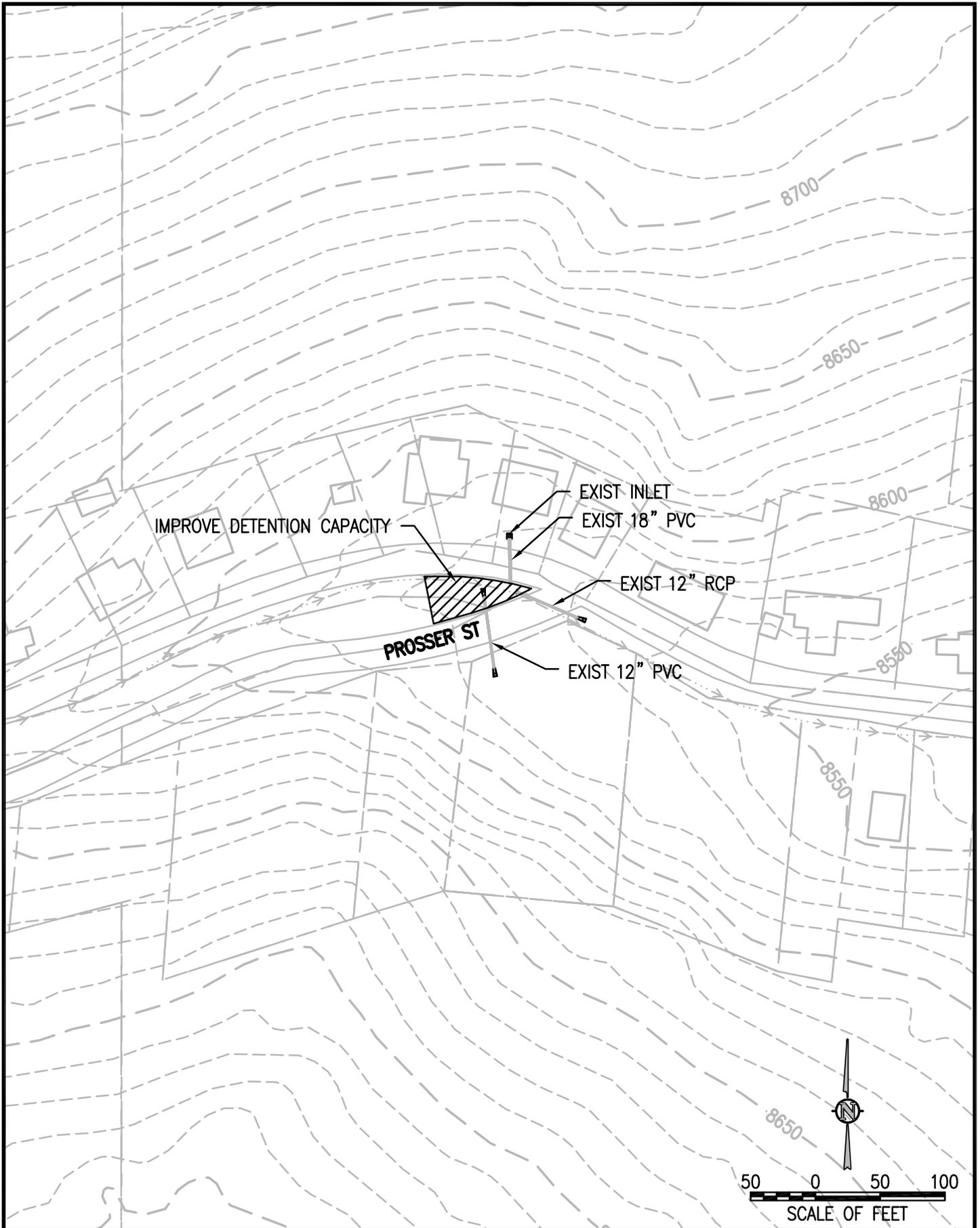


PROJECT #4 - DETENTION BASIN 1

CENTRAL CITY WQIF
12/16/2014

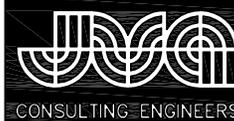


JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

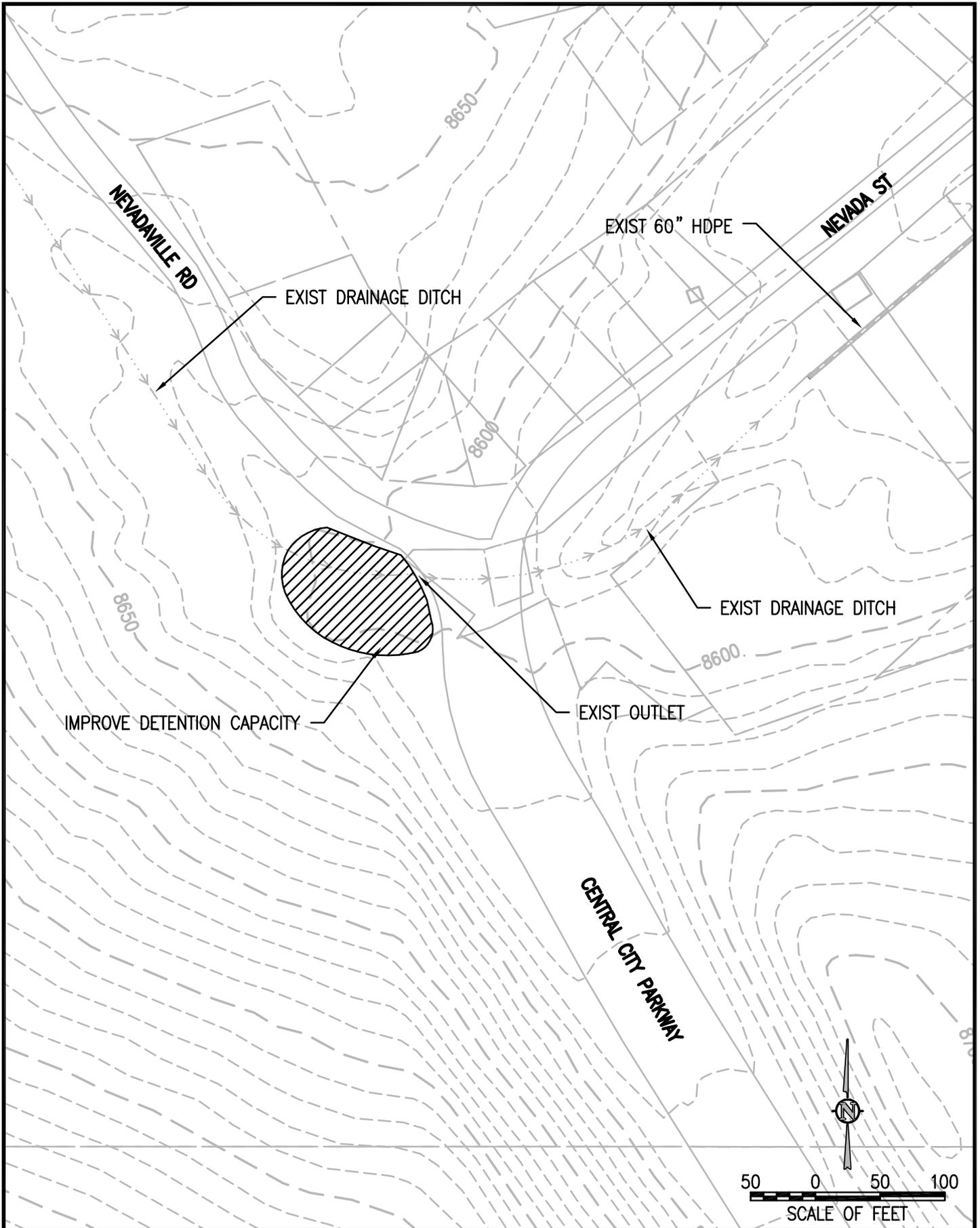


PROJECT #4 - DETENTION BASIN 2

CENTRAL CITY WQIF
12/16/2014



JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

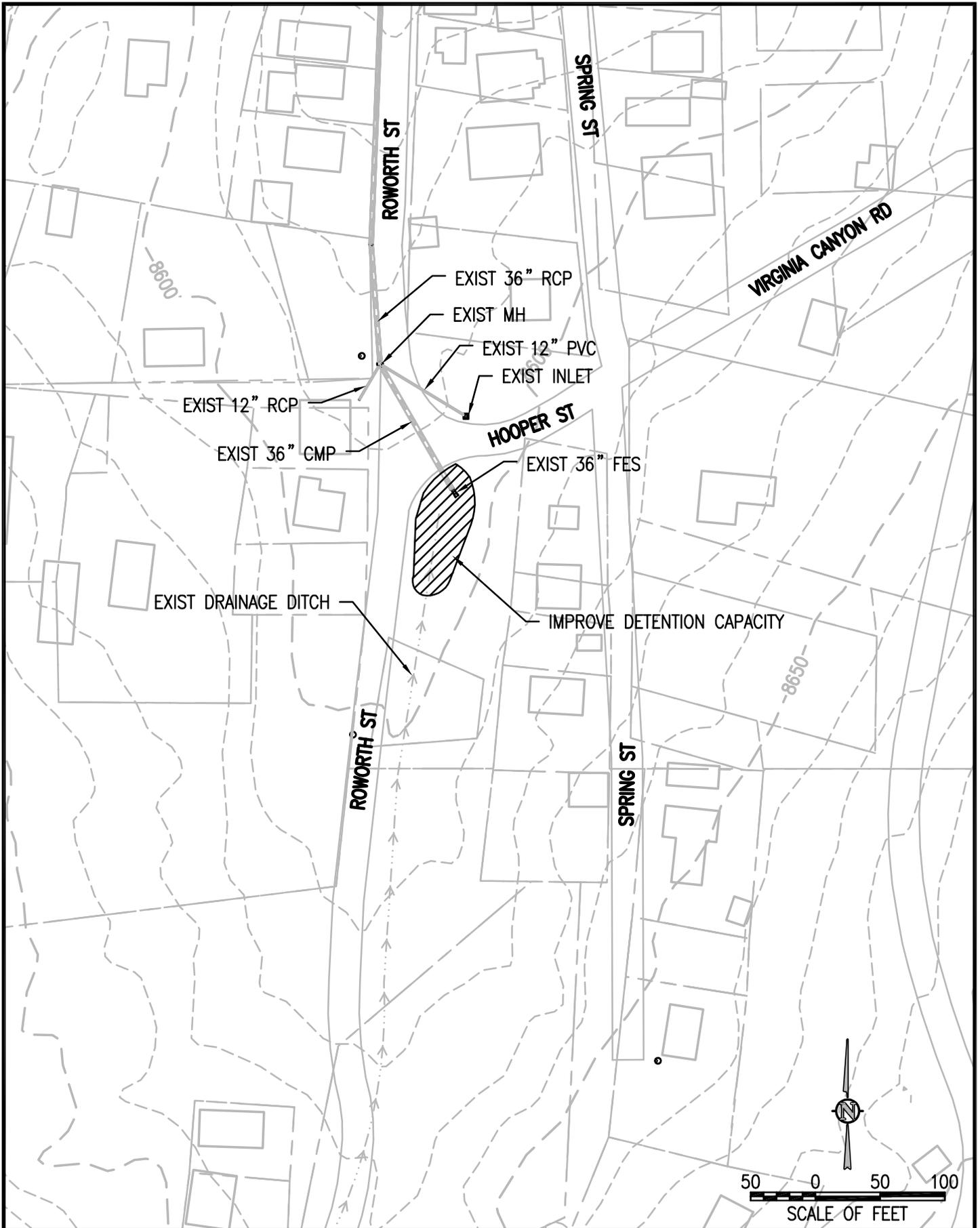


PROJECT #4 - DETENTION BASIN 3

CENTRAL CITY WQIF
12/16/2014



JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

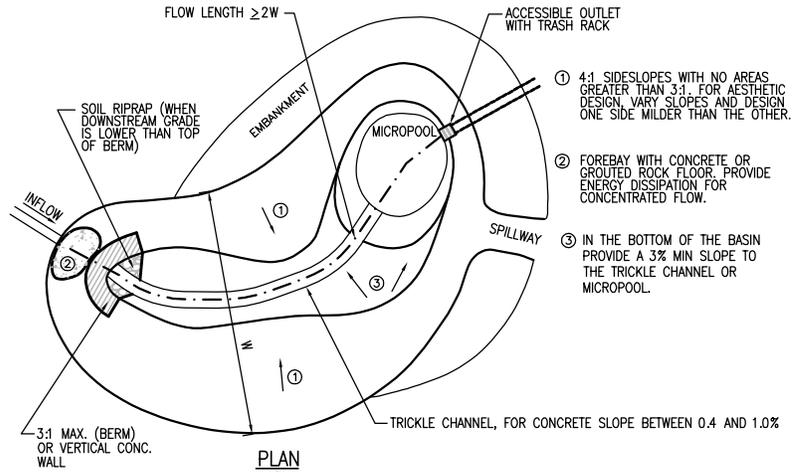


PROJECT #4 - DETENTION BASIN 4

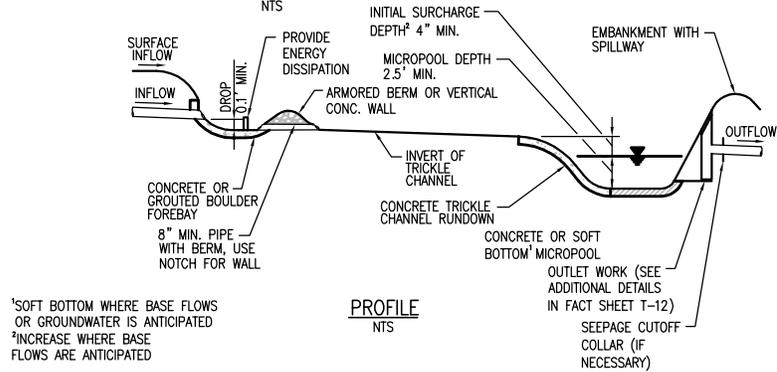
CENTRAL CITY WQIF
12/16/2014



JVA, Incorporated
 Post Office Box 1860
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Phone: 970.722.7677
 Fax: 970.722.7679
 E-mail info@jvajva.com

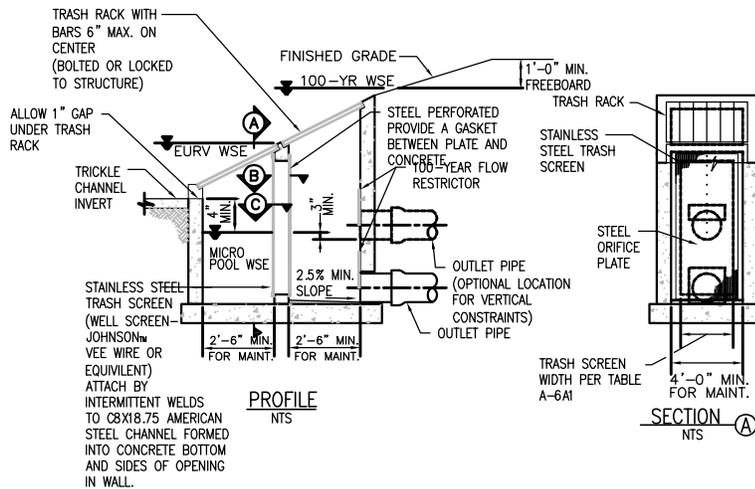


PLAN
NTS



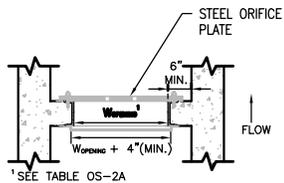
PROFILE
NTS

EXTENDED DETENTION BASIN

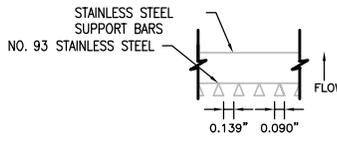


PROFILE
NTS

SECTION A
NTS



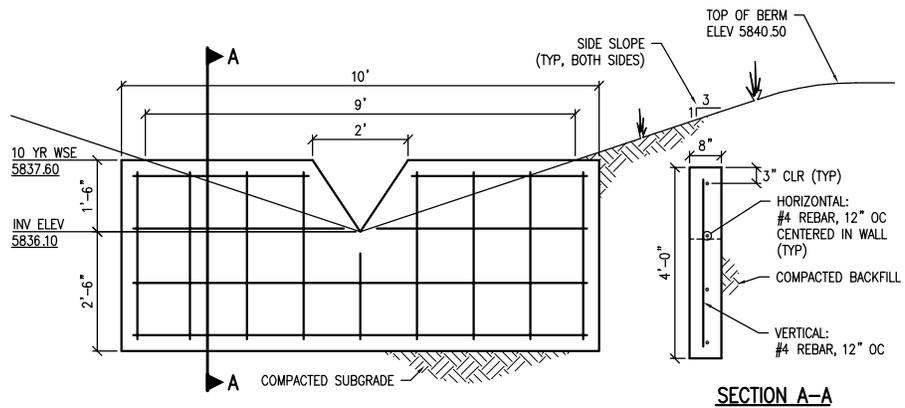
SECTION B
NTS



SECTION C
NTS

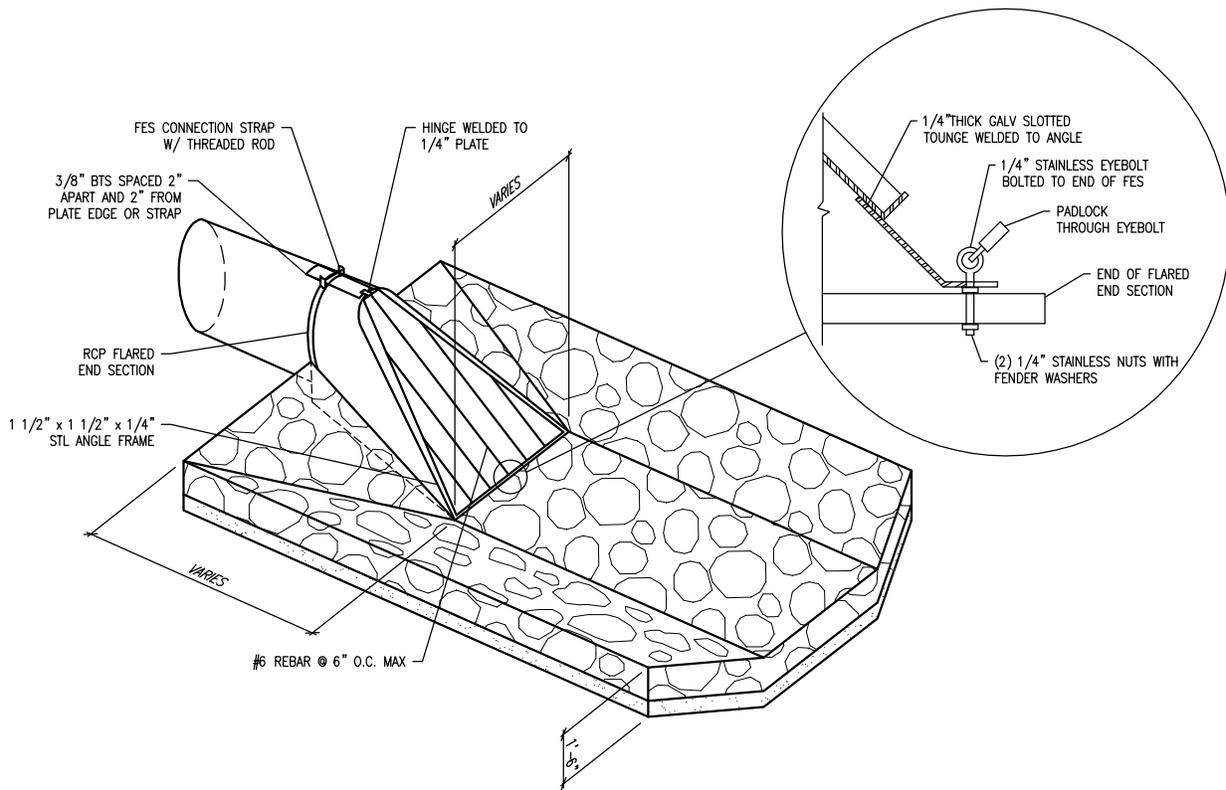
OUTLET STRUCTURE DETAIL





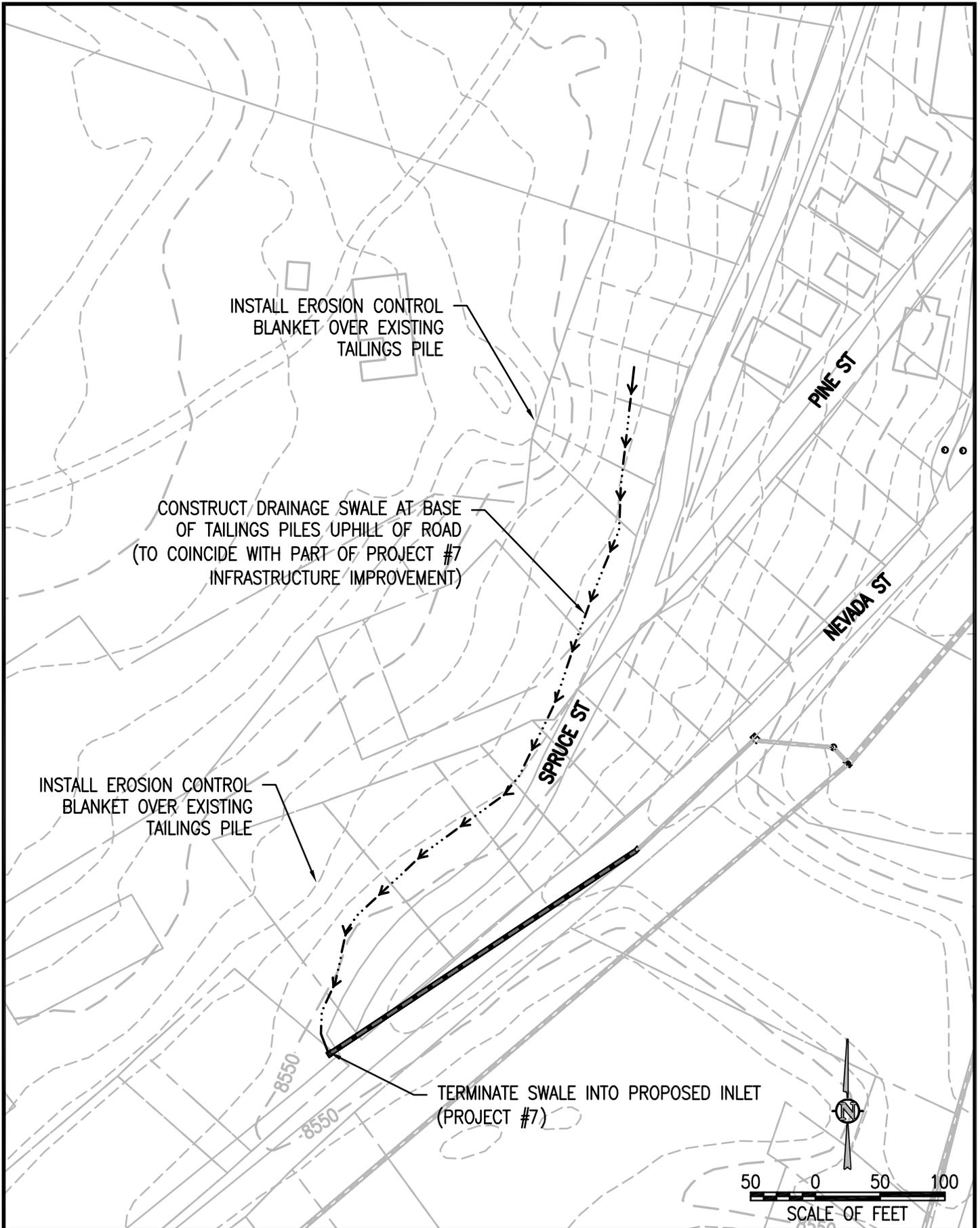
DETENTION BASIN WEIR OUTLET STRUCTURE (N)

NTS



RCP FLARED END SECTION WITH TRASH RACK AND RIP-RAP DETAIL (N)

NTS

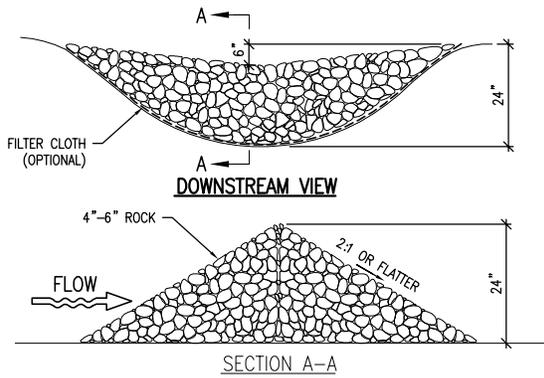


PROJECT #5 - DRAINAGE SWALES 2

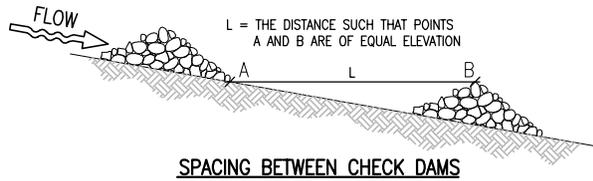
CENTRAL CITY WQIF
12/16/2014



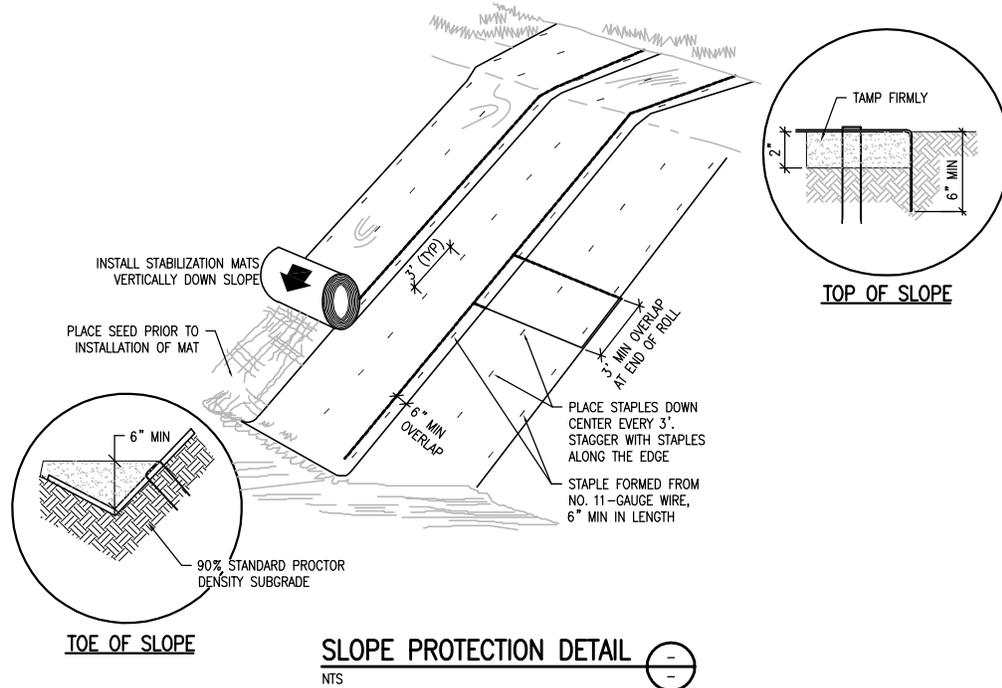
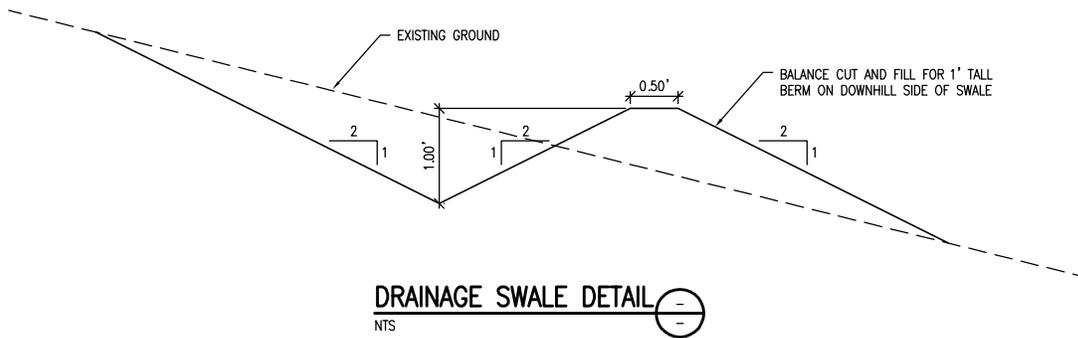
JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

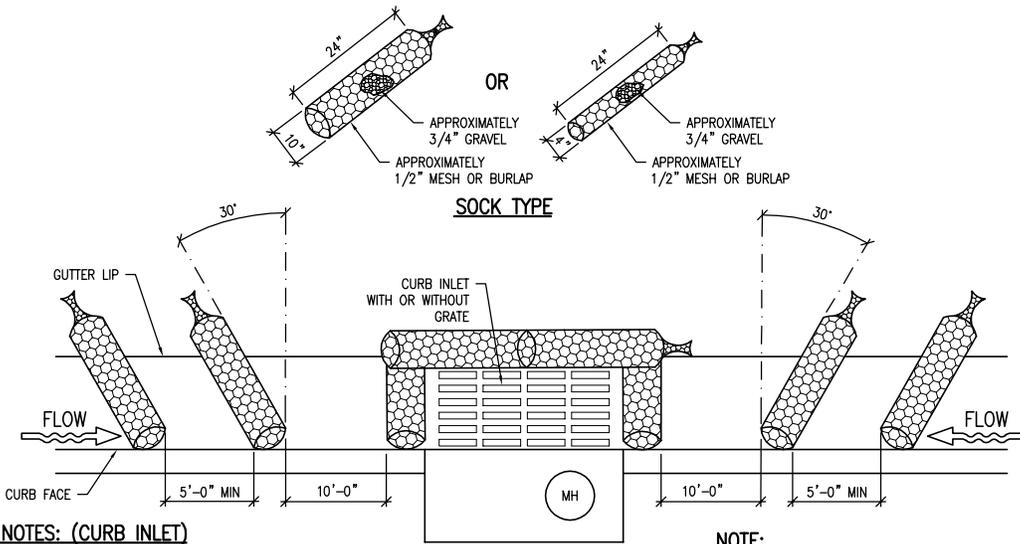


- NOTES:**
1. CHECK DAMS SHOULD BE CONSTRUCTED OF 4" TO 6" STONE. HAND OR MECHANICAL PLACEMENT WILL BE NECESSARY TO ACHIEVE COMPLETE COVERAGE OF THE DITCH OR SWALE AND TO INSURE THAT THE CENTER OF THE DAM IS LOWER THAN THE EDGES.
 2. CHECK DAMS SHOULD BE KEED INTO THE SIDES AND BOTTOM OF THE CHANNEL A MINIMUM OF 4" TO 6".
 3. THE MAXIMUM SPACING BETWEEN BARRIERS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM BARRIER IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM BARRIER.



ROCK CHECK DAM DETAIL (NTS)



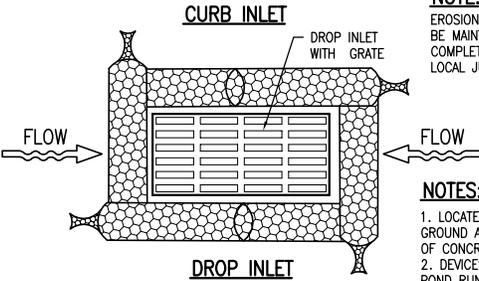


NOTES: (CURB INLET)

1. SOCKS WILL BE USED UPGRADIENT TO, AND FLUSH WITH CURB.
2. NO LESS THAN TWO 10" DIAMETER SOCKS MUST BE USED IN SEQUENCE, SPACED NO MORE THAN 5 FEET APART, UPGRADIENT OF INLET. NO LESS THAN SIX SOCKS SHALL BE USED IF THE 4" SOCK SIZE IS CHOSEN.
3. INCLINE AT 30° FROM PERPENDICULAR, OPPOSITE DIRECTION OF FLOW.
4. DEVICES WILL BE USED TO POND RUNOFF WITHOUT PLUGGING INLET OR CREATING ROADWAY SAFETY CONCERNS.
5. INLET PROTECTION FOR FULL SUMP CONDITIONS ONLY, THROAT OF INLET TO BE LEFT OPEN.
6. THE MAXIMUM HEIGHT OF SOCK SHOULD BE LESS THAN THE TOP OF THE CURB OPENING TO ALLOW OVERFLOW DURING LARGER EVENTS.

NOTE:

EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED, OR AS DIRECTED BY THE LOCAL JURISDICTION.

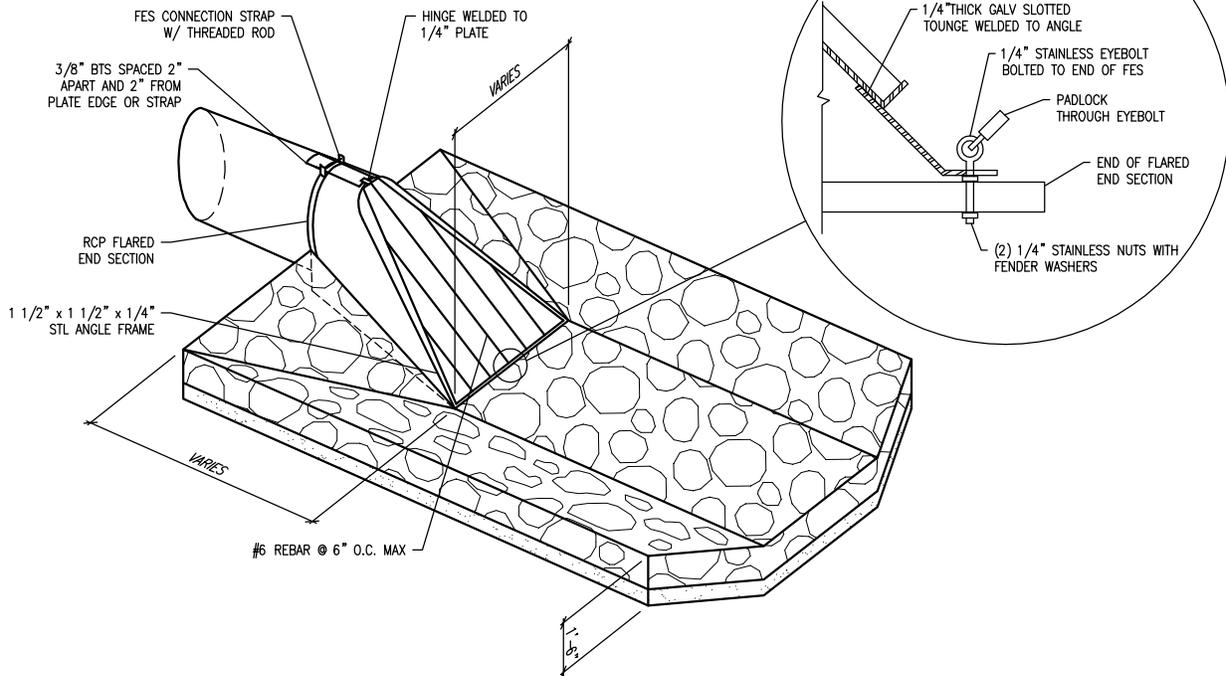


NOTES: (DROP INLET)

1. LOCATE SOCKS IN NATURAL GROUND AT THE OUTSIDE EDGE OF CONCRETE APRON.
2. DEVICES WILL BE USED TO POND RUNOFF WITHOUT PLUGGING INLET OR CREATING ROADWAY SAFETY CONCERNS.

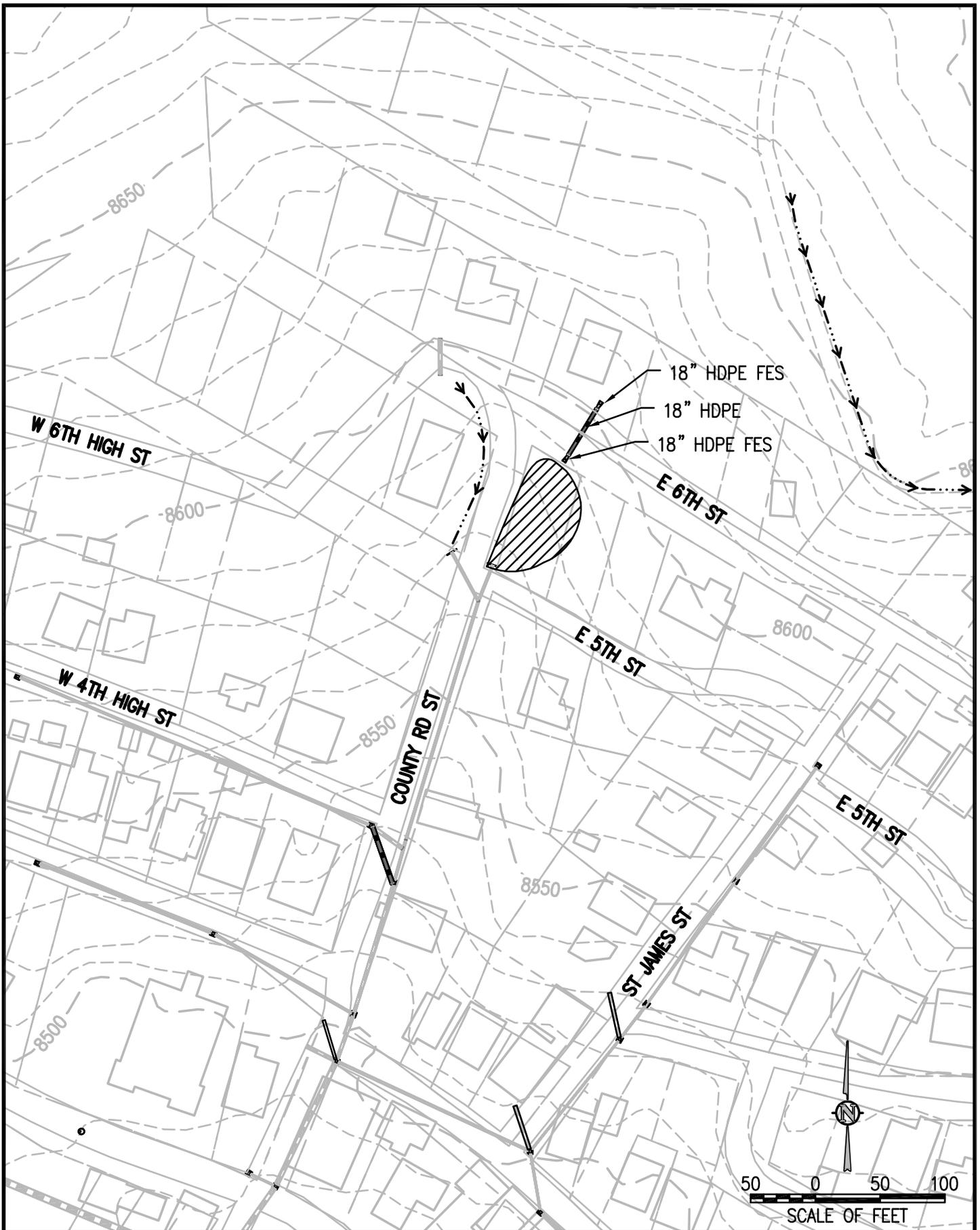
GRAVEL SOCK INLET PROTECTION DETAIL

NTS



RCP FLARED END SECTION WITH TRASH RACK AND RIP-RAP DETAIL

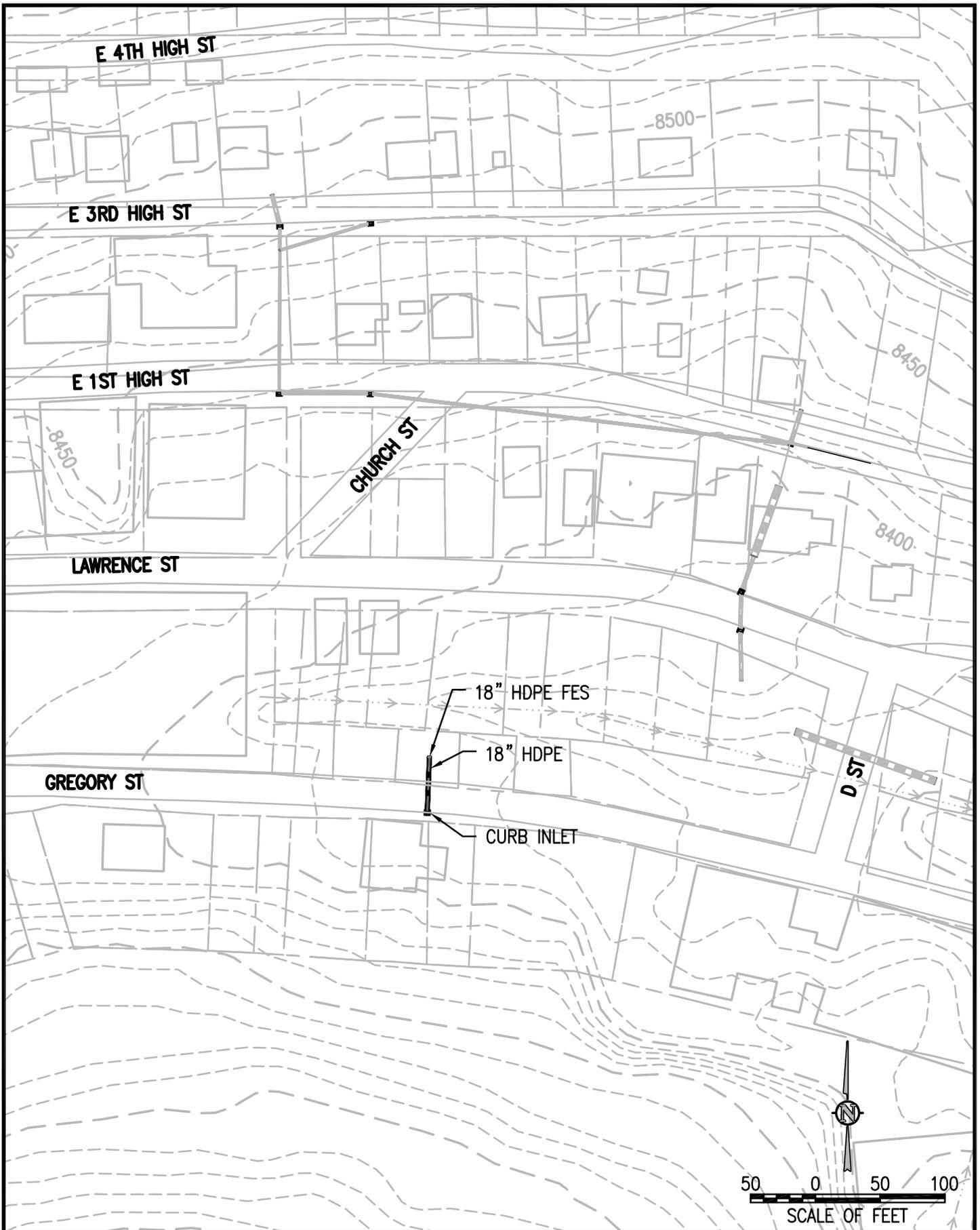
NTS



PROJECT #7 - ADDITIONAL INFRASTRUCTURE 1
 CENTRAL CITY WQIF
 12/16/2014



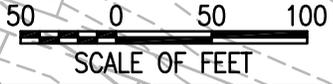
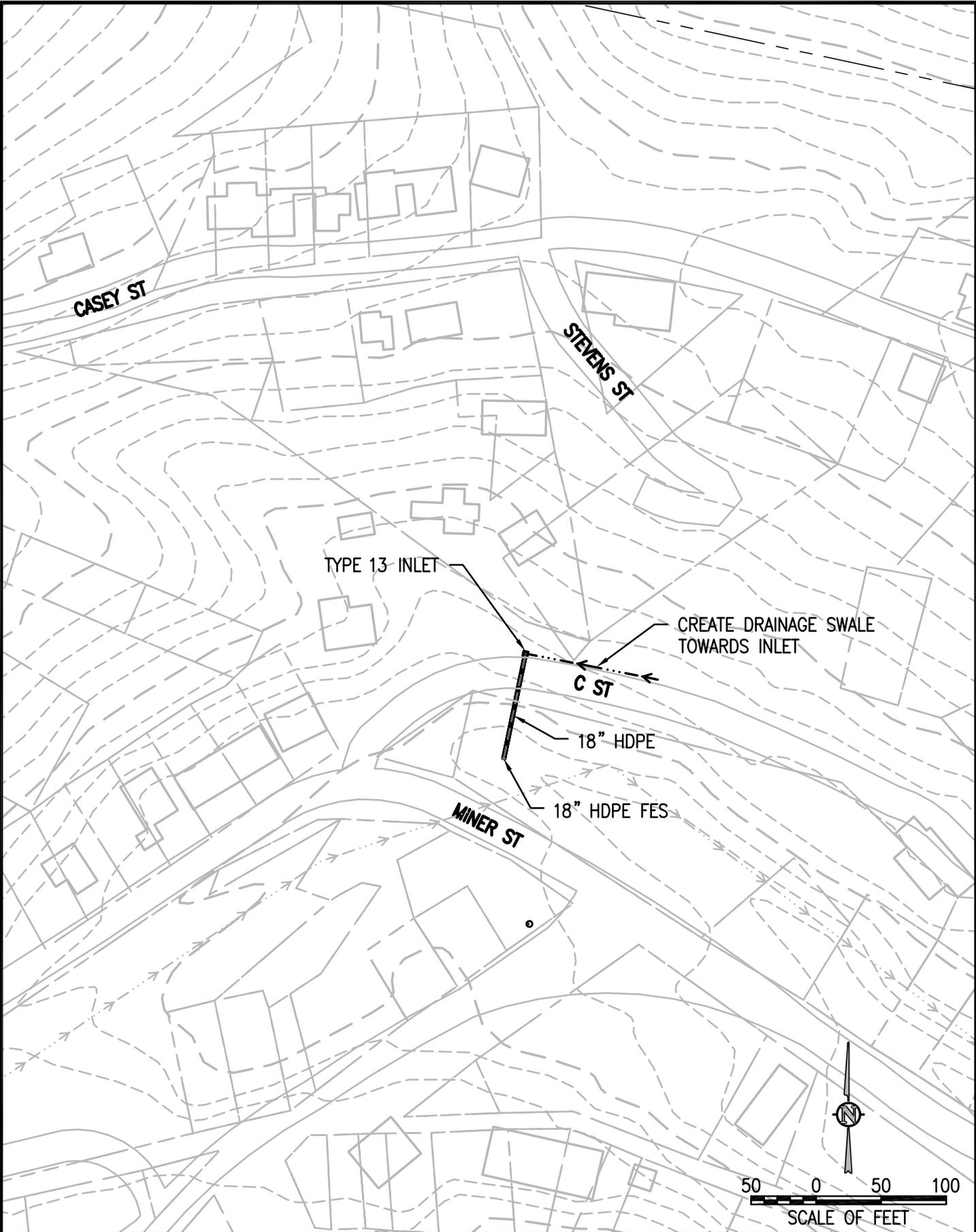
JVA, Incorporated
 Post Office Box 1860
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Phone: 970.722.7677
 Fax: 970.722.7679
 E-mail info@jvajva.com



PROJECT #7 - ADDITIONAL INFRASTRUCTURE 2
 CENTRAL CITY WQIF
 12/16/2014



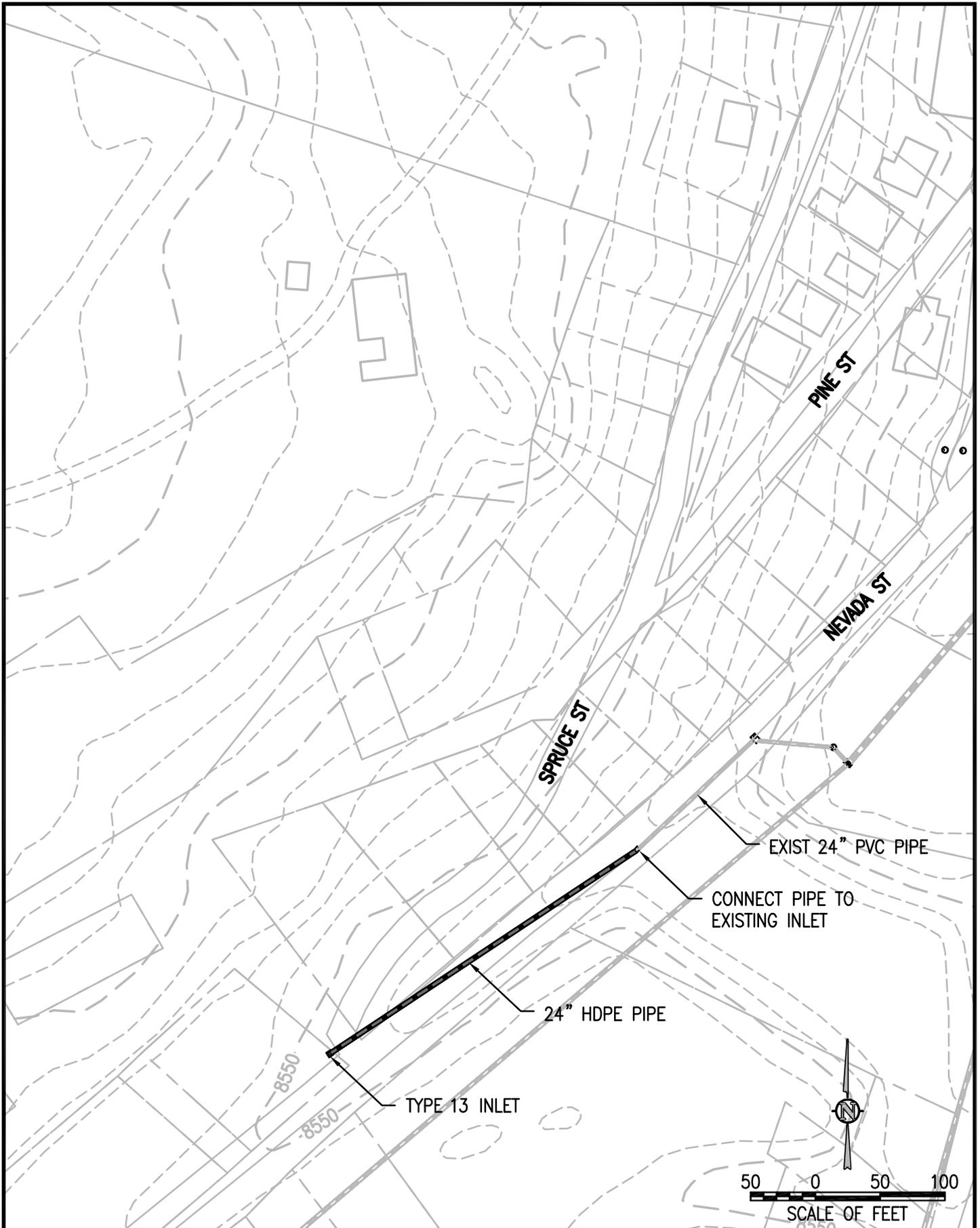
JVA, Incorporated
 Post Office Box 1860
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Phone: 970.722.7677
 Fax: 970.722.7679
 E-mail info@jvajva.com



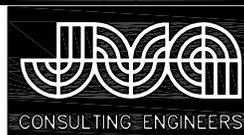
PROJECT #7 - ADDITIONAL INFRASTRUCTURE 3
 CENTRAL CITY WQIF
 12/16/2014



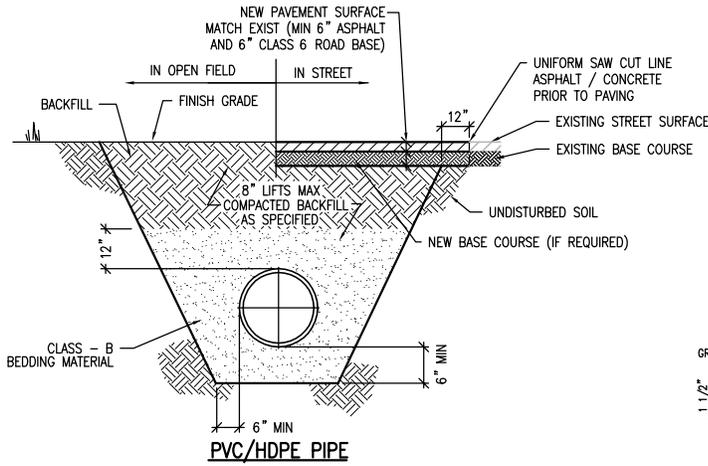
JVA, Incorporated
 Post Office Box 1860
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Phone: 970.722.7677
 Fax: 970.722.7679
 E-mail info@jvajva.com



PROJECT #7 - ADDITIONAL INFRASTRUCTURE 4
 CENTRAL CITY WQIF
 12/16/2014

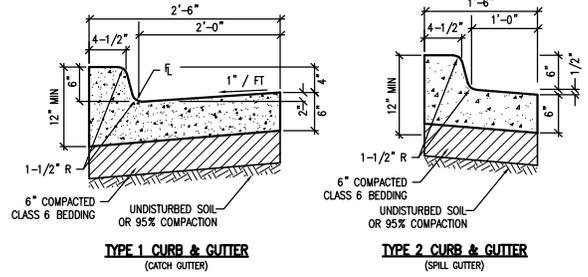


JVA, Incorporated
 Post Office Box 1860
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Phone: 970.722.7677
 Fax: 970.722.7679
 E-mail info@jvajva.com

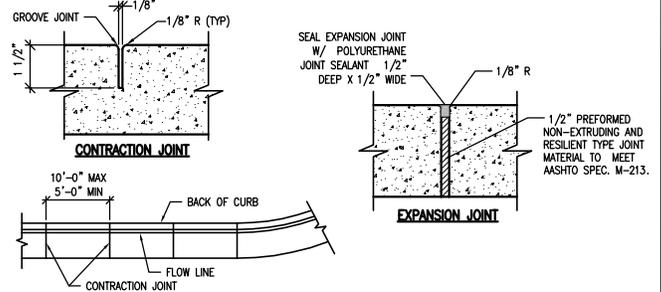


NOTES:

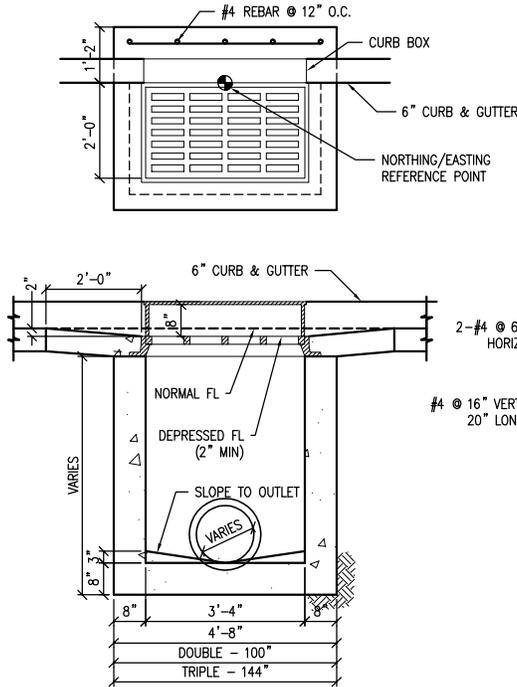
1. IF UNSTABLE MATERIALS ARE FOUND IN TRENCH BOTTOM, OVEREXCAVATE PER SPEC OR AS REQUIRED.
2. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES.
3. MINIMUM COVER 18" BELOW FINAL GRADE.



CURB & GUTTER (TYPE 1 & 2)



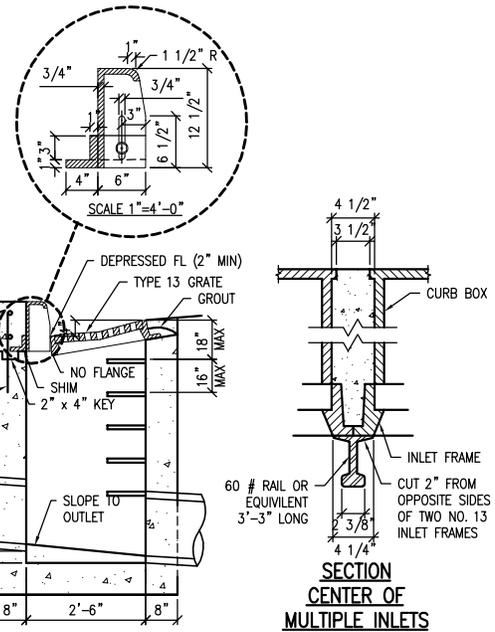
STORM SEWER PIPE BEDDING DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 15)



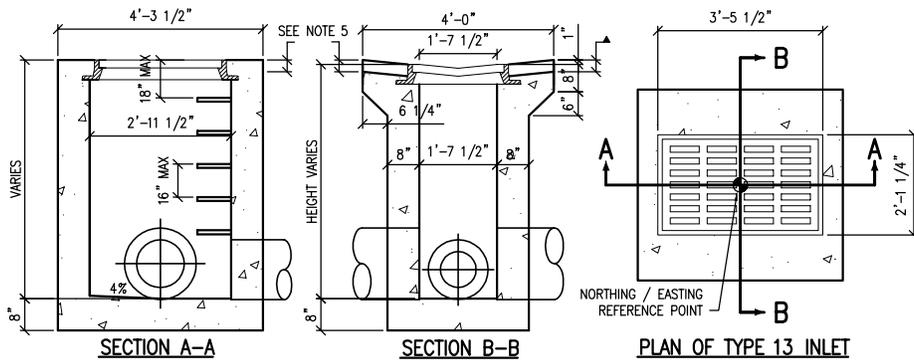
NOTES:

1. INLET STRUCTURES SHALL ALSO INCLUDE 2'-0" CURB & GUTTER TRANSITION SECTION AT EACH END OF INLET PLUS SIDEWALK SECTIONS WHERE REQ'D BEHIND INLET STRUCTURE AND TRANSITION SECTIONS
2. FLOOR SLOPE MAY BE POURED MONOLITHIC WITH BASE
3. OUTLET PIPE(S) TO BE SET FLUSH WITH INSIDE FACE OF INLET WALL
4. UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS OR OTHERWISE APPROVED, ALL No 13 COMBINATION INLETS SHALL BE CONSTRUCTED WITH AN ADJUSTABLE CI CURB BOX
5. STD INLET DEPTHS AND PIPE SIZE ARE NOTED ON THE FOLLOWING TABLE. DEVIATIONS FROM THESE MIN REQUIREMENTS SHALL BE SUBSTANTIATED WITH APPROPRIATE HYDRAULIC ANALYSIS
6. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL
7. NORTHING/EASTING REFERENCE POINT TO BE AT FLOWLINE AT MIDPOINT OF INLET. FLOWLINE ELEVATIONS SHOWN ON PLANS REFER TO NORMAL FLOWLINE. DEPRESS AND TRANSITION FLOWLINE AT OPENING AND ADJACENT TO CURB AND GUTTER AS SHOWN.

CURB AND GUTTER DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 4)



COMBINATION INLET DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 18)

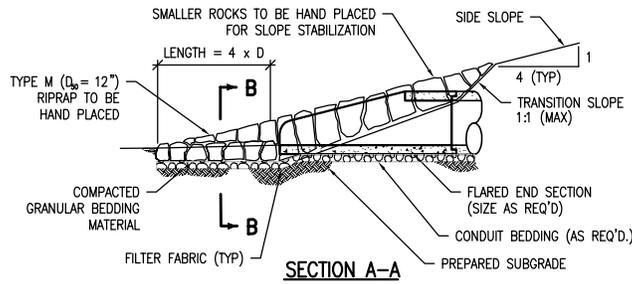


NOTES:

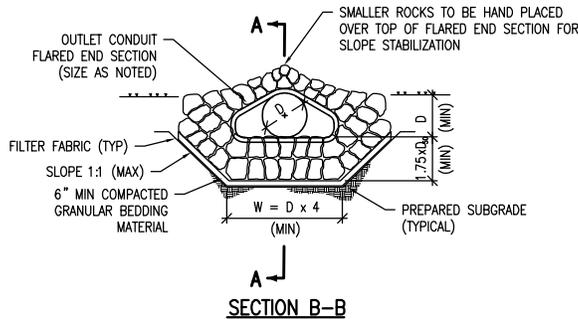
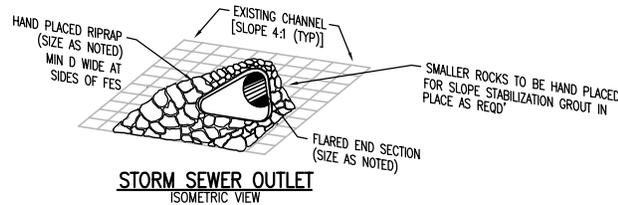
1. CONCRETE SHALL BE CDOT CLASS A OR B. INLET MAY BE CAST-IN-PLACE, PRECAST AND CONFORMING TO ASTM C-478
2. CAST-IN-PLACE CONCRETE WALLS EDGES SHALL BE CHAMFERED 3/4"
3. ALL WALLS AND BASE SHALL BE REINFORCED WITH #4'S @ 8" OC EACH WAY REINFORCING BARS SHALL BE DEFORMED AND SHALL HAVE A 2" MINIMUM CLEARANCE
4. STEPS SHALL BE PROVIDED WHEN INLET HEIGHT EXCEEDS 3'-6" AND SHALL BE IN ACCORDANCE WITH AASHTO M 199
5. ALL GRATES AND FRAMES SHALL BE GRAY OR DUCTILE CAST IRON CONFORMING TO CDOT 712.06. GRATES AND FRAMES SHALL BE DESIGNED TO WITHSTAND HS 20 LOADING
6. SEE PLAN DETAILS FOR LOCATION AND SIZE OF PIPE
7. WHEN BITUMINOUS MATERIAL IS TO EXTEND TO THE EDGE OF THE GRATING FRAME, CONCRETE MAY BE DEPRESSED
9. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL

TYPE 13 FIELD INLET DETAIL

NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 17)

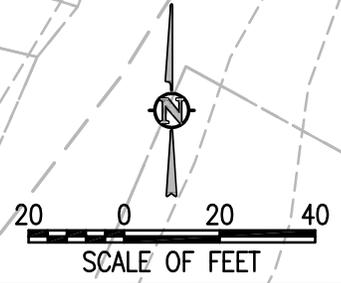
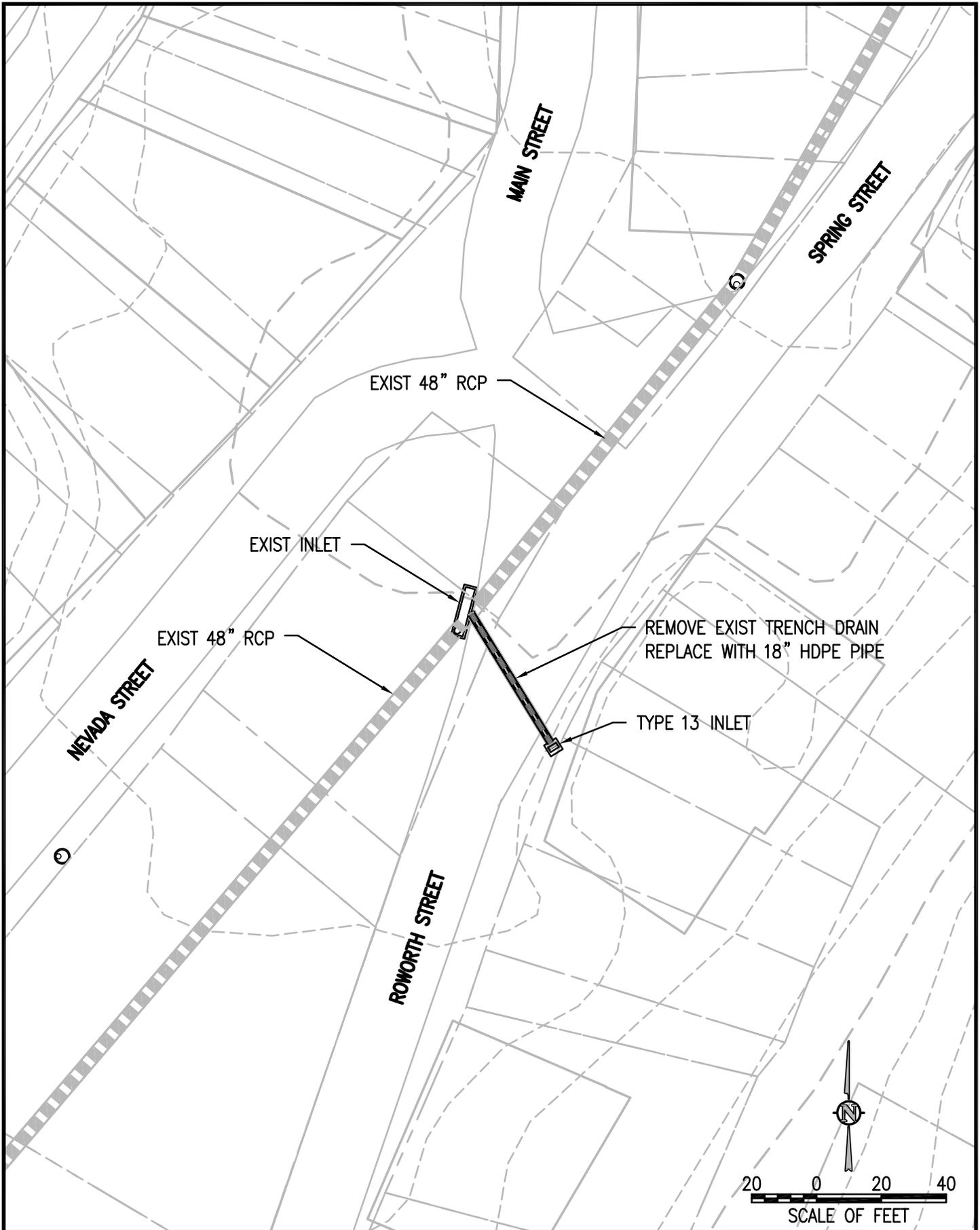


RIPRAP SIZING	
TYPE VL	D50=6"
TYPE L	D50=9"
TYPE M	D50=12"
TYPE H	D50=18"
TYPE VH	D50=24"



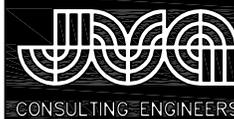
STORM SEWER FLARED END SECTION DETAIL

NTS

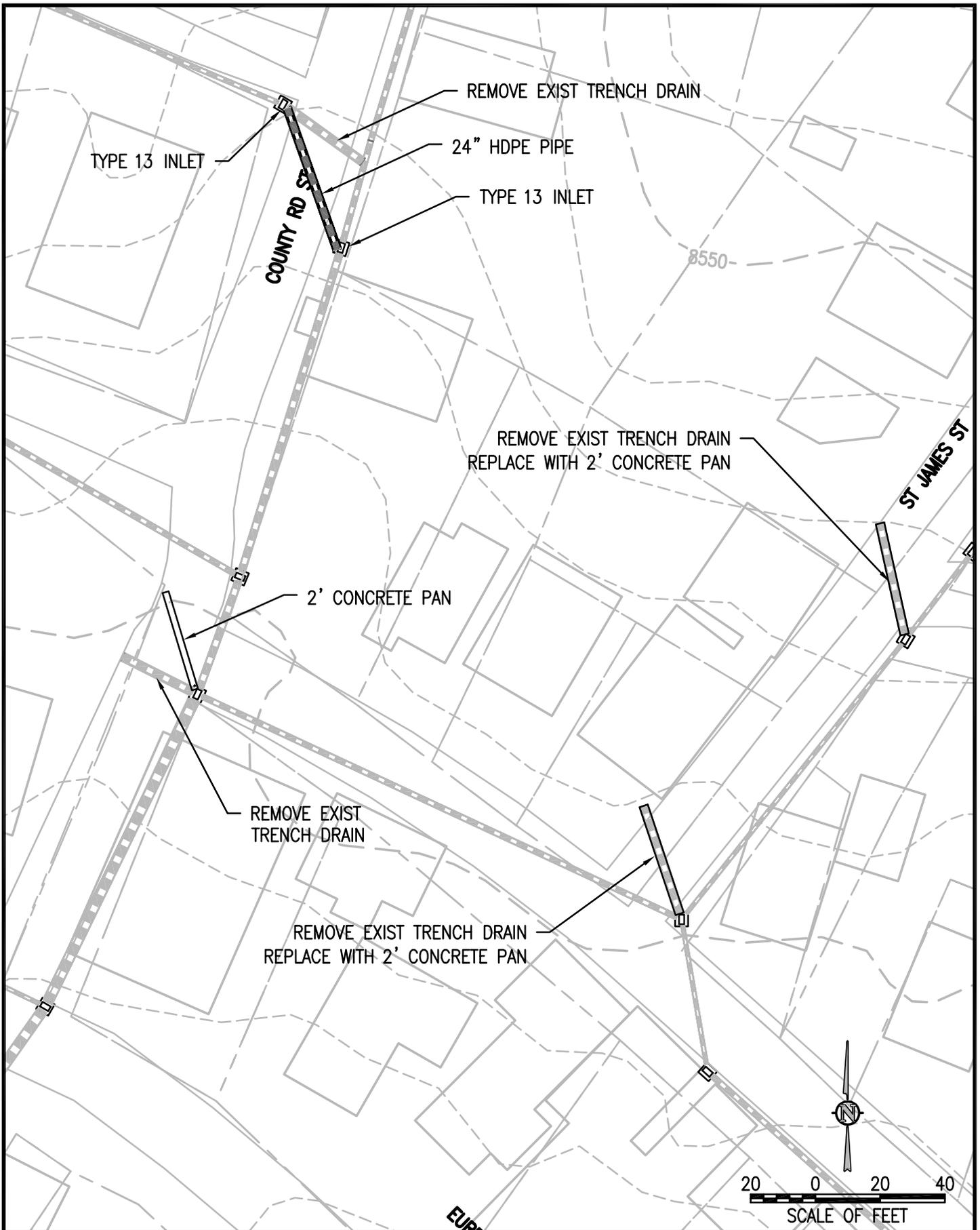


PROJECT #8 - TRENCH DRAINS 1

CENTRAL CITY WQIF
12/16/2014



JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

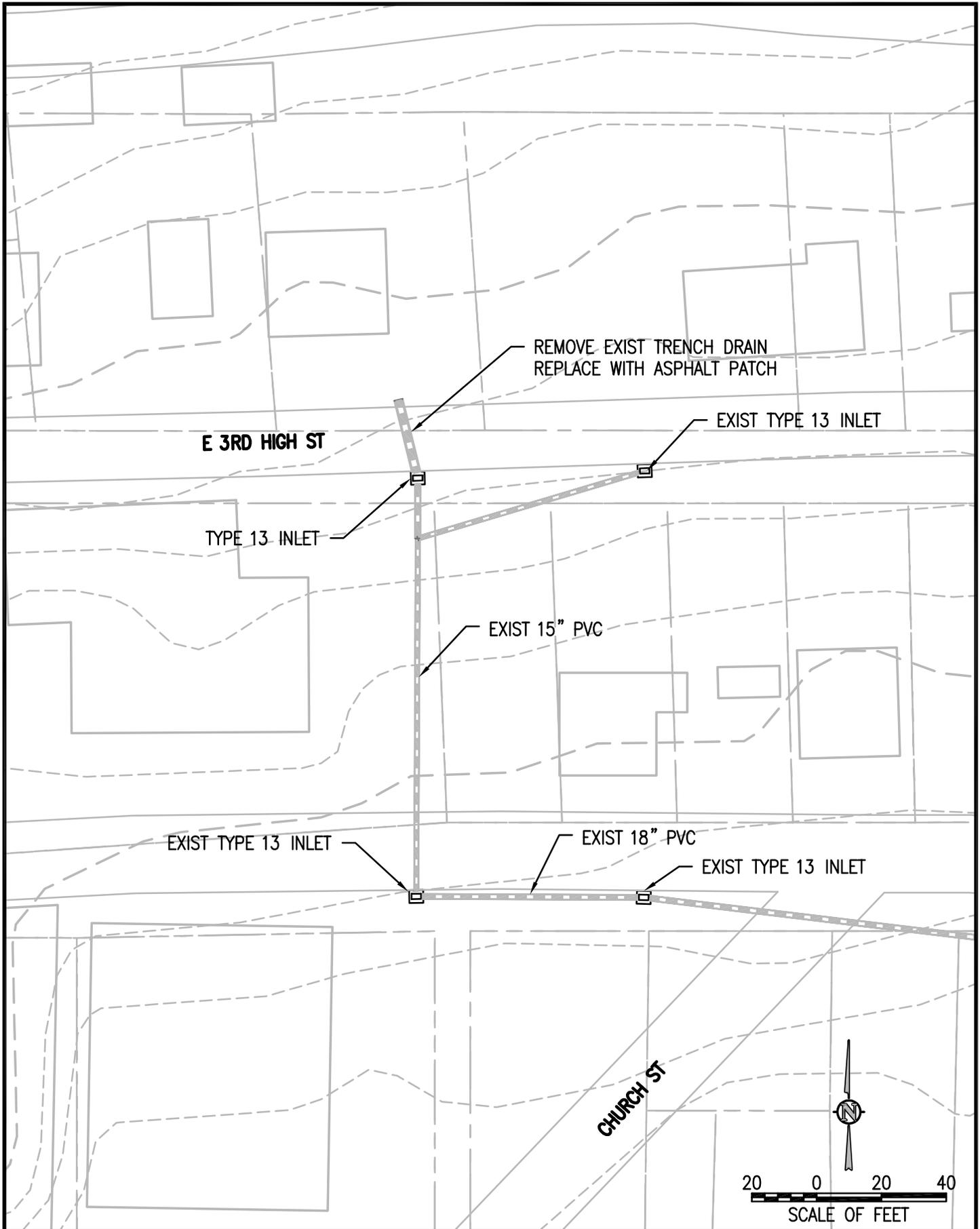


PROJECT #8 - TRENCH DRAINS 2

CENTRAL CITY WQIF
12/16/2014

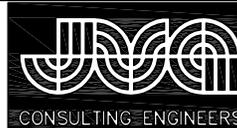


JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

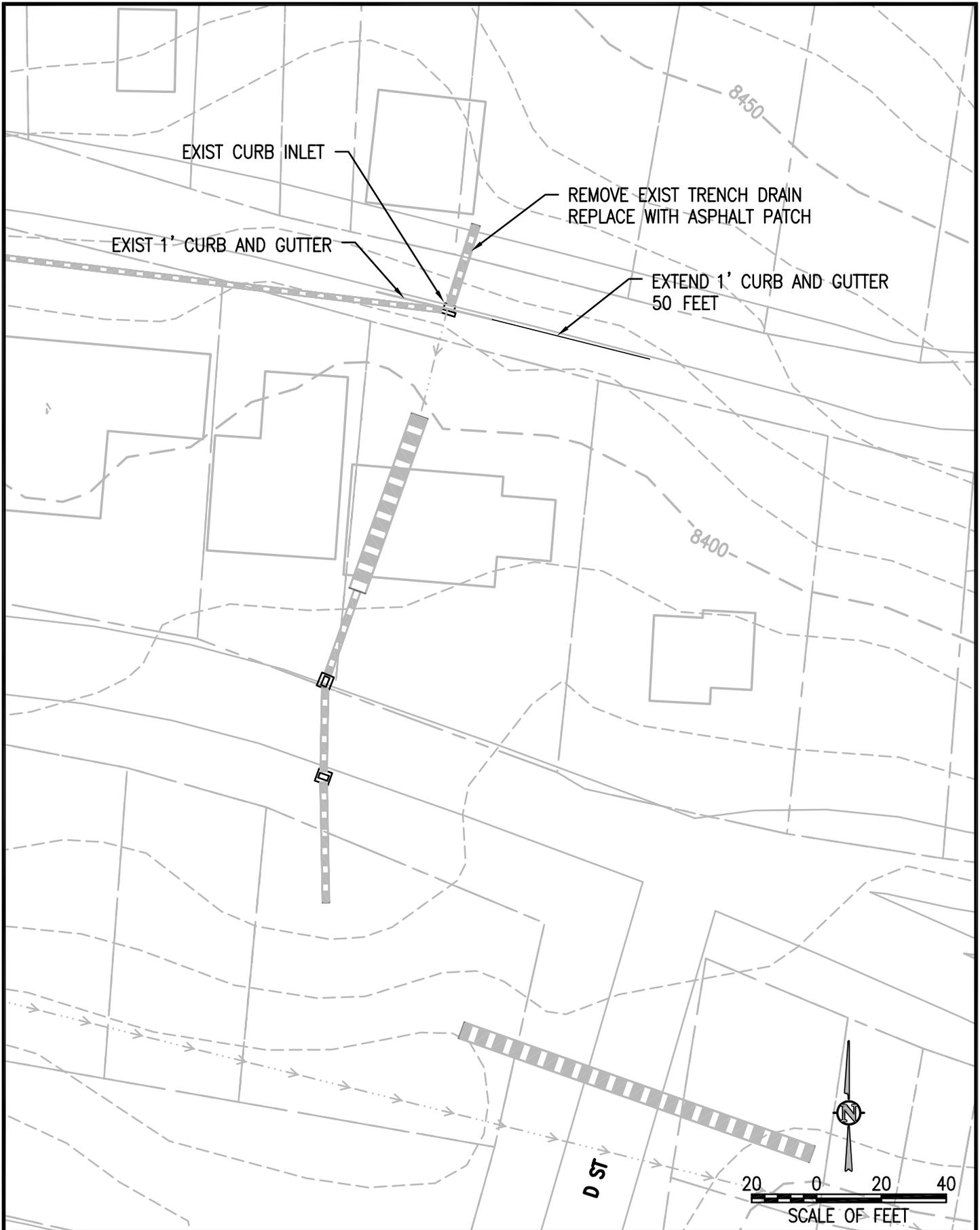


PROJECT #8 - TRENCH DRAINS 3

CENTRAL CITY WQIF
12/16/2014



JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com

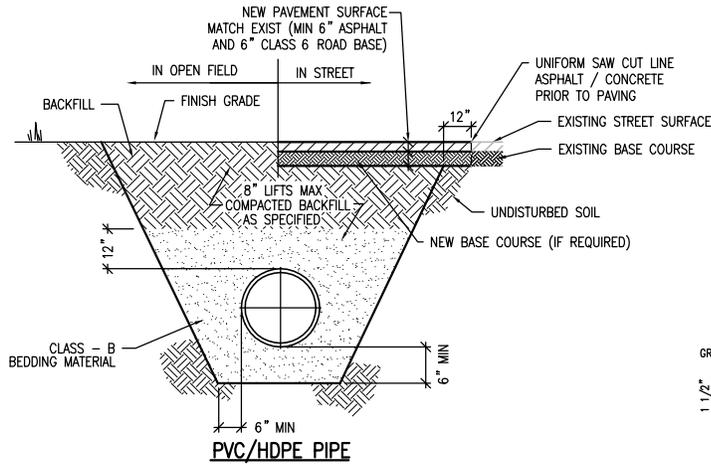


PROJECT #8 - TRENCH DRAINS 4

CENTRAL CITY WQIF
12/16/2014

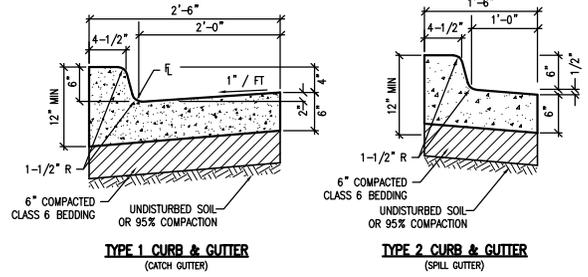


JVA, Incorporated
Post Office Box 1860
47 Cooper Creek Way
Suite 328
Winter Park, CO 80482
Phone: 970.722.7677
Fax: 970.722.7679
E-mail info@jvajva.com



NOTES:

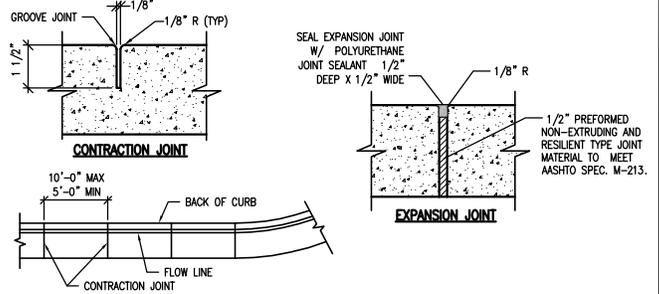
1. IF UNSTABLE MATERIALS ARE FOUND IN TRENCH BOTTOM, OVEREXCAVATE PER SPEC OR AS REQUIRED.
2. TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES.
3. MINIMUM COVER 18" BELOW FINAL GRADE.



TYPE 1 CURB & GUTTER
(CATCH GUTTER)

TYPE 2 CURB & GUTTER
(SPILL GUTTER)

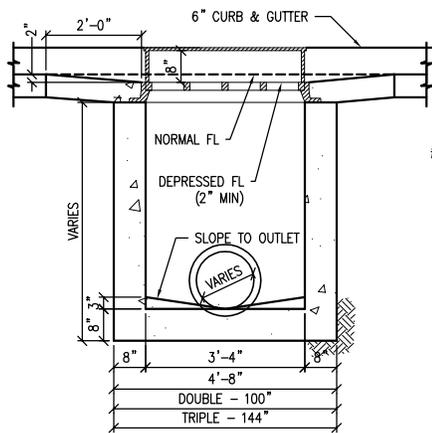
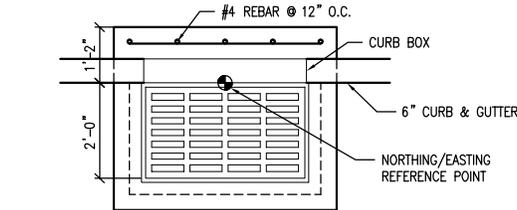
CURB & GUTTER (TYPE 1 & 2)



CONTRACTION JOINT

EXPANSION JOINT

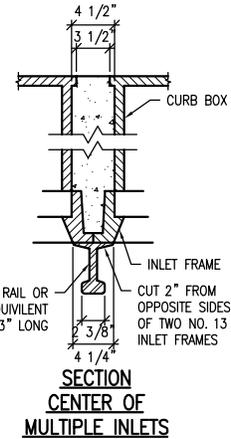
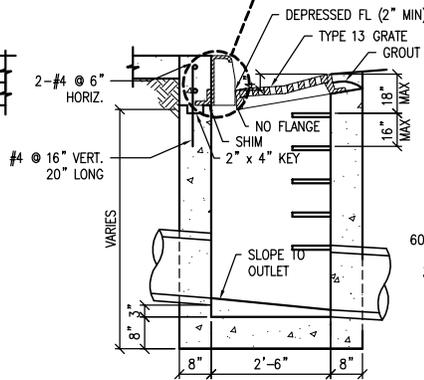
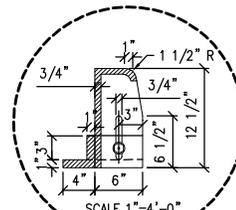
STORM SEWER PIPE BEDDING DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 15)



NOTES:

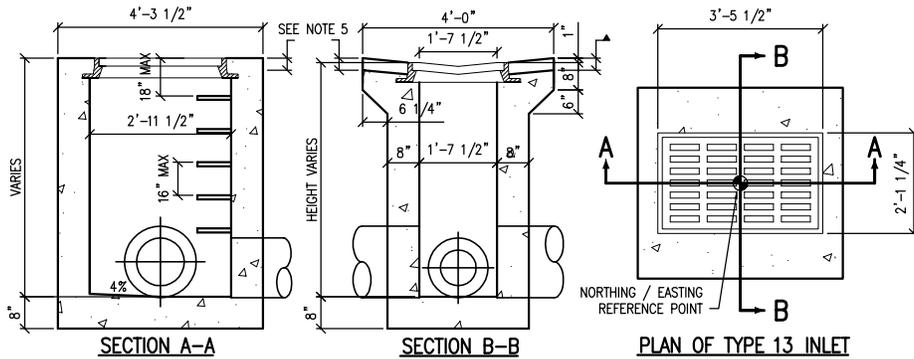
1. INLET STRUCTURES SHALL ALSO INCLUDE 2'-0" CURB & GUTTER TRANSITION SECTION AT EACH END OF INLET PLUS SIDEWALK SECTIONS WHERE REQ'D BEHIND INLET STRUCTURE AND TRANSITION SECTIONS
2. FLOOR SLOPE MAY BE POURED MONOLITHIC WITH BASE
3. OUTLET PIPE(S) TO BE SET FLUSH WITH INSIDE FACE OF INLET WALL
4. UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS OR OTHERWISE APPROVED, ALL No 13 COMBINATION INLETS SHALL BE CONSTRUCTED WITH AN ADJUSTABLE CI CURB BOX
5. STD INLET DEPTHS AND PIPE SIZE ARE NOTED ON THE FOLLOWING TABLE. DEVIATIONS FROM THESE MIN REQUIREMENTS SHALL BE SUBSTANTIATED WITH APPROPRIATE HYDRAULIC ANALYSIS
6. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL
7. NORTHING/EASTING REFERENCE POINT TO BE AT FLOWLINE AT MIDPOINT OF INLET. FLOWLINE ELEVATIONS SHOWN ON PLANS REFER TO NORMAL FLOWLINE. DEPRESS AND TRANSITION FLOWLINE AT OPENING AND ADJACENT TO CURB AND GUTTER AS SHOWN.

CURB AND GUTTER DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 4)



SECTION CENTER OF MULTIPLE INLETS

COMBINATION INLET DETAIL
NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 18)

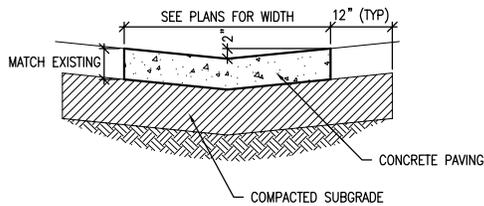


NOTES:

1. CONCRETE SHALL BE CDOT CLASS A OR B. INLET MAY BE CAST-IN-PLACE, PRECAST AND CONFORMING TO ASTM C-478
2. CAST-IN-PLACE CONCRETE WALLS EDGES SHALL BE CHAMFERED 3/4"
3. ALL WALLS AND BASE SHALL BE REINFORCED WITH #4'S @ 8" OC EACH WAY REINFORCING BARS SHALL BE DEFORMED AND SHALL HAVE A 2" MINIMUM CLEARANCE
4. STEPS SHALL BE PROVIDED WHEN INLET HEIGHT EXCEEDS 3'-6" AND SHALL BE IN ACCORDANCE WITH AASHTO M 199
5. ALL GRATES AND FRAMES SHALL BE GRAY OR DUCTILE CAST IRON CONFORMING TO CDOT 712.06. GRATES AND FRAMES SHALL BE DESIGNED TO WITHSTAND HS 20 LOADING
6. SEE PLAN DETAILS FOR LOCATION AND SIZE OF PIPE
7. WHEN BITUMINOUS MATERIAL IS TO EXTEND TO THE EDGE OF THE GRATING FRAME, CONCRETE MAY BE DEPRESSED
9. STEPS SHALL BE CONSTRUCTED AS PER PLASTIC STEP DETAIL

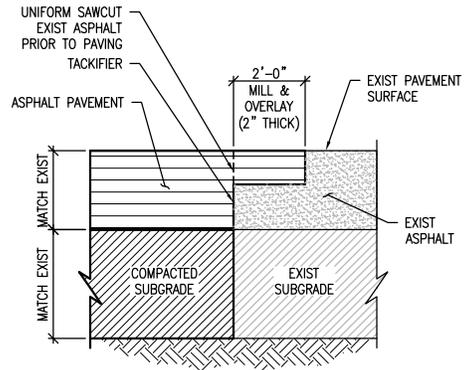
TYPE 13 FIELD INLET DETAIL 

NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 17)



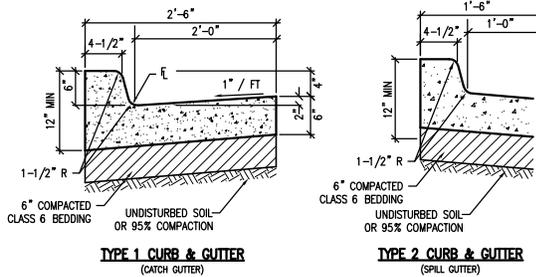
CONCRETE PAN DETAIL 

NTS



ASPHALT "T" PATCH DETAIL 

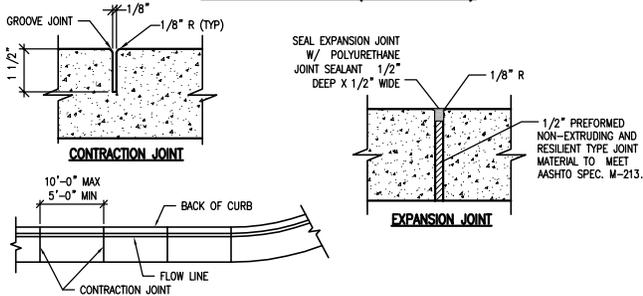
NTS



TYPE 1 CURB & GUTTER
(CATCH GUTTER)

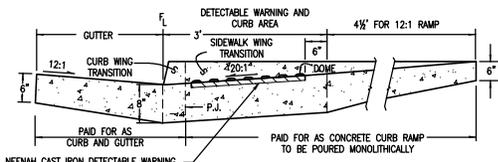
TYPE 2 CURB & GUTTER
(SPILL GUTTER)

CURB & GUTTER (TYPE 1 & 2)



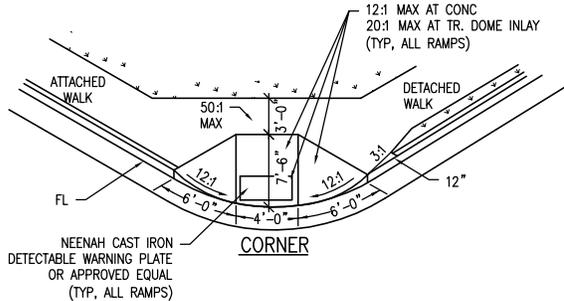
CURB AND GUTTER DETAIL

NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 4)



**SIDE SECTION VIEW OF
DETECTABLE WARNING, WELL, CURB, AND GUTTER**

P.J. = PERMISSIBLE JOINT WITH EPOXY-COATED DEFORMED NO. 4 BY 18 IN. BARS CONFORMING TO AASHTO M 284 AT 18 IN. SPACING.

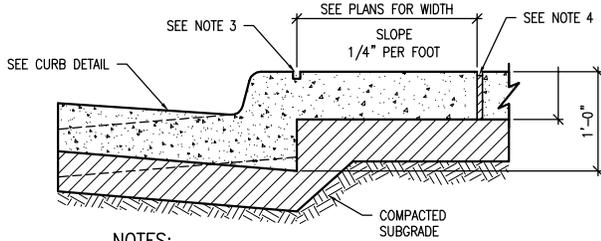


NOTES:

1. THERE SHALL BE NO LIP WHERE THE RAMP MEETS THE GUTTER
2. CURB RAMP SHALL BE PROVIDED AT ALL CORNERS OF STREET INTERSECTIONS AND AT "T" INTERSECTIONS WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB.
3. RAMP LOCATION SHALL BE SPECIFIED ON THE CONSTRUCTION PLANS.
4. NEENAH CAST IRON DETECTABLE WARNING PLATE OR APPROVED EQUAL.
5. CONCRETE RAMP AND WING SURFACES SHALL BE TEXTURED WITH A COARSE BROOMED SURFACE ONLY.
6. SEE CDOT DRAWING M-608-1 FOR FULL NOTES, DETAILS AND DIMENSIONS AND SHALL MEET CURRENT ADA STANDARDS.

CURB RAMP DETAIL

NTS (SEE CENTRAL CITY STANDARD DETAILS FIGS 6&7)

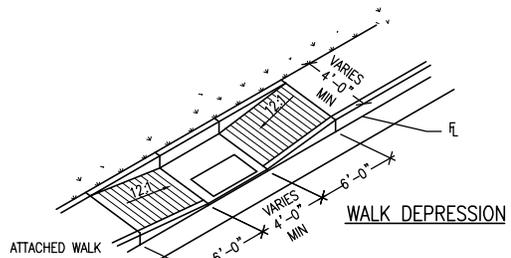


NOTES:

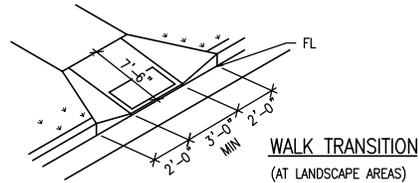
1. FOR CONCRETE REINFORCEMENT, SEE SPECIFICATIONS.
2. FOR CURB & GUTTER DIMENSIONS, SEE DETAIL THIS SHEET.
3. A TOOLED JOINT IS REQUIRED WHEN THE CURB & SIDEWALK ARE POURED MONOLITHICALLY.
4. EXPANSION JOINTS SHALL BE INSTALLED WHEN ABUTTING EXISTING CONCRETE OR FIXED STRUCTURE. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK AND SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE.

ATTACHED WALK DETAIL

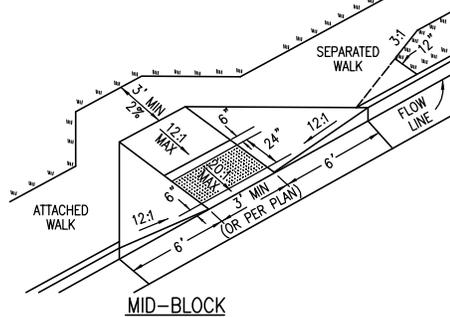
NTS



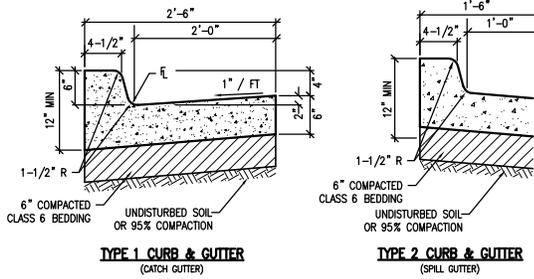
WALK DEPRESSION



**WALK TRANSITION
(AT LANDSCAPE AREAS)**



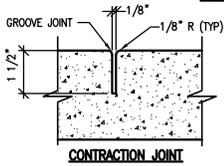
MID-BLOCK



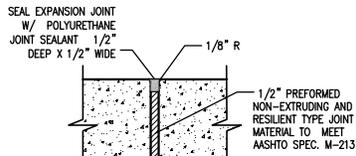
TYPE 1 CURB & GUTTER
(CATCH GUTTER)

TYPE 2 CURB & GUTTER
(SPILL GUTTER)

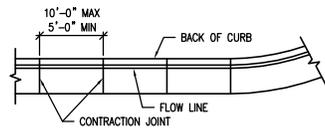
CURB & GUTTER (TYPE 1 & 2)



CONTRACTION JOINT

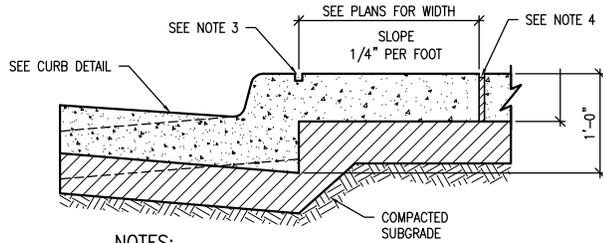


EXPANSION JOINT



CURB AND GUTTER DETAIL

NTS (SEE CENTRAL CITY STANDARD DETAILS FIG 4)

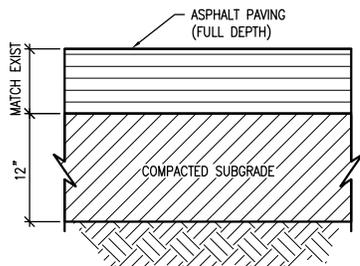


NOTES:

1. FOR CONCRETE REINFORCEMENT, SEE SPECIFICATIONS.
2. FOR CURB & GUTTER DIMENSIONS, SEE DETAIL THIS SHEET.
3. A TOOLED JOINT IS REQUIRED WHEN THE CURB & SIDEWALK ARE POURED MONOLITHICALLY.
4. EXPANSION JOINTS SHALL BE INSTALLED WHEN ABUTTING EXISTING CONCRETE OR FIXED STRUCTURE. EXPANSION JOINT MATERIAL SHALL BE 1/2" THICK AND SHALL EXTEND THE FULL DEPTH OF CONTACT SURFACE.

ATTACHED WALK DETAIL

NTS

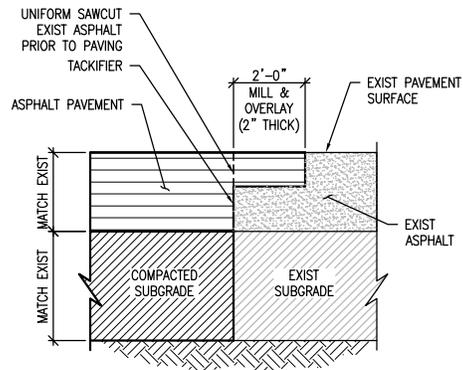


NOTES:

1. COMPACT SUBGRADE TO 95% STD PROCTOR (ASTM D-698) 2% ABOVE OPTIMUM MOISTURE CONTENT

ASPHALT PAVING SECTION DETAIL

NTS



ASPHALT "T" PATCH DETAIL

NTS

APPENDIX F

Cost Estimates



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Big T Storm Replacement
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$5,000.00	\$5,000.00
Pavement Subgrade Prep - 12" Scarify,Recompact	580	CY	\$4.00	\$2,320.00
Place topsoil (4")	25	CY	\$8.00	\$200.00
Fine Grading	19,890	SF	\$1.00	\$19,890.00
Cut, Fill and Compact Onsite Material	6,400	CY	\$4.00	\$25,600.00
Export Excess Cut	1,511	CY	\$20.00	\$30,224.94
Utility Allowance to Support & Relocate Exist Utilities	1	LS	\$4,000.00	\$4,000.00
Traffic Control	1	LS	\$1,500.00	\$1,500.00
	General Sitework Subtotal			\$88,734.94
Pavements				
Road Base - 8"	655	TONS	\$20.00	\$13,100.00
Asphalt Paving - 4"	387	TONS	\$95.00	\$36,765.00
Concrete - 4' Pan, reinforced	1,660	SF	\$6.00	\$9,960.00
Signage & Striping	1	LS	\$5,000.00	\$5,000.00
	Pavements Subtotal			\$64,825.00
Utility - Storm Drainage System				
Storm Line - 60" RCP (Corrosion Resistance Lined)	430	LF	\$265.00	\$113,950.00
Class B Bedding Material	1,800	TONS	\$22.00	\$39,600.00
Inlet - Modified Type D (9' depth)	1	EA	\$9,000.00	\$9,000.00
Inlet - Modified Type D (11' depth)	1	EA	\$11,000.00	\$11,000.00
Inlet - Modified Type D (13' depth)	1	EA	\$13,000.00	\$13,000.00
Existing Inlet Modifications	1	EA	\$5,000.00	\$5,000.00
	Utility - Storm Drainage System Subtotal			\$191,550.00
Erosion Control				
Silt Fence	50	LF	\$4.00	\$200.00
Concrete Washout	1	EA	\$1,000.00	\$1,000.00
Inlet Protection	4	EA	\$300.00	\$1,200.00
Vehicle Tracking Control	1	EA	\$500.00	\$500.00
Seeding and Mulching	0.05	AC	\$2,000.00	\$100.00
Erosion Control Maintenance (months)	2	EA	\$1,000.00	\$2,000.00
	Erosion Control Subtotal			\$5,000.00

Subtotal	\$350,109.94
Contingency (20%)	\$70,025.00
Contractor's OH&P (15%)	\$63,025.00
PROJECT TOTAL	\$483,159.94

Engineer's opinions of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes for greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Spring Street Improvements
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$4,000.00	\$4,000.00
Cut, Fill and Compact Onsite Material	5,000	CY	\$4.00	\$20,000.00
Export Material	1,850	CY	\$20.00	\$37,000.00
	General Sitework Subtotal			\$61,000.00
Pavements				
Road Base - 8"	640	TONS	\$20.00	\$12,800.00
Asphalt Paving - 4"	350	TONS	\$95.00	\$33,250.00
Concrete - Curb & Gutter - 6" Vertical, 1' Pan	650	LF	\$13.00	\$8,450.00
Concrete - Curb Ramps	150	SF	\$10.00	\$1,500.00
Signage & Striping	1	LS	\$2,000.00	\$2,000.00
	Pavements Subtotal			\$58,000.00
Utility - Storm Drainage System				
Storm Line - 60" RCP (Corrosion Resistance Lined)	440	LF	\$265.00	\$116,600.00
Inlet - Type C	4	EA	\$3,500.00	\$14,000.00
	Utility - Storm Drainage System Subtotal			\$130,600.00

Subtotal	\$249,600.00
Contingency (20%)	\$49,920.00
Contractor's OH&P (15%)	\$44,930.00
PROJECT TOTAL	\$344,450.00

Engineer's opinions of probable Construction Cost provided for herein are to be made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Pipe Replacement - Multiple Locations
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$15,000.00	\$15,000.00
Pavement Subgrade Prep - 12" Overex/Moisture/Recompact	1,000	CY	\$3.00	\$3,000.00
Cut, Fill and Compact Onsite Material	20,000	CY	\$2.25	\$45,000.00
	General Sitework Subtotal			\$63,000.00
Pavements				
Asphalt Paving - 4"	120	TONS	\$95.00	\$11,400.00
Concrete - Walk & Flatwork, fiber reinforced	80	SF	\$9.00	\$720.00
Signage & Striping	1	LS	\$3,000.00	\$3,000.00
Traffic Control Plan for Work in Street	1	LS	\$800.00	\$800.00
	Pavements Subtotal			\$15,920.00
Utility - Storm Drainage System				
Storm Line - 24" HDPE	400	LF	\$50.00	\$20,000.00
	Utility - Storm Drainage System Subtotal			\$20,000.00
Erosion Control				
Concrete Washout	3	EA	\$1,000.00	\$3,000.00
Inlet Protection	10	EA	\$300.00	\$3,000.00
Vehicle Tracking Control	4	EA	\$500.00	\$2,000.00
Erosion Control Maintenance (months)	3	EA	\$1,000.00	\$3,000.00
	Erosion Control Subtotal			\$11,000.00

Subtotal	\$109,920.00
Contingency (20%)	\$21,985.00
Contractor's OH&P (15%)	\$19,790.00
PROJECT TOTAL	\$151,695.00

Engineer's opinions of probable Construction Cost provided for herein are to be made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Detention Ponds
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$4,500.00	\$4,500.00
Stripping and Stockpile topsoil	0.4	AC	\$1,000.00	\$400.00
Place topsoil	420	CY	\$2.00	\$840.00
Fine Grading	17,000	SF	\$0.25	\$4,250.00
Cut, Fill and Compact Onsite Material	1,200	CY	\$3.00	\$3,600.00
Export Excess Cut	950	CY	\$8.00	\$7,600.00
Oulet Structures	4	EA	\$5,000.00	\$20,000.00
	General Sitework Subtotal			\$41,190.00
Erosion Control				
Silt Fence	150	LF	\$2.50	\$375.00
Inlet Energy Dissipation (Riprap)	4	EA	\$1,000.00	\$4,000.00
Outfall Protection w/ Riprap	4	EA	\$1,000.00	\$4,000.00
Seeding and Mulching	0.4	AC	\$2,000.00	\$800.00
Erosion Control Maintenance (months)	1	EA	\$1,000.00	\$1,000.00
	Erosion Control Subtotal			\$10,175.00

Subtotal	\$51,365.00
Contingency (20%)	\$10,275.00
Contractor's OH&P (15%)	\$9,250.00
PROJECT TOTAL	\$70,890.00

Engineer's opinions of probable Construction Cost provided for herein are to made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Drainage Swales
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$2,000.00	\$2,000.00
Cut, Fill and Compact Onsite Material	6,500	CY	\$2.25	\$14,625.00
Cut and Export Bedrock	200	CY	\$50.00	\$10,000.00
	General Sitework Subtotal			\$26,625.00
Erosion Control				
Erosion Control Blanket	30000	SF	\$2.50	\$75,000.00
Erosion Control Maintenance (months)	3	EA	\$1,000.00	\$3,000.00
	Erosion Control Subtotal			\$78,000.00

Subtotal	\$104,625.00
Contingency (20%)	\$20,925.00
Contractor's OH&P (15%)	\$18,835.00
PROJECT TOTAL	\$144,385.00

Engineer's opinions of probable Construction Cost provided for herein are to made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Inlet Protection / Trashracks
Central City, CO

	Quantity	Units	Unit Cost	Total
Erosion Control				
Catch Basin Trash Filter	15	EA	\$125.00	\$1,875.00
Catch Basin Sediment Filter	8	EA	\$750.00	\$6,000.00
Gravel Sock Inlet Protection	5	EA	\$150.00	\$750.00
Trash Racks	8	EA	\$500.00	\$4,000.00
	Erosion Control Subtotal			\$12,625.00

Subtotal	\$12,625.00
Contingency (20%)	\$2,525.00
Contractor's OH&P (15%)	\$2,275.00
PROJECT TOTAL	\$17,425.00

Engineer's opinions of probable Construction Cost provided for herein are to be made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Additional Stormwater Infrastructure
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$2,000.00	\$2,000.00
Cut, Fill and Compact Onsite Material	9,000	CY	\$2.25	\$20,250.00
	General Sitework Subtotal			\$22,250.00
Pavements				
Asphalt Patch	160	SF	\$4.00	\$640.00
Concrete - Walk & Flatwork, fiber reinforced	50	SF	\$3.00	\$150.00
Concrete - Curb & Gutter - 6" Vertical, 1' Pan	10	LF	\$13.00	\$130.00
Traffic Control Plan for Work in Street	1	LS	\$1,200.00	\$1,200.00
	Pavements Subtotal			\$2,120.00
Utility - Storm Drainage System				
Storm Line - 18" HDPE	240	LF	\$37.00	\$8,880.00
Storm Line - 24" HDPE	280	LF	\$50.00	\$14,000.00
FES - 18" HDPE	5	EA	\$800.00	\$4,000.00
Inlet - Type 13	2	EA	\$2,800.00	\$5,600.00
Inlet - 3' Combination (4' depth)	2	EA	\$3,500.00	\$7,000.00
	Utility - Storm Drainage System Subtotal			\$39,480.00
Erosion Control				
Silt Fence	25	LF	\$2.50	\$62.50
Channel Lining Matting	15	SY	\$20.00	\$300.00
Inlet Protection	2	EA	\$300.00	\$600.00
	Erosion Control Subtotal			\$962.50

Subtotal	\$64,812.50
Contingency (20%)	\$12,965.00
Contractor's OH&P (15%)	\$11,670.00
PROJECT TOTAL	\$89,447.50

Engineer's opinions of probable Construction Cost provided for herein are to made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Trench Drains - Remove and Replace
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	7	LS	\$2,000.00	\$14,000.00
Cut, Fill and Compact Onsite Material	1,680	CY	\$2.25	\$3,780.00
	General Sitework Subtotal			\$17,780.00
Pavements				
Asphalt Patch	420	SF	\$4.00	\$1,680.00
Concrete - Walk & Flatwork, fiber reinforced	100	SF	\$8.00	\$800.00
Concrete - Curb & Gutter - 6" Vertical, 1' Pan	65	LF	\$13.00	\$845.00
Concrete - 2' Pan, reinforced	210	SF	\$8.00	\$1,680.00
Traffic Control Plan for Work in Street	1	LS	\$6,000.00	\$6,000.00
	Pavements Subtotal			\$11,005.00
Utility - Storm Drainage System				
Storm Line - 18" HDPE	50	LF	\$37.00	\$1,850.00
Storm Line - 24" HDPE	50	LF	\$50.00	\$2,500.00
Inlet - Type 13	2	EA	\$2,800.00	\$5,600.00
	Utility - Storm Drainage System Subtotal			\$9,950.00
Erosion Control				
Inlet Protection	10	EA	\$300.00	\$3,000.00
	Erosion Control Subtotal			\$3,000.00

Subtotal	\$41,735.00
Contingency (20%)	\$8,350.00
Contractor's OH&P (15%)	\$7,515.00
PROJECT TOTAL	\$57,600.00

Engineer's opinions of probable Construction Cost provided for herein are to be made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.



JVA, Incorporated
 47 Cooper Creek Way
 Suite 328
 Winter Park, CO 80482
 Ph: 970.722.7677
 Fax: 970.722.7679

Job Name: SWMP
 Job Number: 1910.22c
 Date:
 By: CWK
 Phase: CIP

Opinion of Probable Costs
 for
Curb and Gutter Improvements
Central City, CO

	Quantity	Units	Unit Cost	Total
General Sitework				
Demo Existing Misc. Structures/Clear & Grub	1	LS	\$20,000.00	\$20,000.00
Pavement Subgrade Prep - 12" Scarify,Recompact	2,000	CY	\$4.00	\$8,000.00
Traffic Control	1	LS	\$2,000.00	\$2,000.00
	General Sitework Subtotal			\$30,000.00
Pavements				
Asphalt Patch	1,000	SF	\$4.00	\$4,000.00
Concrete - Walk & Flatwork, fiber reinforced	5,000	SF	\$9.00	\$45,000.00
Concrete - Curb & Gutter - 6" Vertical, 1' Pan	1,000	LF	\$13.00	\$13,000.00
Concrete - Curb Ramps	500	SF	\$10.00	\$5,000.00
Concrete - 4' Pan, reinforced	100	SF	\$5.50	\$550.00
Traffic Control Plan for Work in Street	1	LS	\$1,500.00	\$1,500.00
	Pavements Subtotal			\$69,050.00
Utility - Storm Drainage System				
Inlet - 3' Combination (3' depth)	5	EA	\$3,000.00	\$15,000.00
	Utility - Storm Drainage System Subtotal			\$15,000.00
Erosion Control				
Inlet Protection	15	EA	\$300.00	\$4,500.00
	Erosion Control Subtotal			\$4,500.00

Subtotal	\$118,550.00
Contingency (20%)	\$23,710.00
Contractor's OH&P (15%)	\$21,340.00
PROJECT TOTAL	\$163,600.00

Engineer's opinions of probable Construction Cost provided for herein are to be made on the basis of Engineer's experience and qualifications and represent Engineer's best judgment as an experienced and qualified professional generally familiar with the industry. However, since the Engineer has no control over the cost of labor, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer cannot and does not guarantee that proposals, bids, or actual Construction Cost will not vary from opinions of probable Construction Cost prepared by Engineer. Actual required quantities will vary from this estimate. Owner/Contractor to verify all required quantities and other estimate items, permits, fees, etc. not included above that may be specified in the Construction documents. If Owner wishes to greater assurance as to probable Construction Cost, Owner shall employ an independent cost estimator.

APPENDIX G

NPL Fact Sheet



UPDATE FACT SHEET

CENTRAL CITY/CLEAR CREEK SUPERFUND SITE

August 2014

Site Summary

Location

The Central City/Clear Creek Superfund site is located in Clear Creek and Gilpin counties, approximately 30 miles west of Denver. The Superfund study area covers the 400-square mile drainage basin of Clear Creek, which has been affected by a number of inactive precious metal mines. The Superfund investigation has focused on mine drainage tunnels and mine tailings and waste rock piles.

History

Gold was discovered near Idaho Springs and in the Black Hawk/Central City area in 1859. For the next 20 years, the Black Hawk/Central City area was the leading mining center in Colorado with the construction of mills to process the gold and silver found through placer and hard rock mining. The decline of mining in the area began with the silver crash in the 1890s and the rise in mining in Leadville. However, mining continued to be an important industry in Clear Creek and Gilpin counties from the turn of the century until approximately 1950. Since 1950, mining in the area has been limited, with only a handful of mines currently operating.

The site was placed on the list of Superfund sites in September 1983. Since that time, the Colorado Department of Public Health and Environment (CDPHE),

the U.S. Environmental Protection Agency (EPA) and the local community have worked to clean up heavy metal contamination resulting from decades of hard rock mining in the area. CDPHE and EPA have developed clean-up plans to deal with the worst sources of contamination within the Clear Creek watershed.

In 1992, limited stakes gaming began in Central City and Black Hawk, leading to land use changes. While these changes have the potential to increase the direct human exposure to mine wastes, many mine waste clean-up projects were implemented as property developed.

Environmental Concerns

The most significant environmental impacts associated with the site affect the Clear Creek stream system, including a reduced fishery and impacts to other aquatic life and habitat. Acidic water that drains from many mines contains various heavy metals, and tailings and waste rock contribute to the non-point source impacts to the basin. Clear Creek is a drinking water source for more than one-quarter million people living in the Denver area, and is a favored place for kayaking, rafting, fishing, wildlife watching and gold panning. The human health hazard from this site involves potential exposure to heavy metals, primarily lead, arsenic, and cadmium. Soil from the tailings piles and waste rock contains heavy metals.

Inside:

North Clear Creek Water Treatment Plant on hold	Page 2
Quartz Hill project nears completion.....	Page 3
Agencies to issue ESD on Argo Tunnel bulkhead	Page 4
Five-year review	Page 4
Meet the EPA team	Page 5

North Clear Creek water treatment plant on hold

Due to the uncertainty of ongoing water rights negotiations with the City of Black Hawk and Gilpin County, construction of the North Clear Creek mine water treatment plant is on hold. The U.S. Environmental Protection Agency and the Colorado Department of Public Health and Environment are working to implement a Superfund remedy under the federal Comprehensive Environmental Response, Compensation and Liability Act.

The Operable Unit 4 Record of Decision (ROD) was issued in 2004 to address metals contamination impacting the North Fork of Clear Creek. In April 2010 the agencies amended the ROD to incorporate active treatment of the Gregory Incline discharge, the National Tunnel discharge, and Gregory Gulch flows at a new water treatment plant. Drainage coming from abandoned mines is acidic and carries metals such as zinc, copper and cadmium. These metals are toxic to fish and plants and cause treatment expense to municipal drinking water suppliers. The water treatment plant would remove these contaminants. The plant would be constructed adjacent to North Clear Creek downstream of Black Hawk.

Shortly after the ROD amendment was published, the City of Black Hawk filed for new water rights to allow it to divert water from the North Fork of Clear Creek immediately below the future treatment plant. Later, Gilpin County filed for additional rights that would also divert from the North Fork of Clear Creek. While the City and County will benefit from the clean water the treatment plant will produce, these new water rights could effectively dry up the North Fork of Clear Creek below the water treatment plant. Negotiations between the agencies, Black Hawk and Gilpin County began in early 2011



Rendering of new North Creek water treatment plant

with the goal of reaching an agreement to leave enough water in the stream to allow brown trout to survive while still meeting future municipal needs. Central City participated in some of the negotiations but has withdrawn. A sustainable brown trout fishery in North Clear Creek is a main objective of the OU4 ROD, as described below.

Surface Water Remedial Objectives:

- Reduce in-stream metals concentrations and sediment transport to minimize water quality and habitat impacts and to maximize reasonably attainable water uses of the North Fork of Clear Creek. These actions also will support the survival of a brown trout population in the North Fork of Clear Creek.
- Reduce in-stream metals concentrations and sediment transport in North Clear Creek with the purpose of reducing adverse water quality and habitat impacts on the main stem of Clear Creek, to protect aquatic life and to support a reproducing brown trout population in the main stem of Clear Creek.
- Ensure that in-stream metals concentrations do not degrade drinking water supplies diverted from the main stem of Clear Creek.
- Reduce the toxicity to benthic aquatic organisms living at the surface water/sediment interface or in sediment to levels that are protective of aquatic life.

Continued next page...

The agencies are firmly committed to the Remedial Action Objectives stated in the 2010 ROD Amendment. Design of the water treatment plant is complete and approximately \$19 million of EPA and state funding has been set aside for construction. Selection of a contractor to build the plant was put on hold in March when negotiations stalled. Construction was initially planned to begin later this summer.

Quartz Hill project nears completion

The Colorado Department of Public Health and Environment project to stabilize the Quartz Hill Tailings Pile in Central City is expected to end during the second week of August 2014. Hammerlund Construction, LLC of Sedalia, Colo., began work on the site March 31, 2014. Pinyon Environmental is responsible for air quality monitoring to verify dust control efforts are effective. To date, all measurements have met health-protective limits.

The Quartz Hill Tailings Pile erodes tailings to Gregory Gulch and Central City's storm sewer system. Grading the pile to a stable slope and capping with inert rock and an underlying geotextile will prevent erosion. These actions will ultimately improve water quality in the North Fork of Clear Creek. In addition, 1,000 feet of deteriorated storm sewer beneath the pile will be replaced.

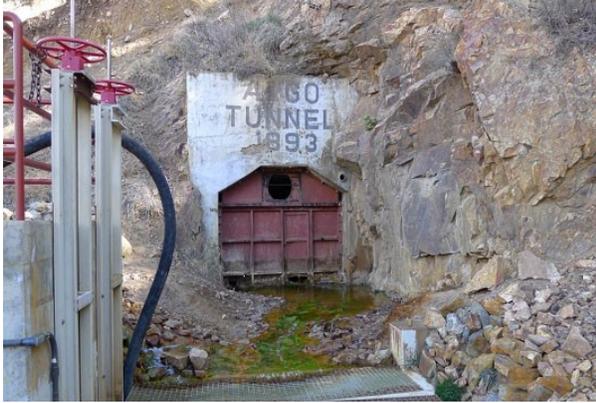
All of the cover rock came from a stockpile along the Central City Parkway about a mile and a half from the site, re-using what otherwise would be considered waste material. Because the stockpile contained native rock from the area, once capped, the appearance of the Quartz Hill pile will be more appropriate than if an off-site source of rock had been used. CDPHE worked closely with Central City to minimize traffic impacts to local residents and businesses and address city concerns.

All construction materials and equipment are transported on the Central City Parkway and Nevada Street. All lanes on Nevada Street will remain open throughout the project. The State Historic Preservation Officer (SHPO) and local historic preservation officials were consulted before the project began. Existing cultural resources were documented, and an archaeologist is present during critical construction phases to protect historic structures that might be revealed during excavation. The yellow house at the top of the site was relocated to allow construction. Remnants of a historic load-out structure on top of the pile were removed, with approval by the SHPO and local authorities.

The completion of Quartz Hill leaves just two major remedial projects to be completed for the Central City/Clear Creek Superfund Site – building a water treatment plant to capture and treat contaminated water flowing into North Clear Creek and constructing a flow-through bulkhead in the Argo Tunnel. The water treatment project is on hold due to the uncertainty of ongoing water rights negotiations with the city of Black Hawk and Gilpin County.



Quartz Hill in Central City



Argo Tunnel

Agencies to issue ESD on Argo Tunnel bulkhead

The Colorado Department of Public Health and Environment and the U.S. Environmental Protection Agency will issue an explanation of significant differences (ESD) for the Argo Tunnel Discharge – Flow Control Bulkhead. The document explains differences between the 1991 selected remedy to address Argo Tunnel discharge and the modification to build a flow-through bulkhead in the tunnel this fall.

The Argo Tunnel has a history of surge events that released acidic metals-laden mine water to the environment. The first recorded event occurred in 1943 when miners intercepted and released a large volume of naturally impounded water, killing four miners. A second event occurred in 1980 as a result of a rock collapse in one or more areas of the tunnel. An unknown volume of water that had been stored during mining operations was released and the water entered Clear Creek from the tunnel portal. The surge event forced the closure of six drinking water intakes located within the Golden area. It is unclear when another event will occur, but over time, the potential is very real.

The Argo Tunnel discharges acidic mine water containing dissolved metals that exceed both surface water quality and drinking water standards. Before the Argo Tunnel Water Treatment Facility began operating in 1998, the Argo discharge

flowed directly to the main stem of Clear Creek, killing or harming fish from the entry point to the city of Golden.

The bulkhead will not change the performance of the existing treatment technology or function of the Argo Tunnel Water Treatment Plant in Idaho Springs. The bulkhead will prevent future surge events from impacting Clear Creek and control flow volume to the plant, resulting in reduced treatment costs.

Once completed, copies of the ESD will be available at the Gilpin County Court House in Central City, at the Clear Creek Watershed Foundation, 2060 Miner Street in Idaho Springs, as well as in the Colorado Department of Public Health Records Center and the EPA Superfund Records Center in Denver. The ESD will be posted on the CDPHE website at <https://www.colorado.gov/pacific/cdphe/central-city-clear-creek>. For more information, contact Warren Smith, (CDPHE) or Jasmin Guerra (EPA).

Five-year review under way

The Colorado Department of Public Health and Environment and the U.S. Environmental Protection Agency are conducting a five-year review of cleanup actions performed under the Superfund program for the Central City/Clear Creek Superfund Site. The review evaluates whether clean up alternatives are still protective of human health and the environment.

With impacts from mine waste piles and tunnel discharges throughout the watershed, cleanup goals focus on improving water quality. The environmental issues include metals contamination in the surface waters of Clear Creek, particularly the North Fork, and the management of mine tailings, waste rock and tunnel drainage to prevent further contamination of the creek.

This is the fifth five-year review for the site, and is scheduled to be completed by the end of September 2014. For more

information about the five-year review, please contact Warren Smith, Community Involvement Manager with the Colorado Department of Public Health and Environment at warren.smith@state.co.us.

Further information about the site is available at: <http://tinyurl.com/centralcityclearcreek> or www2.epa.gov/region8/central-cityclear-creek.

Meet the EPA team



Les Sims, Remedial Project Manager

Les has over 20 years of work-related experience involving Superfund cleanup projects. He has been with the Agency for over 13 years and currently is the Federal Remedial Project Manager

(RPM) for Lowry Landfill, Eagle Mine and Central City/Clear Creek Superfund Sites. Prior to working in the Remedial Program, he served as an On-scene Coordinator for several years in EPA's Emergency Response and Removal Program.

Les holds Bachelor of Science degrees in Environmental Science and Business Management as well as a Master of Science degree in Environmental Health and Management. Prior to joining the Agency, he served as Senior Project Manager for a recognized fortune 500 engineering firm that provided technical support and consultation to EPA's Superfund Program. In his leisure time, Les enjoys spending time with family and friends and occasional overseas travel.

Jasmin Guerra, Community Involvement Coordinator

Jasmin has been with the EPA for four years and currently works as the community involvement coordinator for eight Superfund sites. Previously, she



was an EPA grants specialist working closely with tribes, states and local governments. She served as Region 8's Hispanic Employment Program (HEP) manager and National HEP Council outreach chair for two years.

She has a bachelor's degree in international studies and a master's degree in public administration. Before coming to EPA she worked as a residential program coordinator for the Englewood Meridian Retirement Community, was an interviewer/recruiter for the Oregon State University's Latino Health Project and a promise intern for the state of Oregon. While attending the University of Oregon she was a global feminist issues coordinator for the Women's Center, women's coordinator for the Latino Student Union, a union researcher and a bilingual math tutor.

WE VALUE YOUR FEEDBACK

1. How clear and understandable are our fact sheets and other information products?
2. Are we providing needed information in a timely manner?
3. What other information can we provide that would help you?

Please telephone, e-mail or mail your response and any address changes to:

Warren Smith
Community Involvement Manager
(303) 692-3373
warren.smith@state.co.us
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
HMWMD-B2
Denver, CO 80246-1530

FOR MORE INFORMATION:

**Colorado Department of
Public Health and Environment**

Overall Coordination/Project Manager

Steve Laudeman, State Buildings Program Delegee
(303) 692-3381

E-mail: steve.laudeman@state.co.us

Argo Tunnel Water Treatment Plant & OU 4 Water Treatment Plant

Mary Boardman, Plant Manager
(303) 692-3413

E-mail: mary.boardman@state.co.us

Operable Unit 4

Jim Lewis, Clear Creek Site Manager
(303) 692-3390

E-mail: james.lewis@state.co.us

Community Involvement

Warren Smith, Community Involvement Manager
(303) 692-3373

E-mail: warren.smith@state.co.us

U.S. Environmental Protection Agency

Les Sims, Remedial Project Manager
(303) 312-6224

E-Mail: sims.leslie@epa.gov

Jasmin Guerra, Community Involvement Coordinator
(303) 312-6508

Mail: guerra.jasmin@epa.gov



COLORADO
Department of Public
Health & Environment

