



Stormwater Management Facility Inspection and Maintenance (I&M) Plan Template

for:

Alameda Buckley Subdivision Flg No. 1

Located at:

16620 E. Alameda Parkway, Aurora, CO 80017

Prepared for:

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March 2025

Approved For One Year From This Date

City Engineer

Date

Water Department

Date

Reference:

This plan is adapted from Southeast Metro Stormwater Authority, *OPERATION AND MAINTENANCE (O & M) MANUAL*, and Town of Parker, Colorado, *STORMWATER PERMANENT BEST MANAGEMENT PRACTICES (PBMP) LONG-TERM OPERATION AND MAINTENANCE MANUAL*, October 2004

**Stormwater Management Facility
Inspection and Maintenance (I&M) Plan**

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Stormwater Management Facility Inspection and Maintenance (I&M) Plan

I. Compliance with Stormwater Facility Maintenance Requirements

All property owners are responsible for ensuring stormwater facilities installed on their property are properly maintained and function as designed. Metronet may elect to assign many of the management and maintenance functions described in this plan to a third party. Metronet is aware of their responsibilities regarding stormwater facility maintenance. Maintenance agreement(s) associated with this property are provided in Appendix A.

II. Inspection & Maintenance – Annual Reporting

Requirements for the inspection and maintenance of stormwater facilities, as well as reporting requirements are included in this Stormwater Management Facility Inspection and Maintenance (I&M) Plan.

Verification that the Stormwater facilities have been properly inspected and maintained; submittal of the required Inspection and Maintenance Forms and Inspector qualifications shall be provided to the City of Aurora on an annual basis. The annual reporting form shall be provided to the City of Aurora prior to May 31st of each year.

Copies of the Inspection and Maintenance forms for each of the stormwater facilities are located in Appendix D and E. A standard annual reporting form is provided in Appendix F. Each form shall be reviewed and submitted by the property owner or property manager to:

City of Aurora
Operations Compliance Division
Aurora Water – Stormwater/Wastewater Operations
13646 East Ellsworth Avenue
Aurora, Colorado 80012

III. Preventative Measures to Reduce Maintenance Costs

The most effective way to maintain your water quality facility is to prevent the pollutants from entering the facility in the first place. Common pollutants include sediment, trash & debris, chemicals, dog wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. Metronet's maintenance program includes measures to address these potential contaminants. Depending on the storm water quality facilities installed on the site the maintenance program includes:

- Educate property owners/residents to be aware of how their actions affect water quality, and how they can help reduce maintenance costs.
- Keep properties, streets and gutters, and parking lots free of trash, debris, and lawn clippings.

- Ensure the proper disposal of hazardous wastes and chemicals.
- Plan lawn care to minimize the use of chemicals and pesticides.
- Sweep paved surfaces regularly and dispose the sweepings properly.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings – dispose of properly.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean out the upstream components of the storm drainage system, including inlets, storm sewers and outfalls.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.

IV. Access and Easements

Metronet shall prepare a drawing showing all stormwater management facilities located on the site including designated access locations as well as a required easements. Refer to the Stormwater Facilities Map located in Appendix G for access and easement locations.

V. Safety

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Metronet personnel should never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present and without using appropriate personal protection equipment.

If a toxic or flammable substance is discovered, leave the immediate area and call 911.

Vertical drops and fall hazards may be encountered in areas located within and around the facility. Metronet shall avoid walking on top of retaining walls or other structures that have a significant vertical drop. If a vertical drop is identified that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

If any hazard is found within the facility area that poses an immediate threat to public safety, call 911.

VI. Field Inspection Equipment

Metronet's inspectors shall have the appropriate equipment to take to the field. This is to ensure the safety of the inspector and allow the inspections to be performed as efficiently as possible. Below is a list of the equipment that may be necessary to perform the inspections of all Stormwater Management Facilities:

- Protective clothing and boots.
- Safety equipment (vest, hard hat, confined space entry equipment).

- Communication equipment.
- Inspection and Maintenance Plan for the site including stormwater management facility location maps.
- Clipboard.
- Stormwater Facility Maintenance Inspection Forms (See Appendix D).
- Manhole Lid Remover
- Shovel.

Some of the items identified above need not be carried by the inspector (manhole lid remover, shovel, and confined space entry equipment). However, this equipment should be available in the vehicle driven to the site.

VII. Inspecting Stormwater Management Facilities

The quality of stormwater entering the waters of the state relies heavily on the proper operation and maintenance of permanent best management practices. Stormwater management facilities shall be periodically inspected to ensure they function as designed. The inspection will determine the appropriate maintenance required for the facility.

A. Inspection Procedures

All stormwater management facilities shall be inspected by a qualified individual at a minimum of once per year. See the City of Aurora *Storm Drainage Design & Technical Criteria* Manual for general guidelines for an inspector. Inspections will follow the inspection guidance found in the SOP for the specific type of facility. (Appendix C of this plan).

B. Inspection Report

Metronet's personnel or inspector conducting the inspection activities shall complete the appropriate inspection report for the specific facility. Inspection reports are located in Appendix D.

The following information explains how to fill out the Inspection Forms:

General Information

This section identifies the facility location, person conducting the inspection, the date and time the facility was inspected, and approximate days since the last rainfall. Property classification is identified as single-family residential, multi-family residential, commercial, or other.

The reason for the inspection is also identified on the form depending on the nature of the inspection. All facilities shall be inspected on an annual basis at a minimum. In addition, all facilities shall be inspected after a significant precipitation event to ensure the facility is draining appropriately and to identify any damage that occurred as a result of the

increased runoff.

Inspection Scoring

For each inspection item, a score must be given to identify the urgency of required maintenance. The scoring is as follows:

- 0 = No deficiencies identified.
- 1 = Monitor – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.
- 2 = Routine Maintenance Required – Some inspection items can be addressed through the routine maintenance program (See SOP in appendix C). This can include items like vegetation management or debris/trash removal.
- 3 = Immediate Repair Necessary – This item needs immediate attention because failure is imminent or has already occurred. This could include items such as structural failure of a feature (outlet works, forebay, etc), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.
- N/A This is checked by an item that may not exist in a facility. Not all facilities have all of the features identified on the form (forebay, micro-pool, etc.).

Inspection Summary/Additional Comments

Additional explanations to inspection items, and observations about the facility not covered by the form, are recorded in this section.

Overall Facility Rating

An overall rating must be given for each facility inspected. The overall facility rating should correspond with the highest score (0, 1, 2, 3) given to any feature on the inspection form.

C. Verification of Inspection and Form Submittal

The Stormwater Management Facility Inspection Form provides a record of inspection of the facility. Inspection Forms for each facility type are provided in Appendix D. Verification of the inspection of the stormwater facilities, the facility inspection form(s), and Inspector Qualifications shall be provided to the City of Aurora on an annual basis. The verification and the inspection form(s) shall be reviewed and submitted by Metronet or his property manager.

Refer to Section II of this Plan regarding the annual reporting of inspections.

VIII. Maintaining Stormwater Management Facilities

Stormwater management facilities shall be properly maintained to ensure they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained.

A. Maintenance Categories

Stormwater management facility maintenance programs are separated into three broad categories of work. These categories are based largely on the Urban Drainage and Flood Control District's Maintenance Program for regional drainage facilities. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

Routine Work

The majority of this work consists of scheduled mowings and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior correspondence with the City of Aurora; however, completed inspection and maintenance forms shall be submitted to the City of Aurora for each inspection and maintenance activity with the annual report.

Restoration Work

This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. The **Metronet** shall correspond with the City of Aurora and submit completed maintenance forms to the City of Aurora for each maintenance activity.

Rehabilitation Work

This work consists of large-scale maintenance and major improvements

needed to address failures within the stormwater management facilities. This work requires consultation with the city of Aurora and may require an engineering design with construction plans to be prepared for review and approval. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. If these items are needed the Metronet shall correspond with the City of Aurora and submit completed maintenance forms to the City of Aurora for each maintenance activity.

B. Maintenance Personnel

Metronet's maintenance personnel shall be qualified to properly maintain stormwater management facilities. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

C. Maintenance Forms

The Stormwater Management Facility Maintenance Form provides a record of maintenance activities. Maintenance Forms for each facility type are provided in Appendix E. Maintenance Forms shall be completed by the Metronet's contractor completing the required maintenance items. The form shall then be reviewed by the Metronet or an authorized agent of the property owner and submitted on an annual basis to the City of Aurora.

Refer to Section II of this Plan regarding the annual reporting of inspections and maintenance activities performed.

A P P E N D I X A

Stormwater Maintenance Agreement

**(METRONET TO CHOOSE
APPLICABLE FORM
)**

STORMWATER MAINTENANCE AGREEMENT
BETWEEN

THE CITY OF AURORA, acting by and through its
Utility Enterprise
and

THIS STORMWATER MAINTENANCE AGREEMENT, dated for reference this _
day of _____, 20__ is made by and between the City of Aurora, a Colorado home
rule city and

_____ (hereinafter, the
"Owner") and the City of Aurora, (hereinafter, the "City"), agree as follows:

Paragraph 1. The Owner owns the parcel of land known as Lot _____, Block
_____, _____ Subdivision Filing
No. _____, County of _____, State of Colorado (hereinafter, the
"Property"). The Owner has installed, or caused to be installed, upon the Property the
permanent stormwater best management practices (BMPs). Certain inspections and
maintenance of those BMPs are required under the Owner's Inspection and
Maintenance Plan, also referred to as the Operations and Maintenance Manual dated
_____, 2025 and approved by the City of Aurora (hereinafter, the "IM
Plan") which is attached to and made a part of this Stormwater Maintenance
Agreement as Exhibit "A". The Owner agrees, at the Owner's sole expense, to inspect,
maintain, and to ensure proper functioning of the BMPs, in accord with and as set out
in the IM Plan, as set forth herein below. If the Owner conveys the Property, Owner
shall provide a copy of the IM Plan along with a copy of this Agreement to the Grantee.
Upon conveyance, Owner shall thereafter be relieved of its obligations under this
Agreement. However, such obligations shall run with the Property and become the
obligation of Grantee.

Paragraph 2. In accordance with the City of Aurora Municipal Code 138-442.5, the
Owner has submitted an IM Plan (Exhibit A). That IM Plan was approved by the City
on _____, 2025. The Owner has also submitted the Drainage Plan. That
Drainage Plan was approved by the City on _____, 2025.

Paragraph 3. The Owner shall inspect the BMPs at least once every calendar year, and
shall submit written inspection reports to Aurora Water prior to May 31st of that
calendar year. The City is under no obligation whatsoever pursuant to this Agreement
to notify the Owner of any failure to submit inspection reports.

Paragraph 4. The Owner shall promptly perform all maintenance and shall report maintenance activities to Aurora Water in accordance with the requirements set forth in the IM Plan.

Paragraph 5. Subject to the notice and Owner's right to cure requirements of City of Aurora Municipal Code Section 138-442.5, in the event that the Owner fails to inspect, maintain, or repair any BMP, Owner agrees that the City, at the City's sole discretion, shall have the right to enter upon the Property without warrant or further process of law and may make whatever inspection. Following the City's compliance with the notice requirements of 138-442.5 and Owner's right to cure any deficiencies noted, if the Owner fails to timely cure such deficiencies, the City shall have the right to enter upon the Property without warrant or further process of law and may complete whatever maintenance or repair may be needed, all at the Owner's sole cost. The City shall bill the Owner by invoice for any costs incurred by the City, including but not limited to personnel, contracting, labor, or materials, and the Owner shall pay those costs within thirty (30) City business days of the invoice date.

Paragraph 6. This Agreement shall be binding upon the Owner and the Owner's heirs, successors, and assigns. This Agreement shall be recorded at the Clerk and Recorder's Office. The benefits and burdens of this Agreement shall run with the land.

Paragraph 7. Governing Law. This Agreement is subject to and shall be interpreted under the law of the State of Colorado, and the Charter, City Code, ordinances, rules and regulations of the City of Aurora, Colorado, a Colorado home rule city. The Parties agree that this Agreement shall be deemed to have been made in, and the place of performance is deemed to be in the City of Aurora, Colorado.

Paragraph 8. Appropriation and availability of funds. In accord with the Colorado Constitution, Article X, Section 20, and the City Charter, performance of the City's obligations under this Agreement is expressly subject to appropriation of funds by the City Council and the availability of those funds for expenditure.

Paragraph 9. No Third Party Beneficiary. It is expressly understood and agreed that enforcement of the terms and conditions of this Agreement, and all rights of action relating to such enforcement, shall be strictly reserved to the Parties hereto, and nothing contained in this Agreement shall give or allow any such claim or right of action by any other or third person or entity on this Agreement. It is the express intention of the Parties hereto that any person or entity, other than the Parties to this Agreement, receiving services or benefits under this Agreement shall be deemed to be incidental beneficiaries only.

Paragraph 10. Amendments. This Agreement may be amended only by prior writing executed by duly authorized representatives of the Property Owner and the City, and recorded in the records of the Clerk and Recorder's Office.

Paragraph 11. Headings. The headings of the several paragraphs of this Agreement are inserted only as a matter of convenience and for reference and do not define or limit the scope or intent of any provisions of this Agreement and shall not be construed to affect in any manner the terms and provisions hereof or the interpretation or construction thereof.

Paragraph 12. Entire Agreement. This Agreement, together with all exhibits attached hereto, constitutes the entire agreement between the Parties hereto, and all other representations or statements heretofore made, verbal or written, are merged herein, and this Agreement may be amended only in writing, and executed by duly authorized representatives of the Parties hereto.

Paragraph 13. Nonwaiver Of Rights. No waiver of default by the City of any of the terms, covenants, and conditions hereof to be performed, kept, and observed by the Owner shall be construed, or shall operate, as a waiver of any subsequent default of any of the terms, covenants, or conditions herein contained to be performed, kept, and observed by the Owner.

Paragraph 14. Waiver. This Agreement is for the benefit of the Owner. The Owner does hereby waive, remise, and release any claim, right, or cause of action the Owner may have or which may accrue in the future, whether under theories of contract or any other cause of action whatsoever, against the City arising in whole or in part from this Agreement.

FOR THE CITY OF AURORA:

By: _____ this _____ day of _____, 20____.

Approved as to Form:

FOR THE OWNER:

By: _____ this _____ day of _____,
20____.

(printed name)

By: _____ this _____ day of _____,
20____.

(printed name)

By: _____ this _____ day of _____,
20____.

(printed name)

(The Acknowledgement (notarization) will vary for Owner depending on if Owner is an individual, corporation or partnership. Also, where there is mortgage on the property, the mortgage holder must sign the Subordination section of this Agreement.)

ACKNOWLEDGEMENT
(For an individual acting in his or her own right)

State of _____)
_____)

County of _____)

The foregoing instrument was subscribed and affirmed before me this _____ day of _____, 20____, by _____.

Notary Public

My Commission Expires: _____

ACKNOWLEDGEMENT

(For a Corporation)

State of _____)
_____)

County of _____)

The foregoing instrument was subscribed and affirmed before me this _____ day of _____, 20____, by _____ of _____, a _____ corporation, on behalf of the corporation.

Notary Public

My Commission Expires: _____

ACKNOWLEDGEMENT

(For a Partnership)

State of _____)
_____)

County of _____)

The foregoing instrument was subscribed and affirmed before me this _____ day of _____, 20____, by _____, as _____, on behalf of _____, a partnership.

Notary Public

My Commission Expires: _____

(For an individual acting as principal by an attorney in fact)

County of _____)

Notary Public

My Commission Expires: _____

(By any public officer, trustee, or personal representative)

County of _____)

My Commission Expires: _____

SUBORDINATION

_____, as holder of a mortgage or other
lien or interest described as _____

_____ upon the parcel of land
known as Lot _____, block _____, _____ Subdivision,
Parcel Number _____, hereby intentionally and unconditionally
subordinates that mortgage or other lien or interest in favor of this Stormwater
Maintenance Agreement.

By: _____ this _____ day of _____, 20____.

State of _____)
)
County of _____)

The foregoing Subordination was acknowledged before me this _____ day of _____, 20__ by _____ as the Authorized Agent of _____

_____ on behalf of _____
_____.
_____.

Notary Public

My Commission Expires: _____

EXHIBIT A
Inspection and Maintenance Plan

A P P E N D I X B

Description of Stormwater Management Facilities

Appendix B

General Location and Description of Stormwater Management Facility

A. General Site Description

Alameda Buckley Storage Subdivision Filing No 1 is located in the southwest corner of E. Alameda Parkway and S. Buckley Road. The site is approximately 6 acres

B. General Stormwater Management Description

All information in Sections B, C & D are taken from the 2004 Final Drainage Study by Costin Engineering Consultants, Inc.,

All stormwater generally flows from southeast to northwest via a closed pipe system, comprised of reinforced concrete pipe (RCP). All proposed and future development flows into the extended dry basin that provides detention and water quality. The 100yr flows are captured by the storm pipe system and conveyed to the stormwater management facility.

C. Stormwater Facilities Site Plan

Inspection or maintenance personnel may use the Stormwater Facilities Map in Appendix G to locate the stormwater facilities within this development.

D. On-Site Stormwater Management Facilities

Storage Facilities (Detention)

Detention for the entire property is provided in a Detention Pond located in the northwest portion of the site, adjacent to Colombia Creek.

Water Quality Facilities

A water quality control pond with outlet rates based on a 40-hour release rate. The pond was calculated using UDFCD Criteria Manual, Volume 3.

A P P E N D I X C

Standard Operating Procedures

For:

Extended Detention Basins (EDBs)

A P P E N D I X C – 1

Extended Detention Basins

Standard Operation Procedures for Inspection and Maintenance

Extended Detention Basins (EDBs)



September 2010

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EDB-1 BACKGROUND

Extended Detention Basins (EDBs) are one of the most common types of Stormwater Management Facilities utilized within the Front Range of Colorado. An EDB is a sedimentation basin designed to “extend” the runoff detention time, but to drain completely dry sometime after stormwater runoff ends. The EDB’s drain time for the water quality portion of the facility is typically 40 hours. The basins are considered to be “dry” because the majority of the basin is designed not to have a significant permanent pool of water remaining between runoff events.

EDBs are an adaptation of a detention basin used for flood control, with the primary difference is the addition of forebays, micro-pools and a slow release outlet design. Forebays are shallow concrete “pans” located at the inflow point to the basin and are provided to facilitate sediment removal within a contained area prior to releasing into the pond. These forebays collect and briefly hold stormwater runoff resulting in a process called sedimentation, dropping sediment out of the stormwater. The stormwater is then routed from the forebay into the concrete trickle channel and upper basin, the large grassy portion of the basin. The EDB uses a much smaller outlet that extends the emptying time of the more frequently occurring runoff events to facilitate pollutant removal. An EDB should have a small micro-pool just upstream of the outlet. This micro-pool is designed to hold a small amount of water to keep sediment and floatables from blocking the outlet orifices.

EDB-2 INSPECTING EXTENDED DETENTION BASINS (EDBs)

EDB-2.1 Access and Easements

Inspection or maintenance personnel may utilize the stormwater facility map located in Appendix G containing the location(s) of the access points and maintenance easements of the EDB(s) within this development.

EDB-2.2 Stormwater Management Facilities Locations

Inspection or maintenance personnel may utilize the stormwater facility map located in Appendix G containing the location(s) of the EDB(s) within this development.

EDB-2.3 Extended Detention Basin (EDB) Features

EDBs have a number of features that are designed to serve a particular function. Many times the proper function of one feature depends on another. For example, if a forebay is not properly maintained, it could negatively affect the performance of a feature downstream (trickle channel, micro-pool, etc.). Therefore, it is critical that each feature of the EDB is properly inspected and maintained to ensure the overall facility functions as it was intended. Below is a list and description of the most common features within an EDB and the corresponding maintenance inspection items that can be anticipated:

Table EDB-1
Typical Inspection & Maintenance Requirements Matrix

EDB Features	Sediment Removal	Mowing/ Weed control	Trash & Debris Removal	Erosion	Overgrown Vegetation Removal	Standing Water (mosquito/ algae control)	Structure Repair
Inflow Points (outfalls)	X		X				X
Forebay	X		X				X
Low-flow channel	X		X	X	X		X
Bottom Stage	X	X	X	X	X	X	
Micro-pool	X		X		X	X	X
Outlet Works	X		X				X
Emergency Spillway			X	X	X		X
Upper Stage			X	X			
Embankment		X		X	X		

EDB-2.3.1 Inflow Points

Inflow Points or Outfalls into EDBs are the point source of the stormwater discharge into the facility. An inflow point is commonly a storm sewer pipe with a flared end section that discharges into the EDB. In some instances, an inflow point could be a drainage channel or ditch that flows into the facility.

An energy dissipater (riprap or hard armor protection) is typically immediately downstream of the discharge point into the EDB to protect from erosion. In some cases, the storm sewer outfall can have a toe-wall or cut-off wall immediately below the structure to prevent undercutting of the outfall from erosion.

The typical maintenance items found with inflow points are as follows:

a. Riprap Displaced – Many times, because the repeated impact/force of water, the riprap can shift and settle. If any portion of the riprap apron appears to have settled, soil is present between the riprap, or the riprap has shifted, maintenance may be required to ensure future erosion is prevented. Depending on the nature of the maintenance the use of heavy equipment and proper bedding material may be required to repair the riprap. See Section EDB-3.5 – EDB-3.8.

b. Erosion Present/Outfall Undercut – In some situations, the energy dissipater may not have been sized, constructed, or maintained appropriately and erosion has occurred. Any erosion within the vicinity of the inflow point will require maintenance to prevent damage to the structure(s) and sediment transport within the facility. If there is any

question to whether the original design is inadequate, a qualified engineer should review the situation to avoid chronic maintenance repairs if it is a design issue.

c. Sediment Accumulation – Because of the turbulence in the water created by the energy dissipater, sediment often deposits immediately downstream of the inflow point. To prevent a loss in hydraulic performance of the upstream infrastructure, sediment that accumulates in this area must be removed in a timely manner.

d. Structural Damage – Structural damage can occur at anytime during the life of the facility. Typically, for an inflow, the structural damage occurs to the pipe flared end section (concrete or steel). Structural damage can lead to additional operating problems with the facility, including loss of hydraulic performance.

e. Woody Growth/Weeds Present – Undesirable vegetation can grow in and around the inflow area to an EDB that can significantly affect the performance of the drainage facilities discharging into the facility. This type of vegetation includes trees (typically cottonwoods) and dense areas of shrubs (willows). If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate, resulting in blockage of the discharge. Also, tree roots can cause damage to the structural components of the inflow. Routine maintenance is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree). In addition, noxious weeds growing in the facility can result in the loss of desirable native vegetation and impact adjacent open spaces/land.

EDB-2.3.2 Forebay

A forebay is a solid surface (pad), typically constructed of concrete, immediately downstream of the inflow point. The forebay is designed to capture larger particles and trash to prevent them from entering the main portion of the EDB. The solid surface is designed to facilitate mechanical sediment removal (skid steer). The forebay typically includes a small diameter discharge pipe or v-notch weir on the downstream end and designed to drain the forebay in a specified period of time to promote sedimentation. The forebays vary in size and depth depending on the design and site constraints.

The typical maintenance items found with forebays are as follows:

a. Sediment/Debris Accumulation – Because this feature of the EDB is designed to provide the initial sedimentation, debris and sediment frequently accumulate in this area. If the sediment and debris is not removed from the forebay on a regular basis, it can significantly affect the

function of other features within the EDB. Routine sediment removal from the forebay can **significantly** reduce the need for dredging of the main portion of the EDB using specialized equipment (long reach excavators). Routine removal of sediment from the forebay can **substantially** decrease the long-term sediment removal costs of an EDB.

b. Concrete Cracking/Failing – The forebay is primarily constructed of concrete, which cracks, spalls, and settles. Damage to the forebay can result in decreased performance and impact maintenance efforts.

c. Drain Pipe/Weir Clogged – Many times the drainpipe or weir can be clogged with debris, and prevent the forebay from draining properly. If standing water is present in the forebay (and there is not a base flow), the forebay is most likely not draining properly. This can result in a decrease in performance and create potential nuisances with stagnant water (mosquitoes).

d. Weir/Drain Pipe Damaged – Routine maintenance activities, vandalism, or age may cause the weir or drain pipe in the forebay to become damaged. Weirs are typically constructed of concrete, which cracks and spalls. The drainpipe is typically smaller in diameter and constructed with plastic, which can fracture.

EDB-2.3.3 Trickle Channel (Low-Flow)

The trickle channel conveys stormwater from the forebay to the micro-pool of the EDB. The trickle channel is typically made of concrete. However, grass lined (riprap sides protected) is also common and can provide for an additional means of water quality within the EDB. The trickle channel is typically 6-9 inches in depth and can vary in width.

The typical maintenance items found with trickle channels are as follows:

a. Sediment/Debris Accumulation – Trickle channels are typically designed with a relatively flat slope that can promote sedimentation and the collection of debris. Also, if a trickle channel is grass lined it can accumulate sediment and debris at a much quicker rate. Routine removal of accumulated sediment and debris is essential in preventing flows from circumventing the trickle channel and affecting the dry storage portion of the pond.

b. Concrete/Riprap Damage – Concrete can crack, spall, and settle and must be repaired to ensure proper function of the trickle channel. Riprap can also shift over time and must be replaced/repared as necessary.

c. Woody Growth/Weeds Present – Because of the constant moisture in the area surrounding the trickle channel, woody growth (cottonwoods/willows) can become a problem. Trees and dense shrub type vegetation can affect the capacity of the trickle channel and can allow flows to circumvent the feature.

d. Erosion Outside of Channel – In larger precipitation events, the trickle channel capacity will likely be exceeded. This can result in erosion immediately adjacent to the trickle channel and must be repaired to prevent further damage to the structural components of the EDB.

EDB-2.3.4 Bottom Stage

The bottom stage is at least 1.0 to 2.0 feet deeper than the upper stage and is located in front of the outlet works structure. The bottom stage is designed to store the smaller runoff events, assists in keeping the majority of the basin bottom dry resulting in easier maintenance operations, and enhances the facilities pollutant removal capabilities. This area of the EDB may develop wetland vegetation.

The typical maintenance items found with the bottom stage are as follows:

a. Sediment/Debris Accumulation – The bottom stage can frequently accumulate sediment and debris. This material must be removed to maintain pond volume and proper function of the outlet structure.

b. Woody Growth/Weeds Present - Because of the constant moisture in the soil surrounding the micro-pool, woody growth (cottonwoods/willows) can create operational problems for the EDB. If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate outside of the micro-pool (see EDB 2.3.5), which can cause problems with other EDB features. Also, tree roots can cause damage to the structural components of the outlet works. Routine management is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree).

c. Bank Erosion – The bottom stage is usually a couple feet deeper than the other areas of the ponds. Erosion can be caused by water dropping into the bottom stage if adequate protection/armor is not present. Erosion in this area must be mitigated to prevent sediment transport and other EDB feature damage.

d. Mosquitoes/Algae Treatment – Nuisance created by stagnant water can result from improper maintenance/treatment of the bottom stage. Mosquito larvae can be laid by adult mosquitoes within the permanent pool. Also, aquatic vegetation that grows in shallow pools of water can decompose causing foul odors. Chemical/mechanical treatment of the

bottom stage may be necessary to reduce these impacts to adjacent homeowners.

e. Petroleum/Chemical Sheen – Many indicators of illicit discharges into the storm sewer systems will be present in the bottom stage area of the EDB. These indicators can include sheens, odors, discolored soil, and dead vegetation. If it is suspected that an illicit discharge has occurred, contact the supervisor immediately. Proper removal/mitigation of contaminated soils and water in the EDB is necessary to minimize any environmental impacts downstream.

EDB-2.3.5 Micro-pool

The micro-pool is a concrete or grouted boulder walled structure directly in front of the outlet works. At a minimum, the micro-pool is 2.5 feet deep and is designed to hold water. The micro-pool is critical in the proper function of the EDB; it allows suspended sediment to be deposited at the bottom of the micro-pool and prevents these sediments from being deposited in front of the outlet works causing clogging of the outlet structure, which results in marshy areas within the top and bottom stages.

The typical maintenance items found with micro-pools are as follows:

a. Sediment/Debris Accumulation – The micro-pool can frequently accumulate sediment and debris. This material must be removed to maintain the micro pool volume, depth, and proper function of the outlet structure.

b. Woody Growth/Weeds Present - Because of the constant moisture in the soil surrounding the micro-pool, woody growth (cottonwoods/willows) can create operational problems for the EDB. If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate outside of the micro-pool, which can cause problems with other EDB features. Also, tree roots can cause damage to the structural components of the outlet works. Routine management is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree).

c. Mosquitoes/Algae Treatment – Nuisance created by stagnant water can result from improper maintenance/treatment of the micro-pool. Mosquito larvae can be laid by adult mosquitoes within the permanent pool. If mosquitoes are breeding within the micro-pool this may also be an indication there is significant sediment build-up that is reducing the depth of the micro-pool. Also, aquatic vegetation that grows in shallow pools of water can decompose causing foul odors. Chemical/mechanical treatment of the micro-pool may be necessary to reduce these impacts to adjacent homeowners.

d. Petroleum/Chemical Sheen – Many indicators of illicit discharges into the storm sewer systems will be present in the micro-pool area of the EDB. These indicators can include sheens, odors, discolored soil, and dead vegetation. If it is suspected that an illicit discharge has occurred, contact the supervisor immediately. Proper removal/mitigation of contaminated soils and water in the EDB is necessary to minimize any environmental impacts downstream.

EDB-2.3.6 Outlet Works

The outlet works is the feature that drains the EDB in specified quantities and periods of time. The outlet works is typically constructed of reinforced concrete into the embankment of the EDB. The concrete structure typically has steel orifice plates anchored/embedded into it to control stormwater release rates. The larger openings (flood control) on the outlet structure typically have trash racks over them to prevent clogging. The water quality orifice plate (smaller diameter holes) will typically have a well screen covering it to prevent smaller materials from clogging it. The outlet structure is the single most important feature in the EDB operation. Proper inspection and maintenance of the outlet works is essential in ensuring the long-term operation of the EDB.

The typical maintenance items found with the outlet works are as follows:

a. Trash Rack/Well Screen Clogged – Floatable material entering the EDB will most likely make its way to the outlet structure. This material is trapped against the trash racks and well screens on the outlet structure (which is why they are there). This material must be removed on a routine basis to ensure the outlet structure drains in the specified design period.

b. Structural Damage - The outlet structure is primarily constructed of concrete, which can crack, spall, and settle. The steel trash racks and well screens are also susceptible to damage.

c. Orifice Plate Missing/Not Secure – Many times residents, property owners, or maintenance personnel will remove or loosen orifice plates if they believe the pond is not draining properly. Any modification to the orifice plate(s) will significantly affect the designed discharge rates for water quality and/or flood control. Modification of the orifice plates is not allowed without approval from the City of Aurora Public Works Department, Engineering Control Division.

d. Manhole Access – Access to the outlet structure is necessary to properly inspect and maintain the facility. If access is difficult or not available to inspect the structure, chances are it will be difficult to maintain as well.

e. Woody Growth/Weeds Present - Because of the constant moisture in the soil surrounding the outlet works, woody growth (cottonwoods/willows) can create operational problems for the EDB. If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate around the outlet works, which can cause problems with other EDB features. Also, tree roots can cause damage to the structural components of the outlet works. Routine management is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree).

EDB-2.3.7 Emergency Spillway

An emergency spillway is typical of all EDBs and designed to serve as the overflow in the event the volume of the pond is exceeded. The emergency spillway is typically armored with riprap (or other hard armor) and is sometimes buried with soil. The emergency spillway is typically a weir (notch) in the pond embankment. Proper function of the emergency spillway is essential to ensure flooding does not affect adjacent properties.

The typical maintenance items found with emergency spillways are as follows:

a. Riprap Displaced – As mentioned before, the emergency spillway is typically armored with riprap to provide erosion protection. Over the life of an EDB, the riprap may shift or dislodge due to flow. Depending on the nature of the maintenance the use of heavy equipment and proper bedding material may be required to repair the riprap. See Section EDB-3.5 – EDB-3.8.

b. Erosion Present – Although the spillway is typically armored, stormwater flowing through the spillway can cause erosion damage. Erosion must be repaired to ensure the integrity of the basin embankment, and proper function of the spillway.

c. Woody Growth/Weeds Present – Management of woody vegetation is essential in the proper long-term function of the spillway. Larger trees or dense shrubs can capture larger debris entering the EDB and reduce the capacity of the spillway.

d. Obstruction Debris – The spillway must be cleared of any obstruction (man-made or natural) to ensure the proper design capacity.

EDB-2.3.8 Upper Stage (Dry Storage)

The upper stage of the EDB provides the majority of the water quality flood detention volume. This area of the EDB is higher than the bottom stage and

typically stays dry, except during storm events. The upper stage is the largest feature/area of the basin. Sometimes, the upper stage can be utilized for park space and other uses in larger EDBs. With proper maintenance of the bottom stage, micro-pool, and forebay(s), the upper stage should not experience much sedimentation; however, bottom elevations should be monitored to ensure adequate volume.

The typical maintenance items found with upper stages are as follows:

- a. Vegetation Sparse* – The upper basin is the most visible part of the EDB, and therefore aesthetics is important. Adequate and properly maintained vegetation can greatly increase the overall appearance and acceptance of the EDB by the public. In addition, vegetation can reduce the potential for erosion and subsequent sediment transport to the other areas of the pond.
- b. Woody Growth/Undesirable Vegetation* – Although some trees and woody vegetation may be acceptable in the upper basin, some thinning of cottonwoods and willows may be necessary. Remember, the basin will have to be dredged to ensure volume, and large trees and shrubs will be difficult to protect during that operation.
- c. Standing Water/Boggy Areas* – Standing water or boggy areas in the upper stage is typically a sign that some other feature in the pond is not functioning properly. Routine maintenance (mowing, trash removal, etc) can be extremely difficult for the upper stage if the ground is saturated. If this inspection item is checked, make sure you have identified the root cause of the problem.
- d. Sediment Accumulation* – Although other features within the EDB are designed to capture sediment, the upper storage area will collect sediment over time. Excessive amounts of sedimentation will result in a loss of storage volume. It may be more difficult to determine if this area has accumulated sediment without conducting a field survey.

Below is a list of indicators:

1. Ground adjacent to the trickle channel appears to be several inches higher than the concrete/riprap trickle channel.
2. Standing water or boggy areas in upper stage
3. Uneven grades or mounds
4. Bottom Stage, Micro-pool, or Forebay has excessive amounts of sediment

e. Erosion (banks and bottom) – The bottom grades of the dry storage area are typically flat enough that erosion should not occur. However, inadequate vegetative cover may result in erosion of the upper stage. Erosion that occurs in the upper stage can result in increased

dredging/maintenance of the bottom stage/micro-pool.

f. Trash/Debris – Trash and debris can accumulate in the upper area after large events, or from illegal dumping. Over time, this material can accumulate and clog the EDB outlet works.

g. Maintenance Access – Most EDBs typically have a gravel/concrete maintenance access path to either the upper stage or forebay. This access path should be inspected to ensure the surface is still drivable. Some of the smaller EDBs may not have maintenance access paths; however, the inspector should verify that access is available from adjacent properties.

EDB-2.3.9 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the EDB. This category on the inspection form is for maintenance items that are commonly found in the EDB, but may not be attributed to an individual feature.

a. Encroachment in Easement Area – Private lots/property can sometimes be located very close to the EDBs, even though they are required to be located in tracts with drainage easements. Property owners may not place landscaping, trash, fencing, or other items within the easement area that may adversely affect maintenance or the operation of the facility.

b. Graffiti/Vandalism – Damage to the EDB infrastructure can be caused by vandals. If criminal mischief is evident, the inspector should forward this information to the Aurora Police Department.

c. Public Hazards – Public hazards include items such as vertical drops of greater than 4-feet, containers of unknown/suspicious substances, exposed metal/jagged concrete on structures. **If any hazard is found within the facility area that poses an immediate threat to public safety, call 911 immediately!**

d. Burrowing Animals/Pests – Prairie dogs and other burrowing rodents may cause damage to the EDB features and negatively affect the vegetation within the EDB.

e. Other – Any miscellaneous inspection/maintenance items not contained on the form should be entered here.

EDB-2.4 Inspection Forms

EDB Inspection forms are located in Appendix D. Inspection forms shall be completed by the person(s) conducting the inspection activities. Each form shall be reviewed and submitted by the property owner or property manager to the City of Aurora per the requirements of the Inspection and Maintenance Plan. These inspection forms shall be kept indefinitely and made available to the City of Aurora upon request.

EDB-3 MAINTAINING EXTENDED DETENTION BASINS (EDBS)

EDB-3.1 Maintenance Personnel

Maintenance personnel must be qualified to properly maintain EDBs. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

EDB-3.2 Equipment

It is imperative the appropriate equipment and tools are taken to the field with the operations crew. The types of equipment/tools will vary depending on the task at hand. Below is a basic list of tools, equipment, and material(s) that may be necessary to perform maintenance on an EDB:

- 1.) Loppers/Tree Trimming Tools
- 2.) Mowing Tractors
- 3.) Trimmers (extra string)
- 4.) Shovels
- 5.) Rakes
- 6.) All Surface Vehicle (ASVs)
- 7.) Skid Steer
- 8.) Back Hoe
- 9.) Track Hoe/Long Reach Excavator
- 10.) Dump Truck
- 11.) Jet-Vac Machine
- 12.) Engineers Level (laser)
- 13.) Riprap (Minimum - Type M, or as shown on the approved civil plans)
- 14.) Filter Fabric
- 15.) Erosion Control Blanket(s)

- 16.) Seed Mix (See seed mix in the *Rules and Regulations Regarding Stormwater (Quality) Discharge for Construction Activities*, Std Det. SM, Seeding & Mulching)
- 17.) Illicit Discharge Cleanup Kits
- 18.) Trash Bags
- 19.) Tools (wrenches, screw drivers, hammers, etc)
- 20.) Chain Saw
- 21.) Confined Space Entry Equipment
- 22.) Approved Stormwater Facility Inspection and Maintenance Plan

Some of the items identified above may not be needed for every maintenance operation. However, this equipment should be available to the maintenance operations crews should the need arise.

EDB-3.3 Safety

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures having a significant vertical drop. If a vertical drop within the EDB is identified as greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

EDB-3.4 Maintenance Forms

The EDB Maintenance Form provides a record of each maintenance operation performed by maintenance contractors. The EDB Maintenance Form shall be filled out in the field after the completion of the maintenance operation. Each form shall be reviewed and submitted by the property owner or property manager to the City of Aurora per the requirements of the Inspection and Maintenance Plan. The EDB Maintenance form is located in Appendix E.

EDB-3.5 Maintenance Categories and Activities

A typical EDB Maintenance Program will consist of three broad categories of work. Within each category of work, a variety of maintenance activities can be performed on an EDB. A maintenance activity can be specific to each feature within the EDB, or general to the overall facility. This section of the SOP explains each of the categories and briefly describes the typical maintenance activities for an EDB.

A variety of maintenance activities are typical of EDBs. The maintenance activities range in magnitude from routine trash pickup to the reconstruction of drainage infrastructure. Below is a description of each maintenance activity, the objectives, and frequency of actions:

EDB-3.6 Routine Maintenance Activities

The majority of this work consists of regularly scheduled mowing and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior correspondence with the City of Aurora; however, completed inspection and maintenance forms shall be submitted to the City of Aurora for each inspection and maintenance activity in accordance with the Inspection and Maintenance Plan.

The Maintenance Activities are summarized below and further described in the following sections.

TABLE – EDB-2
Summary of Routine Maintenance Activities

Maintenance Activity	Minimum Frequency	Look for:	Maintenance Action
Mowing	Twice annually	Excessive grass height/aesthetics	Mow grass to a height of 4" to 6"
Trash/Debris Removal	Twice annually	Trash & debris in EDB	Remove and dispose of trash and debris
Outlet Works Cleaning	As needed - after significant rain events – twice annually min.	Clogged outlet structure; ponding water	Remove and dispose of debris/trash/sediment to allow outlet to function properly
Weed control	Minimum twice annually	Noxious weeds; Unwanted vegetation	Treat w/ herbicide or hand pull; Consult the local weed specialist
Mosquito Treatment	As needed	Standing water/mosquito habitat	Treat w/ EPA approved chemicals
Algae Treatment	As needed	Standing water/ Algal growth/green color	Treat w/ EPA approved chemicals

EDB-3.6.1 Mowing

Occasional mowing is necessary to limit unwanted vegetation and to improve the overall appearance of the EDB. Native vegetation should be mowed to a height of 4-to-6 inches tall. Grass clippings should be collected and disposed of properly.

Frequency – Routine - Minimum of twice annually or depending on aesthetics.

EDB-3.6.2 Trash/Debris Removal

Trash and debris must be removed from the entire EDB area to minimize outlet clogging and to improve aesthetics. This activity must be performed prior to mowing operations.

Frequency – Routine – Prior to mowing operations and minimum of twice annually and should be done after significant storm events.

EDB-3.6.3 Outlet Works Cleaning

Debris and other materials can clog the outlet work's well screen, orifice plate(s) and trash rack. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

Frequency - Routine – After significant rainfall event or concurrently with other maintenance activities.

EDB-3.6.4 Weed Control

Noxious weeds and other unwanted vegetation must be treated as needed throughout the EDB. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with the local Weed Inspector is highly recommended prior to the use of an herbicide. All herbicide applications should be applied in accordance with the manufacturer's recommendations.

Frequency – Routine – As needed based on inspections.

EDB-3.6.5 Mosquito/Algae Treatment

Treatment of permanent pools is necessary to control mosquitoes and undesirable aquatic vegetation that can create nuisances. Only EPA approved chemicals/materials can be used in areas that are warranted.

Frequency – As needed.

EDB- 3.7 Minor Maintenance Activities

This work consists of a variety of isolated or small-scale maintenance or operational problems. Most of this work can be completed by a small crew, tools, and small equipment. These items require prior correspondence with the City of Aurora Water Staff and require completed inspection and maintenance forms to be submitted to the City of Aurora Water Staff for each inspection and maintenance activity.

Table – EDB-3
Summary of Minor Maintenance Activities

Maintenance Activity	Minimum Frequency	Look for:	Maintenance Action
<u>Sediment Removal*</u>	As needed; typically every 1 –2 years	Sediment build-up; decrease in pond volume	Remove and dispose of sediment
Erosion Repair	As needed, based upon inspection	Rills/gullies forming on side slopes, trickle channel, other areas	Repair eroded areas Revegetate; address source of erosion
Vegetation Removal/Tree Thinning	As needed, based upon inspection	Large trees/wood vegetation in lower chamber of pond	Remove vegetation; restore grade and surface
Drain Cleaning/Jet Vac	As needed, based upon inspection	Sediment build-up /non draining system	Clean drains; Jet Vac if needed

*Usually from the forebay, trickle channel, and/or micro-pool

EDB-3.7.1 Sediment Removal

Sediment removal is necessary to maintain the original design volume of the EDB and to ensure proper function of the infrastructure. Regular sediment removal (minor) from the forebay, inflow(s), and trickle channel can significantly reduce the frequency of major sediment removal activities (dredging) in the upper and lower stages. The minor sediment removal activities can typically be addressed with shovels and smaller equipment.

Stormwater sediments removed from EDBs do not meet the criteria of “hazardous waste”. However, these sediments are contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments from permanent pools must be carefully removed to minimize turbidity, further sedimentation, or other adverse water quality impacts. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a landfill for proper disposal. Prompt and thorough cleanup is important should a spill occur during transportation.

Frequency – Nonroutine – As necessary based upon inspections. Sediment removal in the forebay, trickle channel, and micro-pool may be necessary as frequently as every 1-2 years.

EDB-3.7.2 Erosion Repair

The repair of eroded areas is necessary to ensure the proper function of the EDB, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to trickle channels, energy dissipaters, and rilling to major gullies in the embankments and spillways. The repair of eroded areas may require the use of excavators,

earthmoving equipment, riprap, concrete, erosion control blankets, and turf reinforcement mats. Major erosion repair to the pond embankments, spillways, and adjacent to structures will require consultation with the City of Aurora Water and Engineering Staff.

Frequency – Nonroutine – As necessary based upon inspections.

EDB-3.7.3 Vegetation Removal/Tree Thinning

Dense stands of woody vegetation (willows, shrubs, etc) or trees can create maintenance problems for the infrastructure within an EDB. Tree roots can damage structures and invade pipes/channels thereby blocking flows. Also, trees growing in the upper and lower stages of the EDB will most likely have to be removed when sediment/dredging operations occur. A small tree is easier to remove than a large tree, therefore, regular removal/thinning is imperative. All trees and woody vegetation that is growing in the bottom of the EDB or near structures (inflows, trickle channels, outlet works, emergency spillways, etc) should be removed. Any trees or woody vegetation in the EDB should be limited to the upper portions of the pond banks.

Frequency – Nonroutine – As necessary based upon inspections.

EDB-3.7.4 Clearing Drains/Jet-Vac

An EDB contains many structures, openings, and pipes that can be frequently clogged with debris. These blockages can result in a decrease of hydraulic capacity and create standing water in areas outside of the micro-pool. Many times the blockage to this infrastructure can be difficult to access and/or clean. Specialized equipment (jet-vac machines) may be necessary to clear debris from these difficult areas.

Frequency – Nonroutine – As necessary based upon inspections.

EDB-3.8 Major Maintenance Activities

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires consultation with the City of Aurora to ensure the proper maintenance is performed. This work requires the City of Aurora Water Staff review the original design before approval of the proposed maintenance. **A public improvements permit shall be required for all major maintenance activities.** This work may also require more specialized maintenance equipment, design/details, submittal of plans to the City of Aurora for review and approval, surveying, or assistance through private contractors and consultants.

**Table – EDB-4
Summary of Major Maintenance Activities**

Maintenance Activity	Minimum Frequency	Look for:	Maintenance Action
Major Sediment Removal	As needed – based upon scheduled inspections	Large quantities of sediment; reduced pond capacity	Remove and dispose of sediment. Repair vegetation as needed
Major Erosion Repair	As needed – based upon scheduled inspections	Severe erosion including gullies, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
Structural Repair	As needed – based upon scheduled inspections	Deterioration and/or damage to structural components – broken concrete, damaged pipes, outlet works	Structural repair to restore the structure to its original design

EDB-3.8.1 Major Sediment Removal

Major sediment removal consists of removal of large quantities of sediment or removal of sediment from vegetated areas. Care shall be given when removing large quantities of sediment and sediment deposited in vegetated areas. Large quantities of sediment need to be carefully removed, transported and disposed of. Vegetated areas need special care to ensure design volumes and grades are preserved.

Major sediment removal activities will require larger and more specialized equipment. The major sediment activities will also require surveying with an engineer's level, and consultation with the City of Aurora Water and Engineering Staff to ensure design volumes/grades are achieved. Pond volume recertification will be required in accordance with the City of Aurora's drainage criteria manual.

Frequency – Nonroutine – Repair as needed based upon inspections.

EDB-3.8.2 Major Erosion Repair

Major erosion repair consists of filling and revegetating areas of severe erosion. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion repair. Care should be given to ensure design grades and volumes are preserved. Any condition/repair affecting design grades or pond volumes requires consultation with the City of Aurora Water and Engineering Staff.

Frequency – Nonroutine – Repair as needed based upon inspections.

EDB-3.8.3 Structural Repair

An EDB includes a variety of structures that can deteriorate or be damaged during the course of use and routine maintenance. These structures are constructed of steel and concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time. These structures include items like outlet works, trickle channels, forebays, inflows and other features. In-house operations staff can perform some of the minor structural repairs. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with the City of Aurora and Engineering Staff shall take place prior to all structural repairs.

Frequency – Nonroutine – Repair as needed based upon inspections.

Reference:

This plan is adapted from Southeast Metro Stormwater Authority, *OPERATION AND MAINTENANCE (O & M) MANUAL*, and Town of Parker, Colorado, *STORMWATER PERMANENT BEST MANAGEMENT PRACTICES (PBMP) LONG-TERM OPERATION AND MAINTENANCE MANUAL*, October 2004

A P P E N D I X D

Inspection Forms



EXTENDED DETENTION BASIN (EDB) INSPECTION FORM

Date: _____

Subdivision/Business Name: _____ Inspector: _____

Subdivision/Business Address: _____

Weather: _____

Date of Last Rainfall: _____ Amount: _____ Inches

Property Classification: Residential Multi Family Commercial Other: _____
(Circle One)

Reason for Inspection: Routine Complaint After Significant Rainfall Event
(Circle One)

INSPECTION SCORING - For each facility inspection item, insert one of the following scores:

0 = No deficiencies identified

2 = Routine maintenance required

1 = Monitor (potential for future problem)

3 = Immediate repair necessary

N/A = Not applicable

FEATURES

1.) Inflow Points

- ☐ Riprap Displaced
- ☐ Erosion Present/Outfall Undercut
- ☐ Sediment Accumulation
- ☐ Structural Damage (pipe, end-section, etc.)
- ☐ Woody Growth/Weeds Present

2.) Forebay

- ☐ Sediment/Debris Accumulation
- ☐ Concrete Cracking/Failing
- ☐ Drain Pipe/Wier Clogged (not draining)
- ☐ Wier/Drain Pipe Damage

3.) Trickle Channel (Low-flow)

- ☐ Sediment/Debris Accumulation
- ☐ Concrete/Riprap Damage
- ☐ Woody Growth/Weeds Present
- ☐ Erosion Outside Channel

4.) Bottom Stage (Micro-Pool)

- ☐ Sediment/Debris Accumulation
- ☐ Woody Growth/Weeds Present
- ☐ Bank Erosion
- ☐ Mosquitoes/Algae Treatment
- ☐ Petroleum/Chemical Sheen

5.) Outlet Works

- ☐ Trash Rack/Well Screen Clogged
- ☐ Structural Damage (concrete, steel, subgrade)
- ☐ Orifice Plate(s) Missing/Not Secure
- ☐ Manhole Access (cover, steps, etc.)
- ☐ Woody Growth/Weeds Present

6.) Emergency Spillway

- ☐ Riprap Displaced
- ☐ Erosion Present
- ☐ Woody Growth/Weeds Present
- ☐ Obstruction/Debris

7.) Upper Stage (Dry Storage)

- ☐ Vegetation Sparse
- ☐ Woody Growth/Undesirable Vegetation
- ☐ Standing Water/Boggy Areas
- ☐ Sediment Accumulation
- ☐ Erosion (banks and bottom)
- ☐ Trash/Debris
- ☐ Maintenance Access

8.) Miscellaneous

- ☐ Encroachment in Easement Area
- ☐ Graffiti/Vandalism
- ☐ Public Hazards
- ☐ Burrowing Animals/Pests
- ☐ Other

Inspection Summary / Additional Comments: _____

OVERALL FACILITY RATING (Circle One)

0 = No Deficiencies Identified

2 = Routine Maintenance Required

1 = Monitor (potential for future problem exists)

3 = Immediate Repair Necessary

This inspection form shall be kept indefinitely and made available to the City of Aurora upon request.

A P P E N D I X E

Maintenance Forms



EXTENDED DETENTION BASIN (EDB) MAINTENANCE FORM

Subdivision/Business Name: _____ Completion Date: _____
Subdivision/Business Address: _____ Contact Name: _____

Maintenance Category: _____ Routine _____ Restoration _____ Rehabilitation _____
(Circle All That Apply)

MAINTENANCE ACTIVITIES PERFORMED

ROUTINE WORK

- ___ MOWING
- ___ TRASH/DEBRIS REMOVAL
- ___ OUTLET WORKS CLEANING (TRASH RACK/WELL SCREEN)
- ___ WEED CONTROL (HERBICIDE APPLICATION)
- ___ MOSQUITO TREATMENT
- ___ ALGAE TREATMENT

RESTORATION WORK

- ___ SEDIMENT REMOVAL
 - ___ FOREBAY
 - ___ TRICKLE CHANNEL
 - ___ INFLOW
- ___ EROSION REPAIR
 - ___ INFLOW POINT
 - ___ TRICKLE CHANNEL
- ___ VEGETATION REMOVAL/TREE THINNING
 - ___ INFLOW(S)
 - ___ TRICKLE CHANNEL
 - ___ UPPER STAGE
 - ___ BOTTOM STAGE
- ___ REVEGETATION
- ___ JET-VAC/CLEARING DRAINS
 - ___ FOREBAY
 - ___ OUTLET WORKS
 - ___ INFLOWS

REHABILITATION WORK

- ___ SEDIMENT REMOVAL (DREDGING)
 - ___ BOTTOM STAGE
 - ___ UPPER STAGE
- ___ EROSION REPAIR
 - ___ OUTLET WORKS
 - ___ UPPER STAGE
 - ___ BOTTOM STAGE
 - ___ SPILLWAY
- ___ STRUCTURAL REPAIR
 - ___ INFLOW
 - ___ OUTLET WORKS
 - ___ FOREBAY
 - ___ TRICKLE CHANNEL

OTHER _____

ESTIMATED TOTAL MANHOURS: _____

EQUIPMENT/MATERIAL USED: _____

COMMENTS/ADDITIONAL INFO: _____

A P P E N D I X F

Annual Inspection and Maintenance Reporting Form



Annual Inspection and Maintenance Reporting Form
for
Stormwater Facilities

*(This form shall be submitted to the City of Aurora prior to May 31 of each year along
with the Inspection Forms and Maintenance Forms as required for the
property/subdivision)*

Date: _____

**To: City of Aurora
Water Department
Attn: Operations Compliance Division
13646 East Ellsworth Avenue
Aurora, Colorado 80012**

Re: Certification of Inspection and Maintenance; Submittal of forms

Property/Subdivision Name: Alameda Buckley Subdivision Filing No. 1

Property Address: 16620 E. ALAMEDA PKWY, AURORA, CO 80017

Contact Name: Lee Wright_____

I verify that the required stormwater facility inspections and required maintenance have been completed in accordance with the Stormwater Facilities Maintenance Agreement and the Inspection and Maintenance Plan associated with the above referenced property.

The required Stormwater Facility Inspection and Maintenance forms are hereby provided.

Name of Party Responsible for Inspection
& Maintenance

Property Owner

Authorized Signature

Signature

A P P E N D I X G

Stormwater Facility Map, Facility Plan and Detail Sheets

Construction Plans for
Alameda Buckley Storage Subdivision Filing No. 1

General Notes

2.02.5.01 City of Aurora plan review is only for general conformance with City of Aurora Design Criteria and the City Code. The City is not responsible for the accuracy and adequacy of the design, of dimensions, and elevations which shall be confirmed and correlated at the job site. The City of Aurora, through the approval of this document, assumes no responsibility for the completeness and/or accuracy of this document.

2.03.5.02 All roadway construction shall conform to City of Aurora "Roadway Design and Construction Specifications," latest revision.

2.03.5.03 All water distribution, sanitary sewer, and storm drainage construction shall conform to City of Aurora "Public Utility Improvements Rules and Regulations Regarding Standards and Specifications," latest revision.

2.03.5.04 All materials and workmanship shall be subject to inspection by the City. The City reserves the right to accept or reject any materials and workmanship that does not conform to the City standards and specifications.

2.03.5.05 The Contractor shall notify the City Public Improvement Inspections Division, 303-739-7350, 24 hours prior to the beginning of construction.

2.03.5.06 Location of existing utilities shall be verified by the Contractor prior to actual construction. For information, contact Utility Notification Center of Colorado, 1-800-922-1987.

2.03.5.07 The Contractor shall have one signed copy of the plans (approved by the City of Aurora), one copy of the appropriate standards and specifications at the job site at all times, and a copy of any permits and extension agreements needed at the job site at all times.

2.03.5.08 It is the Consultant's responsibility to accurately show existing conditions, both onsite, and off-site, on the construction plans. Any modifications needed due to conflicts, omissions, or changed conditions either on-site or off-site, that arise in the field, will be entirely the Developer's responsibility. The cost to rectify any adverse situation to meet the City standards and specifications and the City Code shall be borne solely by the Developer.

2.03.5.09 The owner/developer must obtain the written permission of the adjacent property owner(s) prior to any off-site grading or construction.

2.03.5.10 Concrete shall not be placed until the forms have been inspected and a pour slip issued. Pour slips will not be issued unless the Contractor has, at the job site, a copy of the approved plans bearing the signature of the City Engineer and with the "Approved for Curb and Gutter Only" block initialed by the City Engineer's representative.

2.03.5.11 Paving shall not start until a soil report and pavement design is approved by the City Engineer and subgrade compaction tests are taken and approved by the City Engineer.

2.03.5.12 Standard City of Aurora curb ramps are to be constructed at all curb returns, at all "T" intersections and at all curbside kiosks or clusters.

2.03.5.13 All stationing is based on centerline of roadways unless otherwise noted.

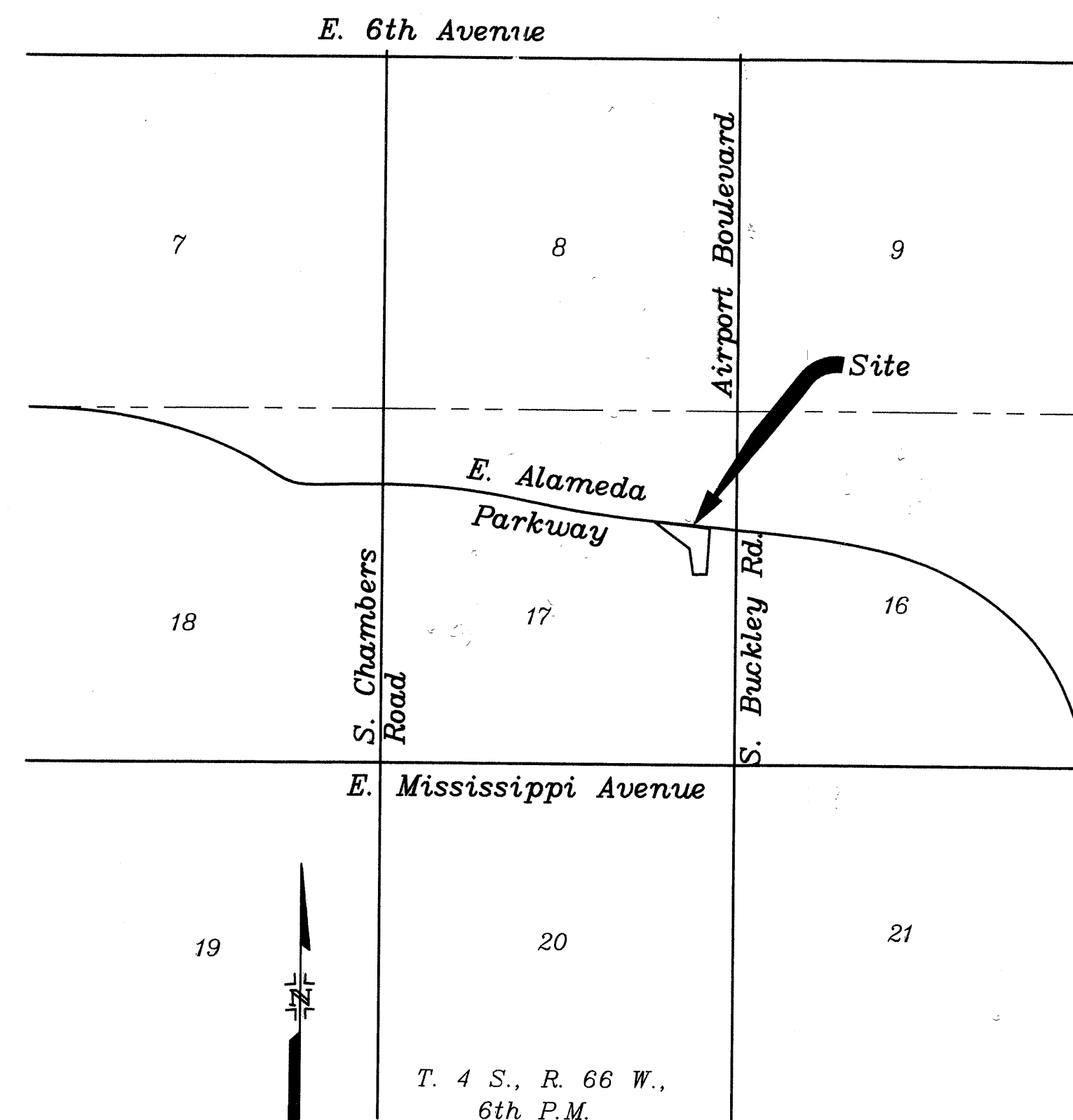
2.03.5.14 All elevations are top of curb unless otherwise noted.

2.03.5.15 The City of Aurora shall not be liable for the maintenance of the Alameda Buckley Subdivision Filing No. 1. These facilities may not meet City standards and are to remain in private maintenance in perpetuity.

2.03.5.16 The contractor/developer is responsible for contacting CDOT to ensure that all work on or adjacent to state highways or CDOT R.O.W. meets CDOT requirements.

Utility Notes

- ALL MATERIALS, WORKMANSHIP, CONSTRUCTION DETAILS, AND TESTING FOR THE WATER LINE CONSTRUCTION SHALL CONFORM TO THE STANDARDS AND SPECIFICATIONS FOR WATER DISTRIBUTION LINES AS SET FORTH BY THE CITY OF AURORA, DEPARTMENT OF UTILITIES, LATEST REVISION.
- ALL FIRE HYDRANTS WILL BE LOCATED NOT LESS THAN THREE - SIX INCHES (3'-6") FEET AND NOT MORE THAN EIGHT (8) FEET FROM THE CURB TO THE CENTER OF THE HYDRANT AND BE UNOBSTRUCTED ON THE STREET SIDE. MINIMUM CLEARANCE ON ALL OTHER SIDES WILL BE FIVE (5) FEET.
- ALL FIRE HYDRANTS MUST BE GRADE STAKED IN THE FIELD WHENEVER CURB AND GUTTER HAS NOT BEEN INSTALLED.
- ALL UTILITY EASEMENTS MUST REMAIN UNOBSTRUCTED AND FULLY ACCESSIBLE ALONG THEIR ENTIRE LENGTH FOR MAINTENANCE EQUIPMENT.
- WATER MAIN RETRAINTS SHALL BE IN ACCORDANCE WITH THE CITY OF AURORA PUBLIC UTILITY IMPROVEMENTS RULES AND REGULATIONS STANDARDS AND SPECIFICATIONS, LATEST EDITION. MEGALUGS OR UNI-FLANGE MAY BE USED IN PLACE OF RODS AND CLAMPS.
- WATER LINE VALVES ARE NOT ALLOWED IN CROSS PANS.
- ALL WATER METERS, WATER SERVICE LINES AND SANITARY SEWER SERVICE LINES ARE NOT ALLOWED IN OR UNDER DRIVEWAYS. WATER METERS, WATER SERVICE LINE AND SEWER SERVICE LINES UNDER THE DRIVEWAY SHALL BE INSTALLED WITHIN A PVC SLEEVE.
- ALL SANITARY SEWER LINES SHALL BE TEES OFF OF MAINS. WYES SHALL BE USED FOR LOTS AT BACK OF CUL-DE-SACS.
- NO CONNECTIONS ALLOWED TO THE FIRE LINE BETWEEN THE GATE VALVE AT THE MAIN WATER LINE AND THE BACK FLOW PREVENTER (WITHIN THE BUILDING).
- WATER PRESSURE ZONE 3.0 PSI AT ELEVATIONS 5720 STATIC. A PRESSURE REDUCING VALVE (PRV) IS REQUIRED WHEN THE PRESSURE AT THE UNIT IS GREATER THAN 80 PSI.
- ADJUST ALL MANHOLES AND VALVE BOXES TO CITY OF AURORA STANDARDS AND SPECIFICATIONS, LATEST REVISION, AS NECESSARY.
- ALL FIRE LINES AND COMMERCIAL WATER SERVICE LINES WILL REQUIRE REDUCED PRESSURE BACK FLOW PREVENTER OR DOUBLE CHECK VALVES AS REQUIRED BY THE CITY OF AURORA UTILITY DEPARTMENT. CONTACT THE BUILDING DIVISION AT (303) 739-7420 TO SCHEDULE FLOW TESTS FOR PRIVATE FIRE LINES PRIOR TO THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY.
- THE CONTRACT SHALL CONTRACT THE C.O.A. WATERWATER CONTROL DIVISION AT (303) 326-8050 FOR INSPECTION OF ANY REQUIRED GREASE TRAPS OR SAND/OIL INTERCEPTORS TO THE ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.



Sheet Index

SHEET 1	COVER SHEET
SHEETS 2 - 5	DETAILED GRADING PLANS
SHEETS 6 - 8	EROSION CONTROL PLAN, NOTES AND DETAILS
SHEETS 9 - 11	STORM SEWER PLAN AND PROFILES
SHEET 12	OVERALL WATER & UTILITY PLAN
SHEET 13	SIGNAGE & STRIPING PLAN
SHEET 14-15	FINAL DRAINAGE PLAN

I HEREBY AFFIRM THAT THE CONSTRUCTION PLANS FOR ALAMEDA BUCKLEY STORAGE SUBDIVISION FILING NO.1 WERE PREPARED BY ME IN CONFORMANCE WITH THE REQUIREMENTS OF THE PUBLIC UTILITY IMPROVEMENTS RULES AND REGULATIONS REGARDING STANDARDS AND SPECIFICATIONS OF THE CITY OF AURORA.

WILLIAM E. MILLER, P.E. #13889
DATE 4/10/04

Approved for One Year From this Date
5-12-04

City Engineer
Utilities Department
Fire Department
Director of Parks and Open Space

BENCHMARK: AP-048 COA BC IN THE END OF CONC. HEADWALL ON S.SIDE ALAMEDA PARKWAY @ COLUMBIA CREEK CULVER 1000' +/- W OF BUCKLEY RD. RE. ELEV. ON 12-23-91 DO TO RERUN OLD ELEV.=5480.374 FT. ELEVATION - 5480.459

24 HOURS BEFORE YOU DIG
CALL

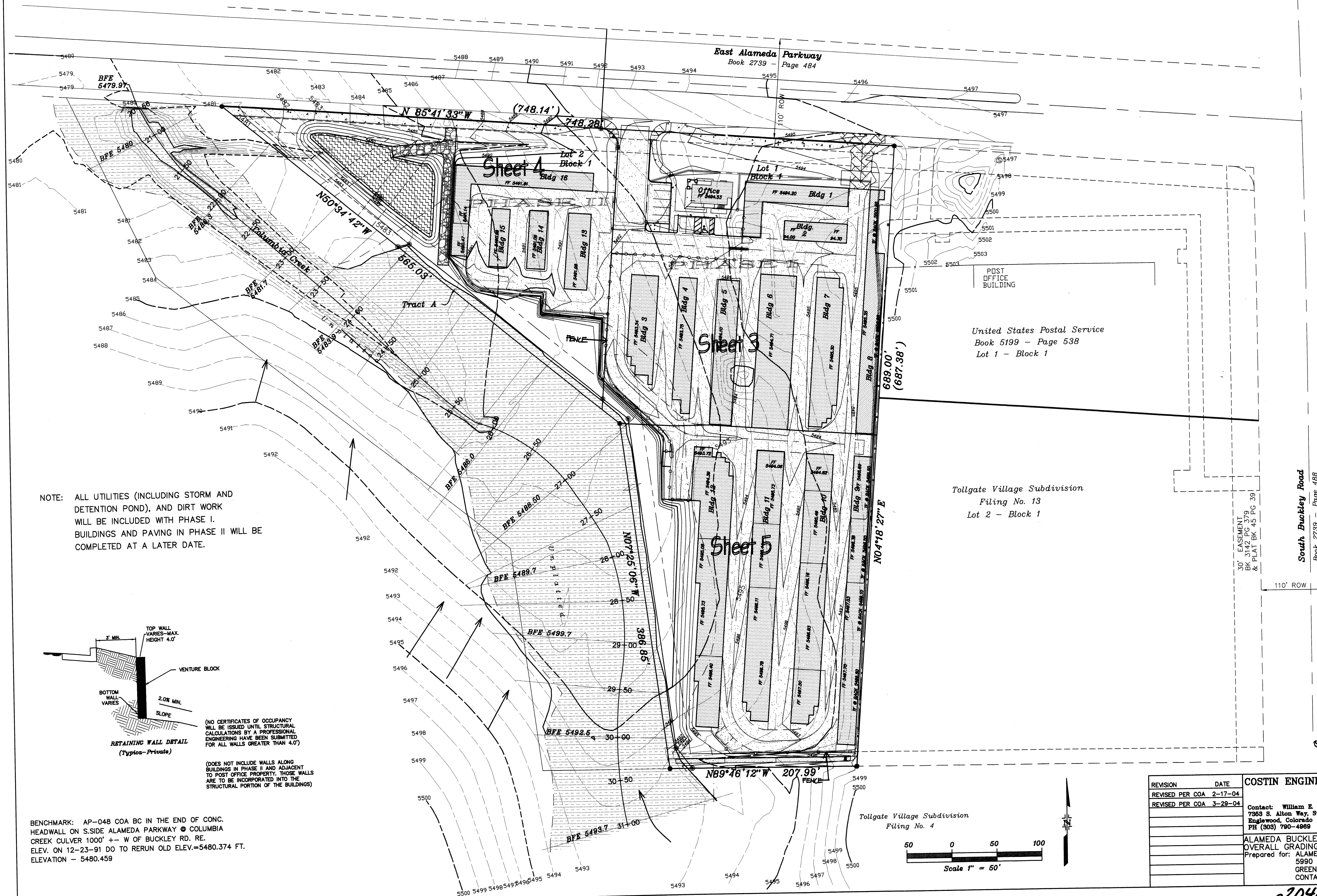
UTILITY NOTIFICATION CENTER - 1-800-922-1987
GAS, ELECTRIC, TELEPHONE
& CABLE T.V. LOCATIONS

REVISION	DATE	COSTIN ENGINEERING CONSULTANTS, INC. ENGINEERING LAND SURVEYING CONSTRUCTION MANAGEMENT
REVISED PER COA	2-17-04	
Contact: William E. Miller 7353 S. Alton Way, Suite A115 Englewood, Colorado 80112 PH (303) 790-4989		ALAMEDA BUCKLEY SUBDIVISION FILING NO. 1 CONSTRUCTION DRAWINGS-COVER SHEET Prepared for: ALAMEDA & BUCKLEY VENTURE, L.L.C. 5990 GREENWOOD PLAZA BLVD., SUITE 102 GREENWOOD VILLAGE, CO. 80111 CONTACT: THOMAS SATTLER
		DATE 12-12-2003 DES/DT/CHK WEM/MC PROJ. NO. 4190036A SHEET 1 OF 15

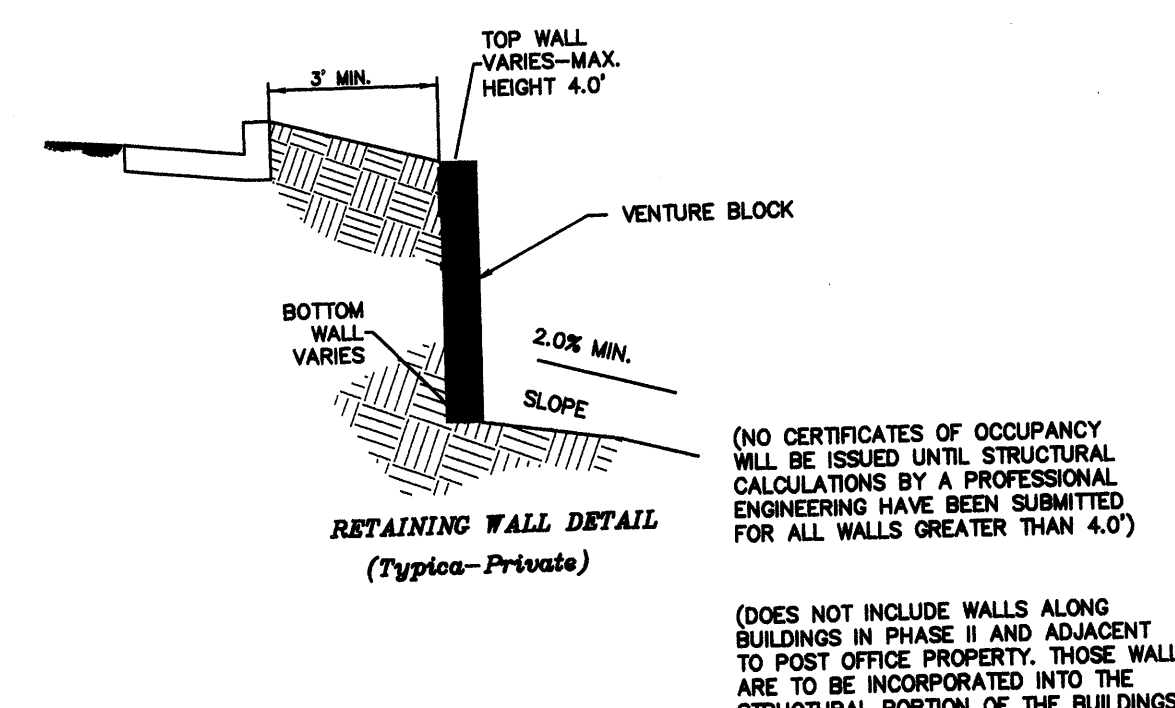
204090 1/15

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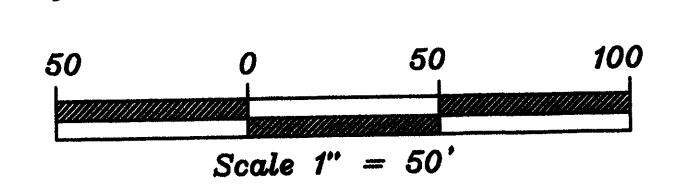
204090 2/15



NOTE: ALL UTILITIES (INCLUDING STORM AND DETENTION POND), AND DIRT WORK WILL BE INCLUDED WITH PHASE I. BUILDINGS AND PAVING IN PHASE II WILL BE COMPLETED AT A LATER DATE.



BENCHMARK: AP-048 COA BC IN THE END OF CONC. HEADWALL ON S.SIDE ALAMEDA PARKWAY @ COLUMBIA CREEK CULVER 1000' +/- W OF BUCKLEY RD. RE. ELEV. ON 12-23-91 DO TO RERUN OLD ELEV.=5480.374 FT. ELEVATION - 5480.459



Approved for One Year From this Date
5-12-04
City Engineer

REVISION		DATE
REVISED PER COA		2-17-04
REVISED PER COA		3-29-04
COSTIN ENGINEERING CONSULTANTS, INC. ENGINEERING LAND SURVEYING CONSTRUCTION MANAGEMENT		
Contact: William E. Miller 7863 S. Alton Way, Suite A115 Englewood, Colorado 80112 PH (303) 790-4989		
ALAMEDA BUCKLEY SUBDIVISION FILING NO. 1 OVERALL GRADING - KEY MAP Prepared for: ALAMEDA & BUCKLEY VENTURE, L.L.C. 5990 GREENWOOD PLAZA BLVD., SUITE 102 GREENWOOD VILLAGE, CO. 80111 CONTACT: THOMAS SATTLER		
DATE		12-12-03
DES/CHK		WEM/MC
PROJ. NO.		4190040
SHEET		2 OF 13

204090 2/15

C:\MICHELE\413\CONSTRUCT\DRAWINGS\204090\204090-13-01.dwg Plot Date: 23:15:27 25/004

REV. 204090 9/15

Notes:

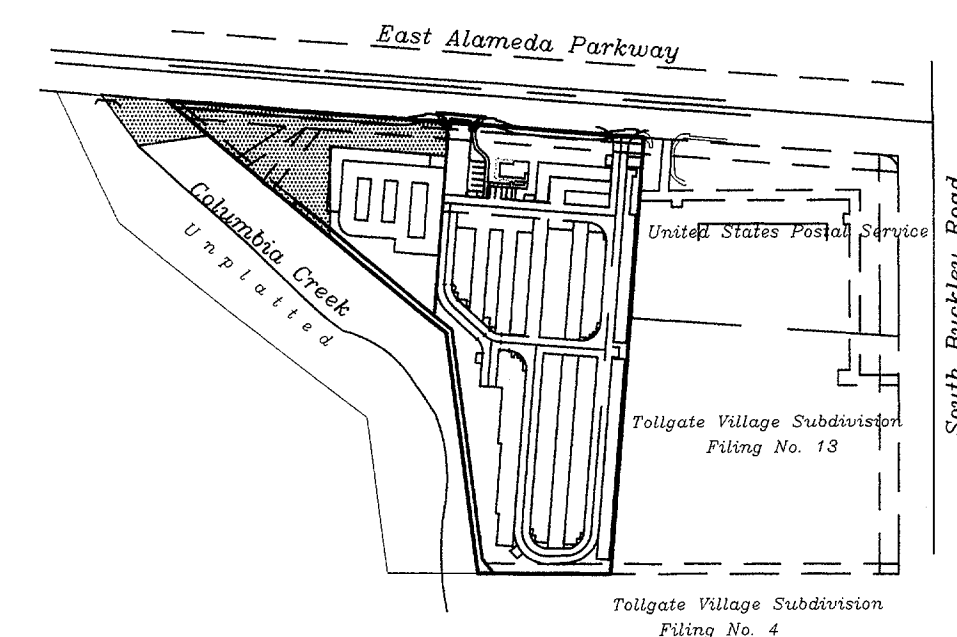
1. ALL STORM PUBLIC EXCEPT AS INDICATED.
2. ALL RCP IS CLASS III UNLESS OTHERWISE NOTED.

NOTE:
EXISTING 8" VCP SANITARY LINE MUST
BE T.V.D PRIOR TO GRADING OF POND.
CALL WASTEWATER SHOP @ 303-326-8050
TO SCHEDULE. CONTRACTOR IS RESPONSIBLE
FOR REPAIR/REPLACEMENT OF EXISTING SANITARY
SEWER LINE DUE TO DAMAGES INCURRED DURING
GRADING OF POND.

BENCHMARK: AP-048 COA BC IN THE END OF CONC.
HEADWALL ON S.SIDE ALAMEDA PARKWAY @ COLUMBIA
CREEK CULVER 1000' +/- W OF BUCKLEY RD. RE.
ELEV. ON 12-23-91 DO TO RERUN OLD ELEV.=5480.374 FT.
ELEVATION - 5480.459

24 HOURS BEFORE YOU DIG
CALL

UTILITY NOTIFICATION CENTER - 1-800-922-1987
GAS, ELECTRIC, TELEPHONE
& CABLE T.V. LOCATIONS



Scale 1" = 50'

NOTE: ALL UTILITIES (INCLUDING STORM AND
DETENTION POND), AND DIRT WORK
WILL BE CONSTRUCTED WITH PHASE I.
BUILDINGS AND PAVING IN PHASE II WILL BE
COMPLETED AT A LATER DATE.

Scale
1" = 2'
H & V

TYPE C INLET	5484
TOP WEIR	5481.70
TOP GRADE	5482.41
INV. WEIR	5481.1
INV. HOLE	5479.5
INV. TYPE C	5478.0
(PRIVATE)	5476

Scale
1" = 2'
H & V

TYPE C INLET	5484
TOP GRADE	5482.41
INV. WEIR	5481.1
INV. POND	5479.3
TRASH RACK-12" X 15" **	5480
ORIFICE PLATE	5478
** USE SCREEN #3 VEE WIRE SLOT OPENING: 12-0.074" X 0.80" ROD TYPE, SUPPORTED ON-CENTER SPACING W/3/4" X 1" FLAT BAR FRAME	5476

Approved for One Year From this Date
5-14-04

City Engineer
Date
Utilities Department
Date

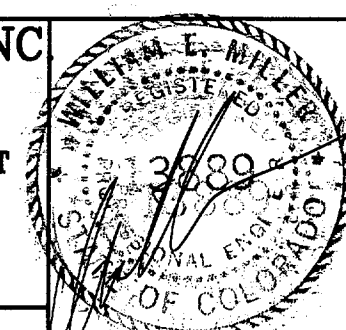
REVISION DATE
REVISED PER COA 2-17-04
REVISED PER COA 3-29-04
11 2-17-05

COSTIN ENGINEERING CONSULTANTS, INC

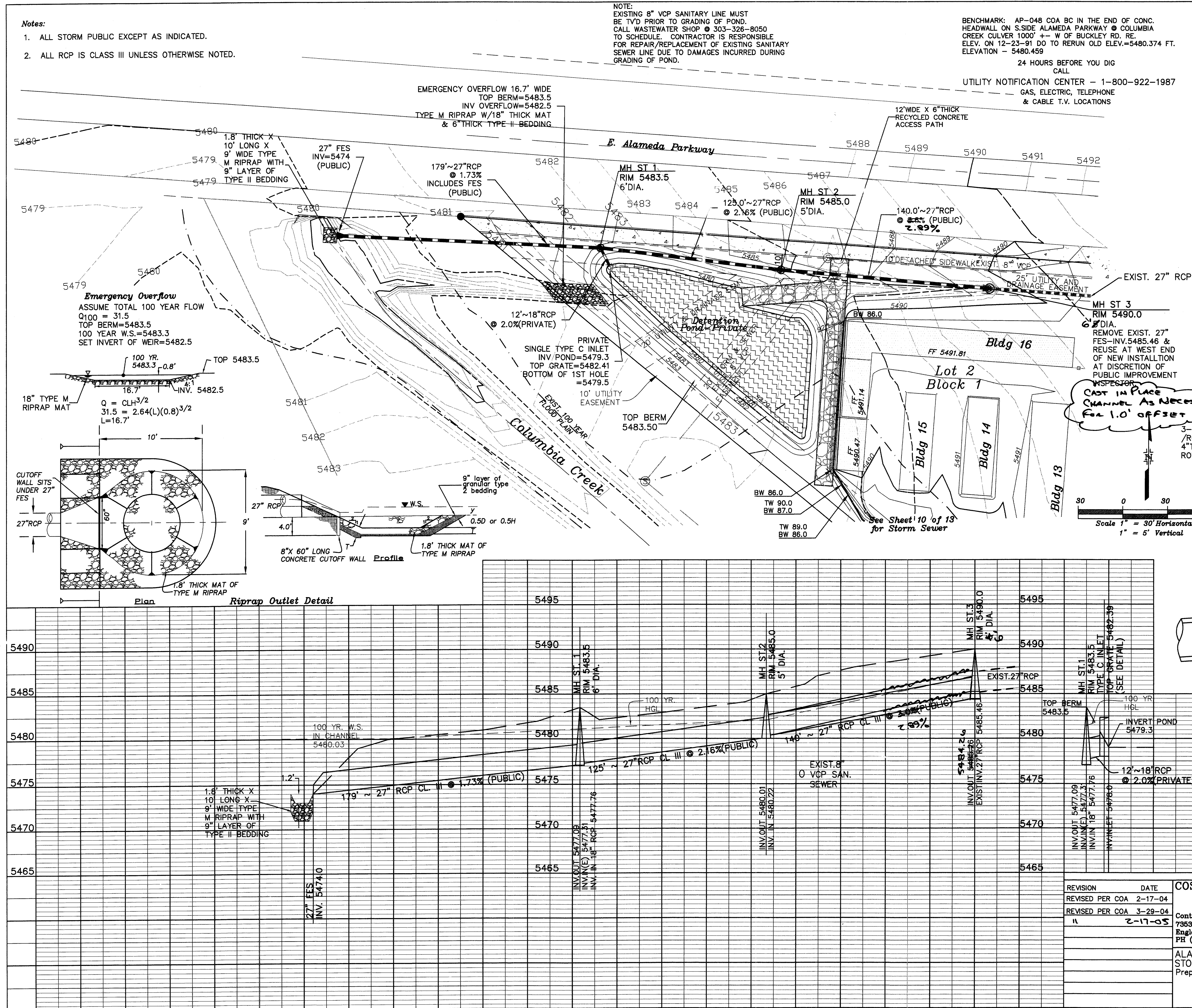
ENGINEERING
LAND SURVEYING
CONSTRUCTION MANAGEMENT

Contact: William E. Miller
7353 S. Alton Way, Suite A115
Englewood, Colorado 80112
PH (303) 790-4969

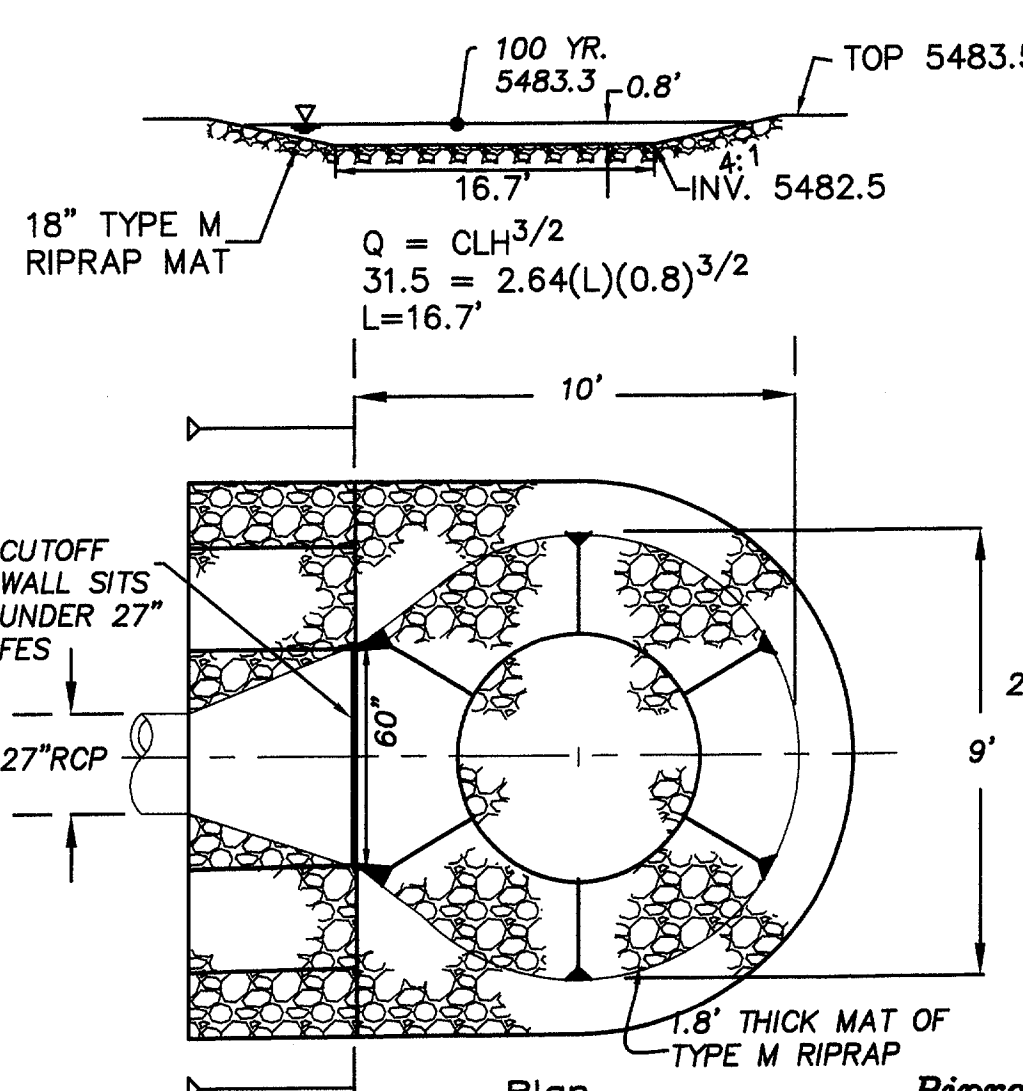
ALAMEDA BUCKLEY SUBDIVISION FILING NO. 1
STORM SEWER PLAN & PROFILE-DETENTION POND
Prepared for: ALAMEDA & BUCKLEY VENTURE, L.L.C.
5990 GREENWOOD PLAZA BLVD., SUITE 102
GREENWOOD VILLAGE, CO. 80111
CONTACT: THOMAS SATTLER



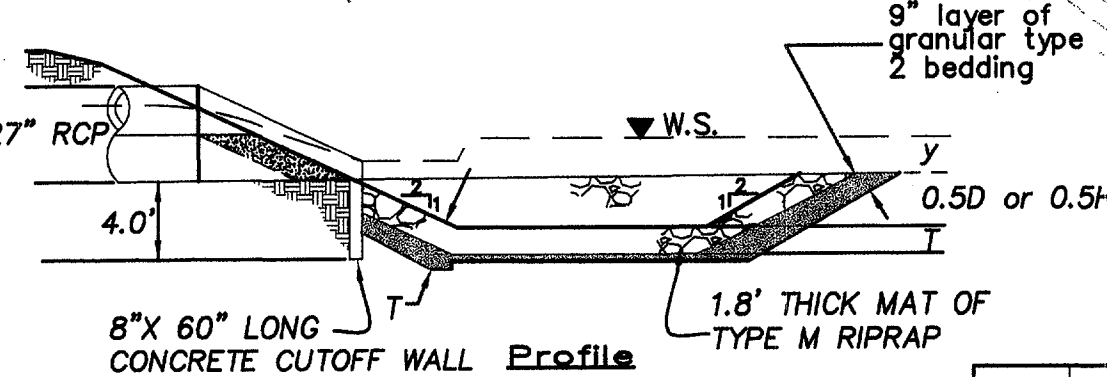
DATE 12-12-03
DES/DTF/CHK WEM/MC
PROJ. NO. 4190040
SHEET 9 OF 15



Emergency Overflow
ASSUME TOTAL 100 YEAR FLOW
Q100 = 31.5
TOP BERM=5483.5
100 YEAR W.S.=5483.3
SET INVERT OF WEIR=5482.5



Riprap Outlet Detail



Profile

204090 9/15

204090 10/15

Notes:

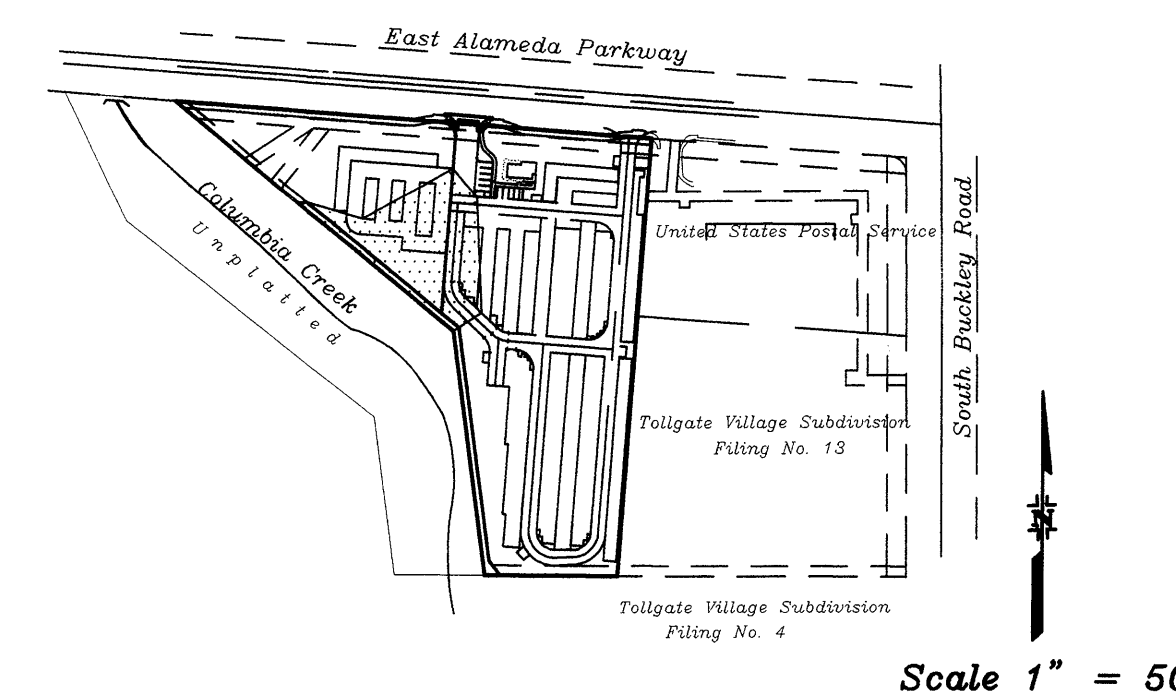
1. ALL STORM SEWER PIPING, DETENTION POND AND OUTLET STRUCTURES ON THIS SHEET ARE PRIVATE.
2. ALL RCP IS CLASS III UNLESS OTHERWISE NOTED.

BENCHMARK: AP-048 COA BC IN THE END OF CONC. HEADWALL ON S.SIDE ALAMEDA PARKWAY @ COLUMBIA CREEK CULVER 1000' +/- W OF BUCKLEY RD. RE. ELEV. ON 12-23-91 DO TO RERUN OLD ELEV.=5480.374 FT. ELEVATION = 5480.459

24 HOURS BEFORE YOU DIG CALL

UTILITY NOTIFICATION CENTER - 1-800-922-1987
GAS, ELECTRIC, TELEPHONE
& CABLE T.V. LOCATIONS

NOTE: ALL UTILITIES (INCLUDING STORM AND DETENTION POND), AND DIRT WORK WILL BE CONSTRUCTED WITH PHASE I. BUILDINGS AND PAVING IN PHASE II WILL BE COMPLETED AT A LATER DATE.



12' WIDE X 6" THICK RECYCLED CONCRETE ACCESS PATH

Detention Pond

Lot 2 Block 1

Bldg 16

Bldg 15

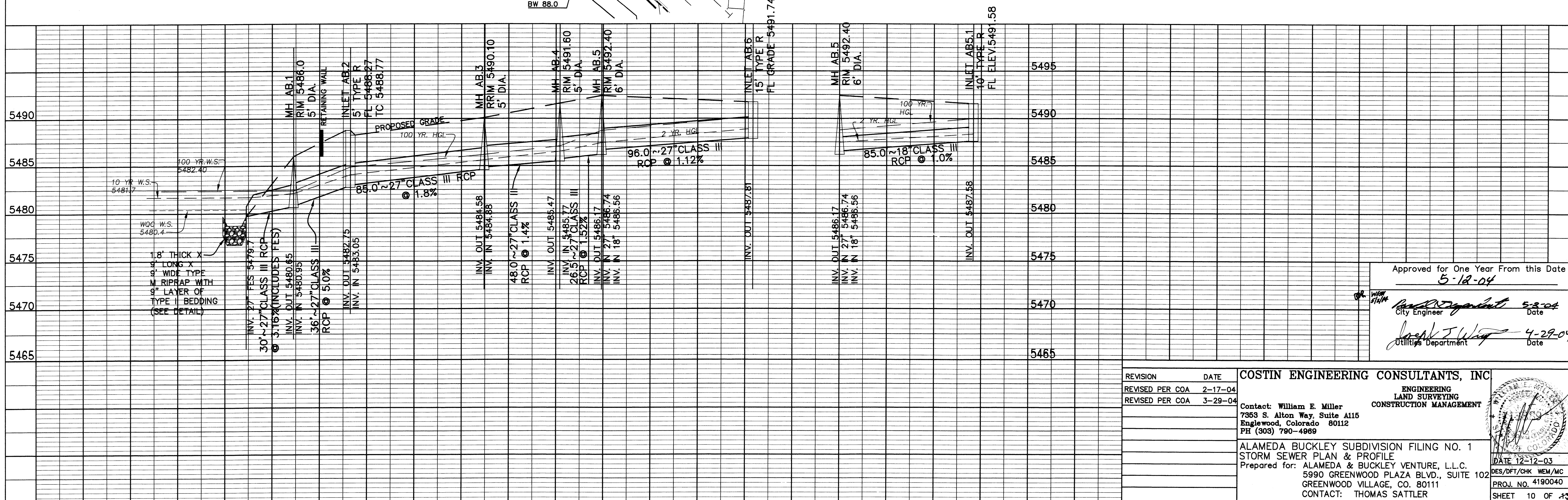
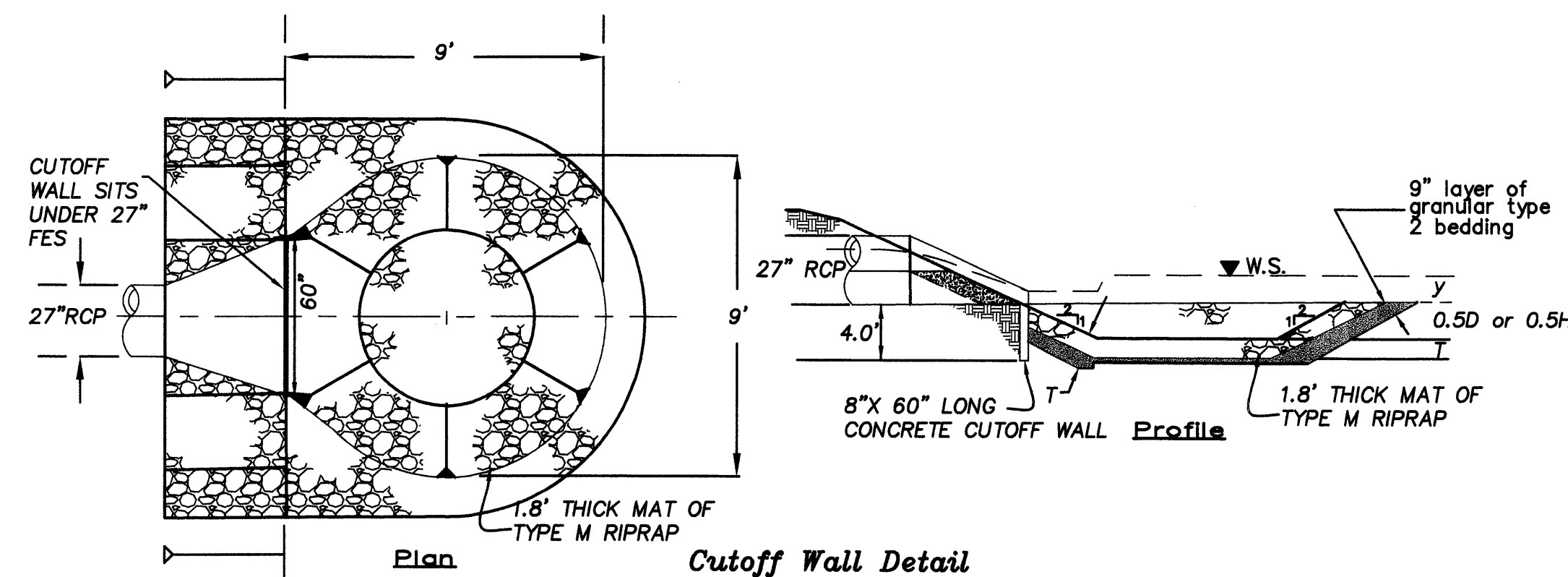
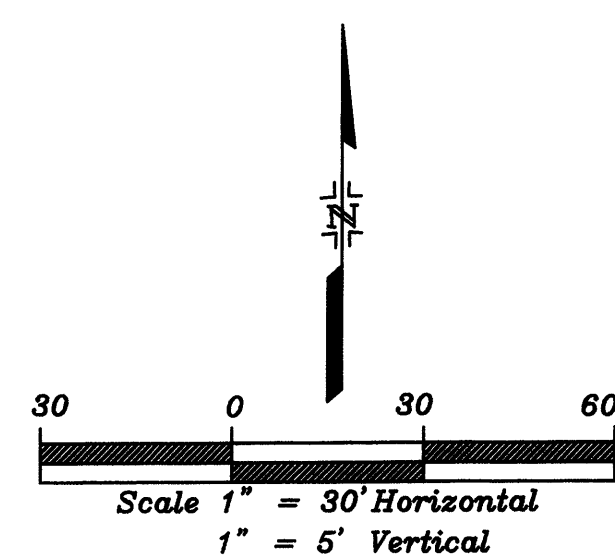
Bldg 14

Bldg 13

Bldg 4

INLET AB.5.1
10" TYPE R INLET
FL ELEV 5491.58

INLET AB.6
15" TYPE R INLET
FL GRATE 5497.4



Approved for One Year From this Date
5-12-04

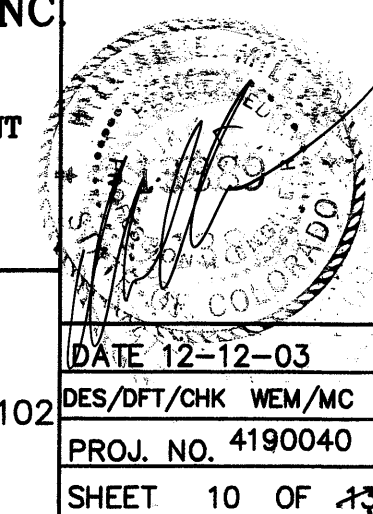
City Engineer
Date
Utilities Department
Date

REVISION DATE
REVISED PER COA 2-17-04
REVISED PER COA 3-29-04

COSTIN ENGINEERING CONSULTANTS, INC.
ENGINEERING
LAND SURVEYING
CONSTRUCTION MANAGEMENT

Contact: William E. Miller
7353 S. Alton Way, Suite A115
Englewood, Colorado 80112
PH (303) 790-4969

ALAMEDA BUCKLEY SUBDIVISION FILING NO. 1
STORM SEWER PLAN & PROFILE
Prepared for: ALAMEDA & BUCKLEY VENTURE, L.L.C.
5990 GREENWOOD PLAZA BLVD., SUITE 102
GREENWOOD VILLAGE, CO. 80111
CONTACT: THOMAS SATTLER



204090 10/15

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REV 204090 11/15

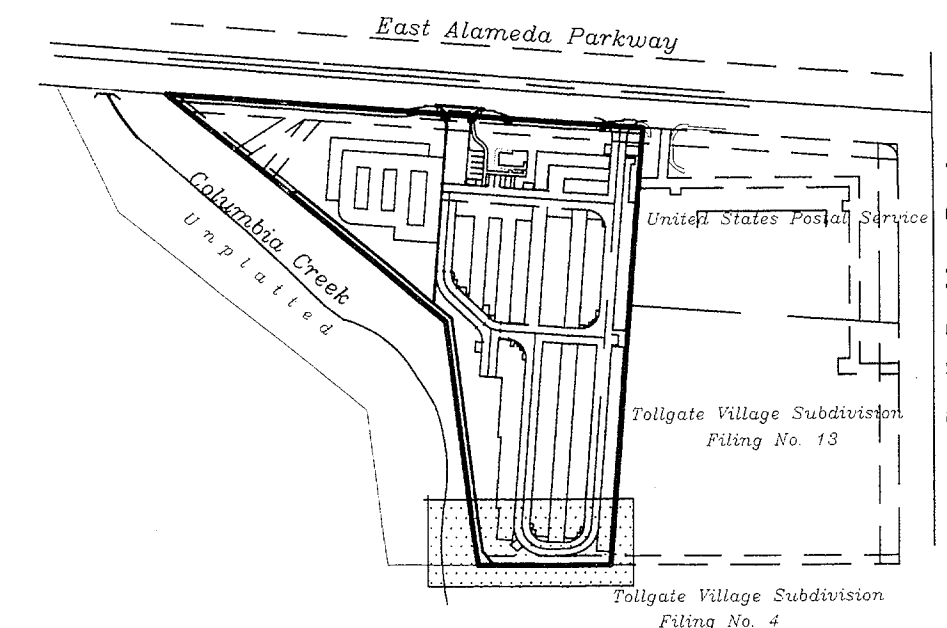
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1. ALL STORM SHOWN ON THIS SHEET IS PRIVATE, INCLUDING SECTIONS OC-OC, 1-1, 2-2, 3-3 AND 4-4.

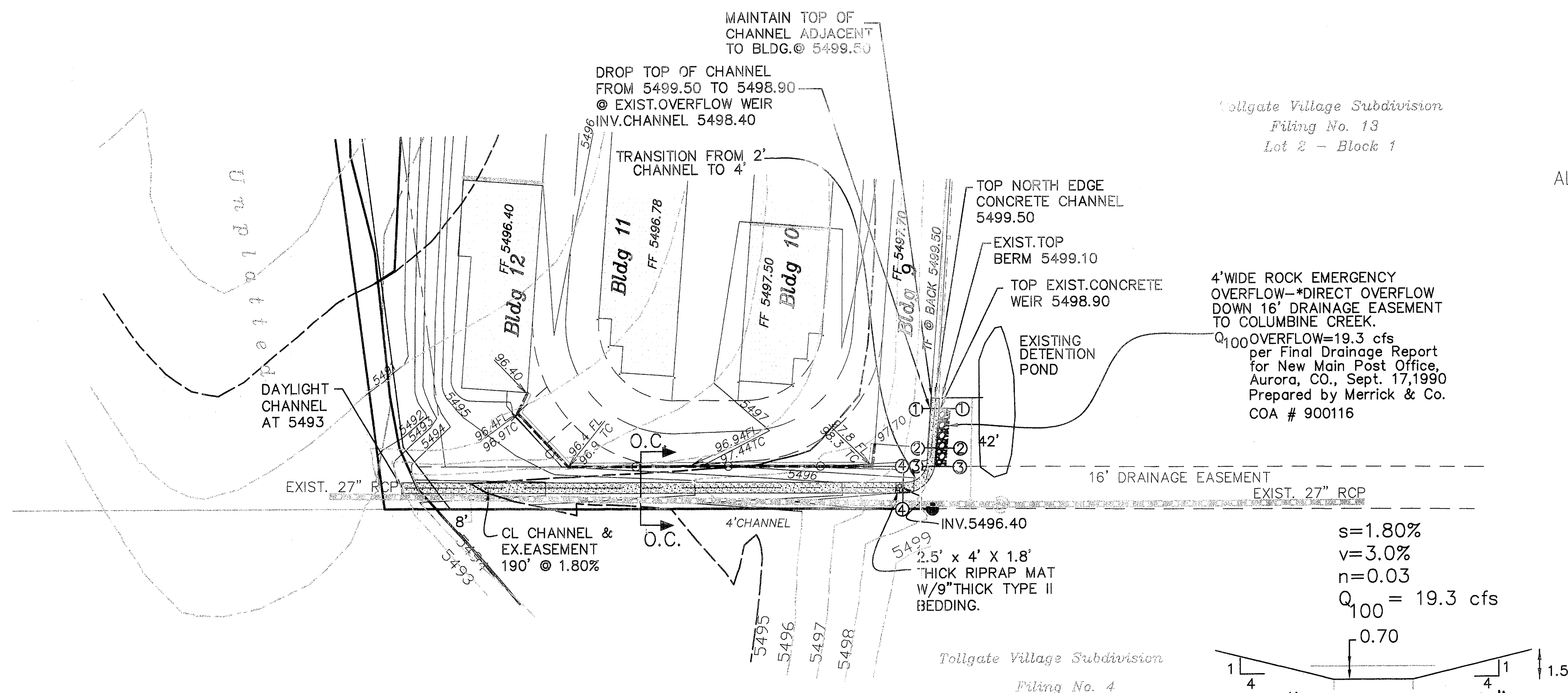
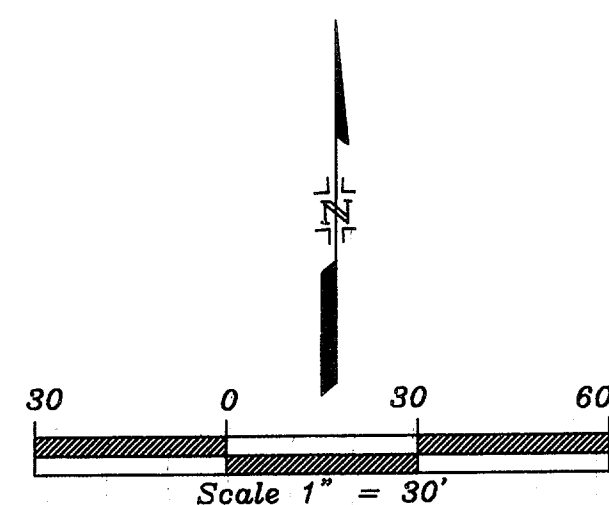
BENCHMARK: AP-048 COA BC IN THE END OF CONC. HEADWALL ON S.SIDE ALAMEDA PARKWAY @ COLUMBIA CREEK CULVER 1000' +- W OF BUCKLEY RD. RE. ELEV. ON 12-23-91 DO TO RERUN OLD ELEV.=5480.374 FT. ELEVATION - 5480.459

24 HOURS BEFORE YOU DIG
CALL

UTILITY NOTIFICATION CENTER - 1-800-922-1987
GAS, ELECTRIC, TELEPHONE
& CABLE T.V. LOCATIONS



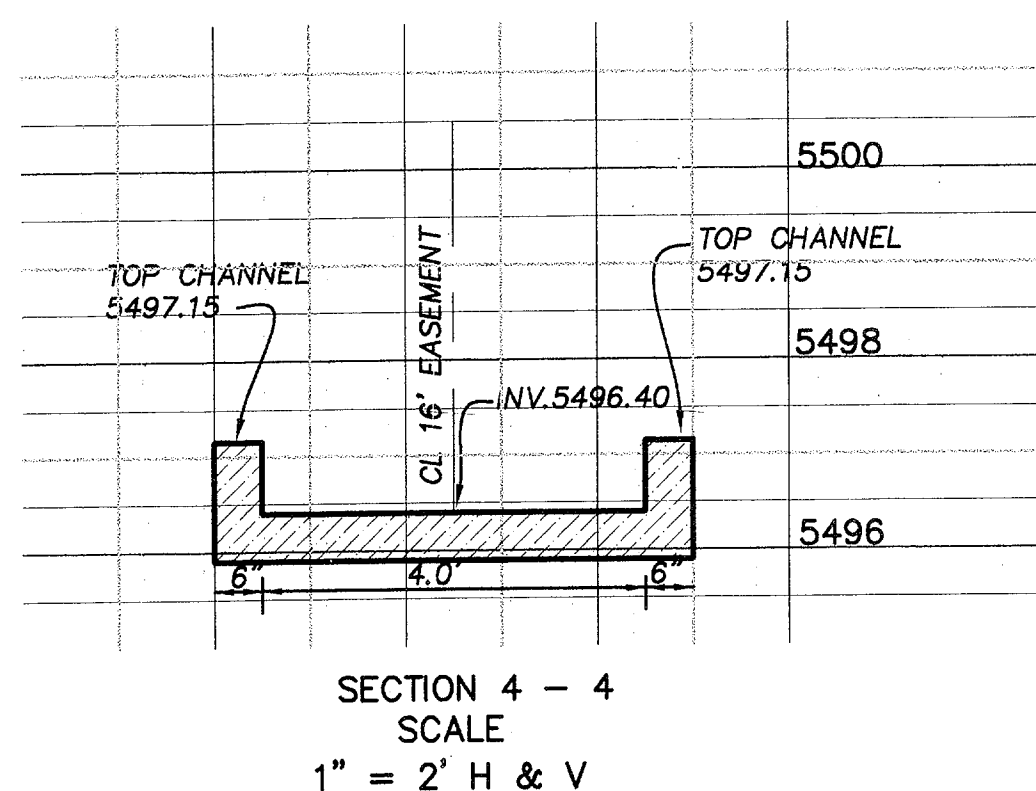
Scale 1" = 50'



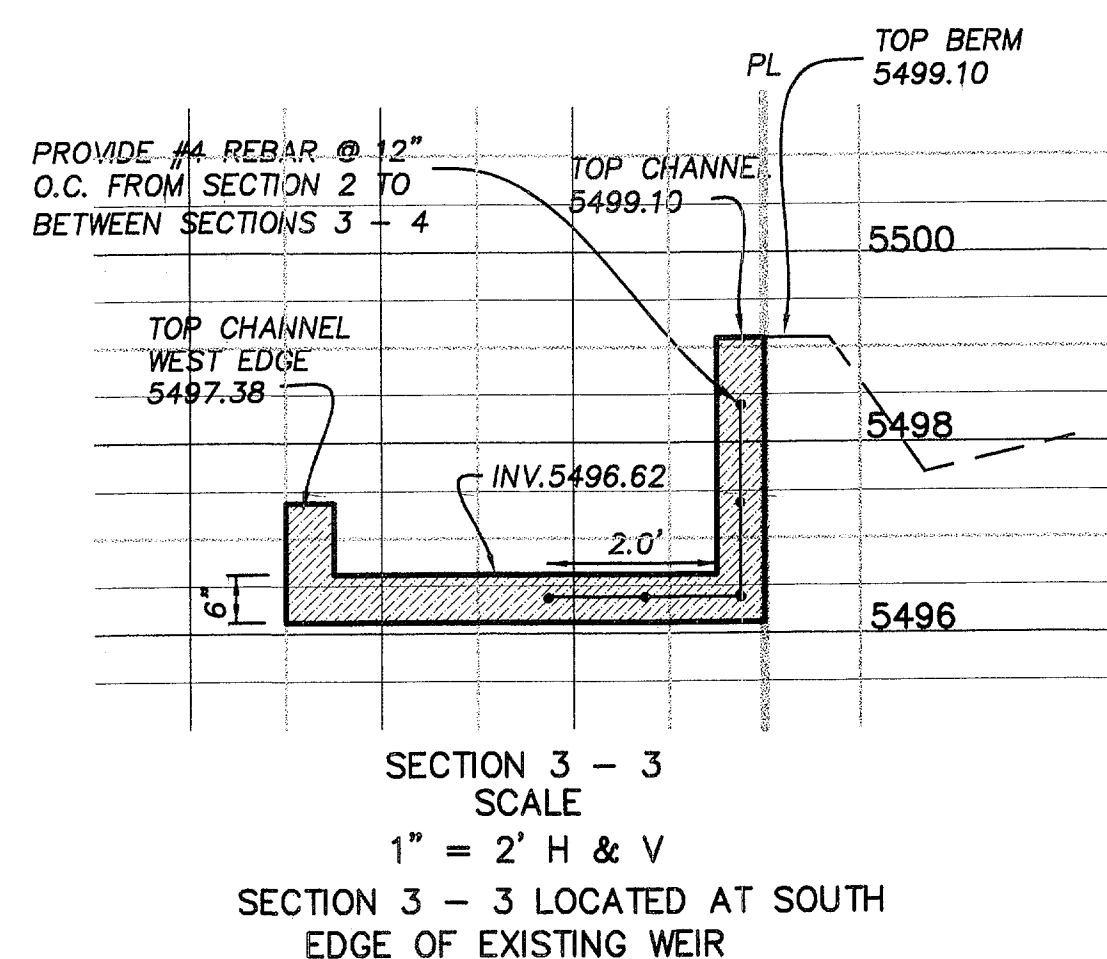
4' WIDE ROCK EMERGENCY
OVERFLOW - *DIRECT OVERFLOW
DOWN 16' DRAINAGE EASEMENT
TO COLUMBINE CREEK.

$$s = 1.80\%$$
$$v = 3.0\%$$
$$n = 0.03$$
$$Q_{100} = 19.3 \text{ cfs}$$
$$0.70$$

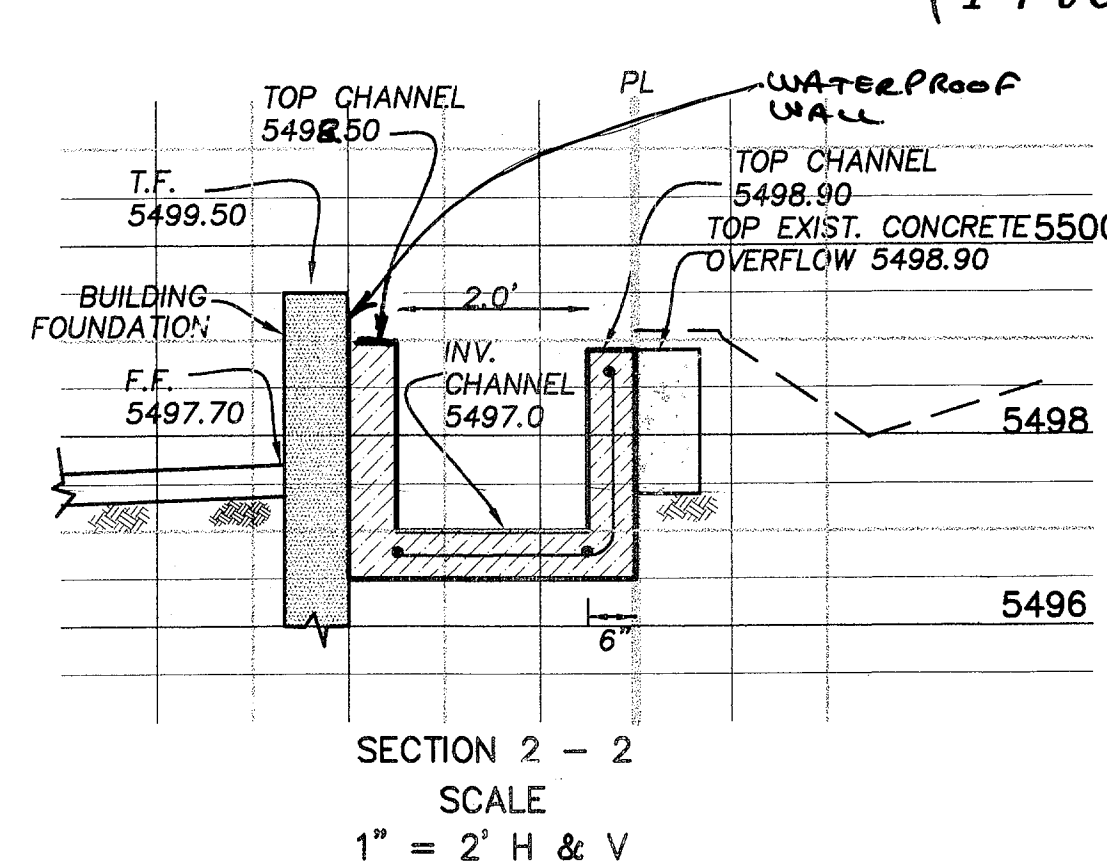
Section O.C. - O.C.
(Private)



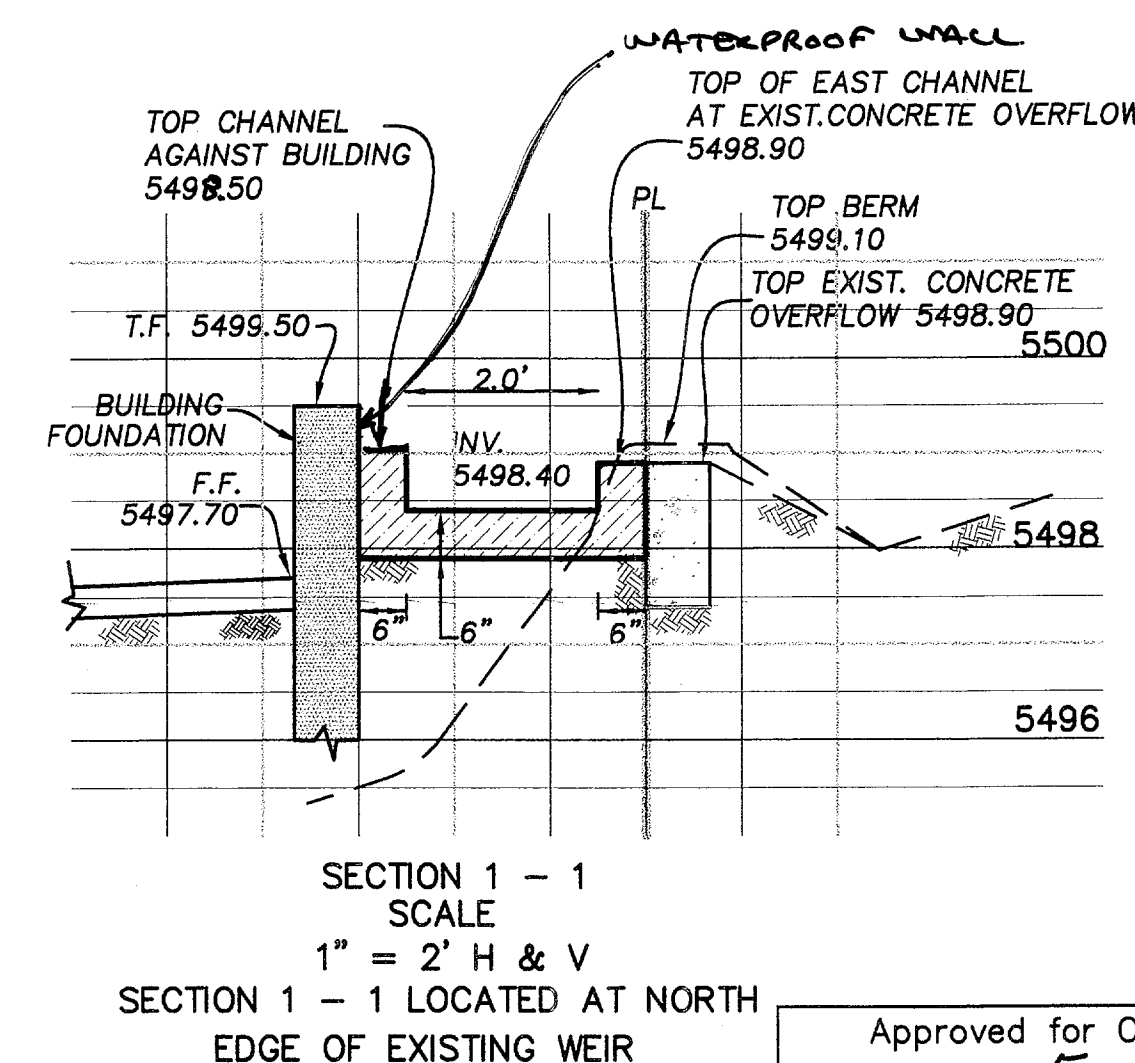
SECTION 4 - 4
SCALE
1" = 2' H & V



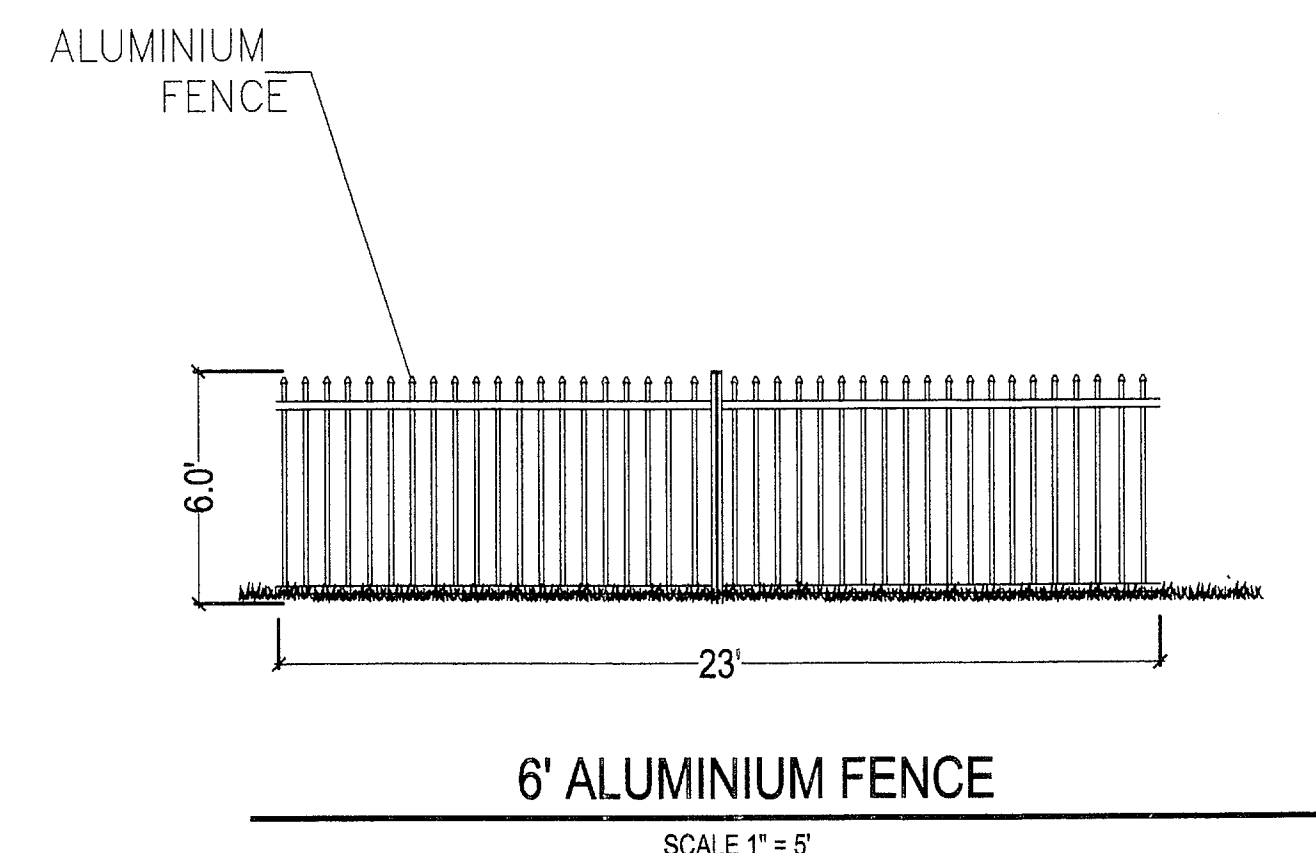
SECTION 3 - 3
SCALE
1" = 2' H & V
SECTION 3 - 3 LOCATED AT SOUTH
EDGE OF EXISTING WEIR



SECTION 2 - 2
SCALE
1" = 2' H & V



SECTION 1 - 1
SCALE
1" = 2' H & V
SECTION 1 - 1 LOCATED AT NORTH
EDGE OF EXISTING WEIR



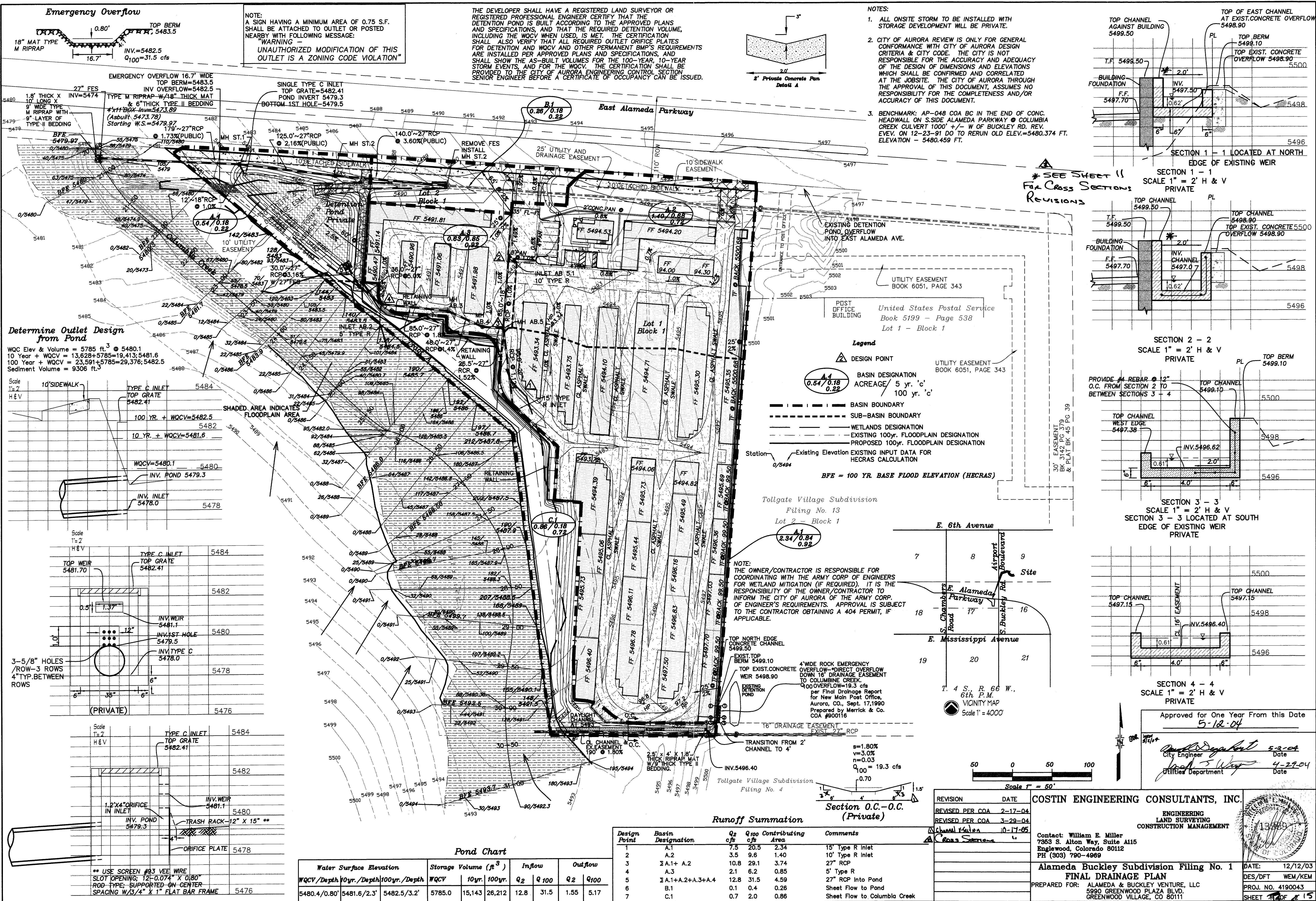
Approved for One Year From this Date
5-12-04

City Engineer
Date
Utilities Department
Date
Director of Parks and Open Space
Date

REVISION	DATE	COSTIN ENGINEERING CONSULTANTS, INC.
REVISED PER COA	2-17-04	ENGINEERING LAND SURVEYING CONSTRUCTION MANAGEMENT
11	10-12-05	Contact: William E. Miller 7353 S. Alton Way, Suite A115 Englewood, Colorado 80112 PH (303) 790-4989
		ALAMEDA BUCKLEY SUBDIVISION FILING NO. 1 STORM SEWER PLAN & PROFILE-CONCRETE CHANNEL Prepared for: ALAMEDA & BUCKLEY VENTURE, L.L.C. 5990 GREENWOOD PLAZA BLVD., SUITE 102 GREENWOOD VILLAGE, CO. 80111 CONTACT: THOMAS SATTLER
		DATE 12-12-03 DES/DFT/CHK WEM/MC PROJ. NO. 4190040 SHEET 11 OF 15

204090 11/15

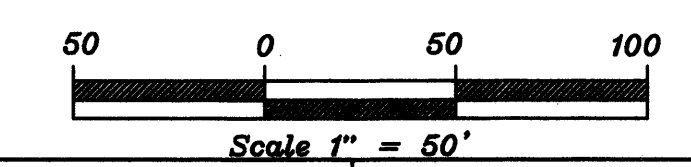
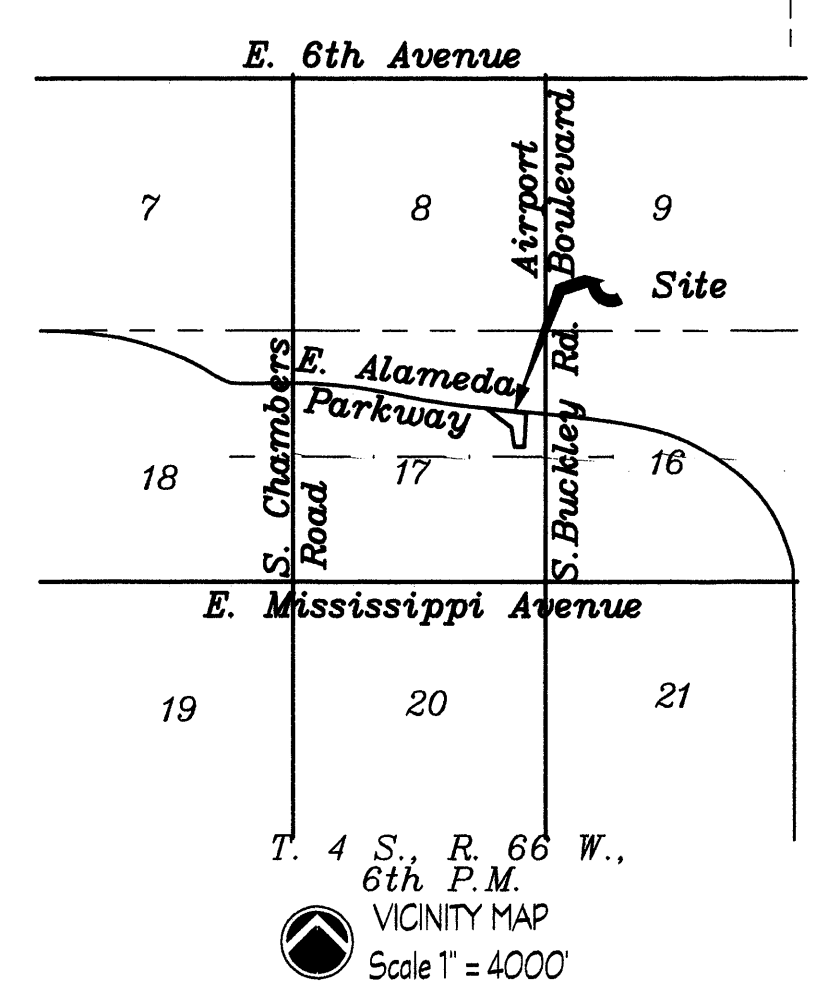
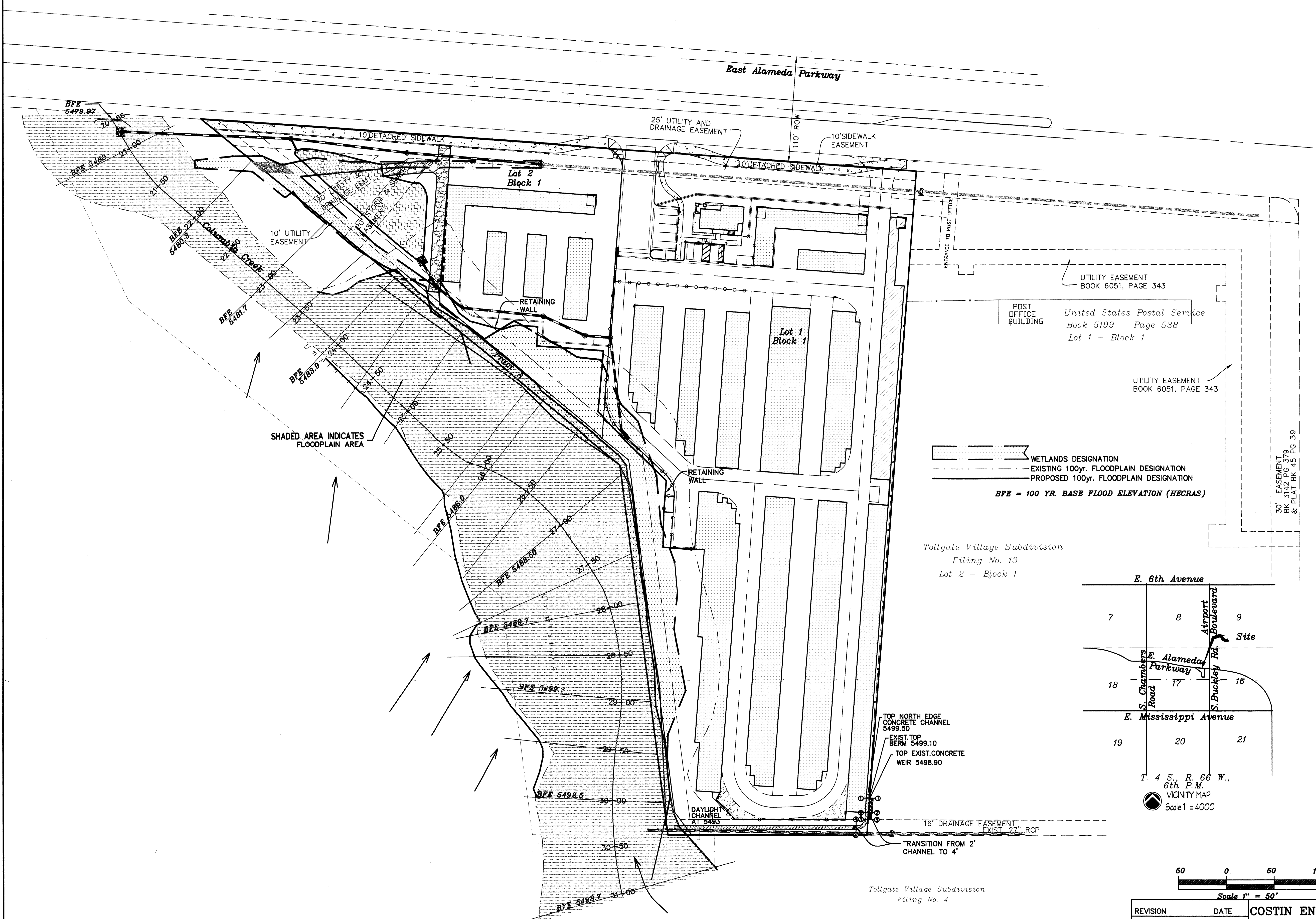
REV. 204090 11/15



204090 11/15

204090 15/15

BENCHMARK: AP-048 COA BC IN THE END OF CONC. HEADWALL ON S.SIDE ALAMEDA PARKWAY @ COLUMBIA CREEK CULVERT 1000' +/- W OF BUCKLEY RD. REV. ELEV. ON 12-23-91 DO TO RERUN OLD ELEV.=5480.374 FT. ELEVATION - 5480.459 FT.



FOR INFORMATION ONLY

REVISION	DATE	COSTIN ENGINEERING CONSULTANTS, INC.	
REVISED PER COA	2-17-04	ENGINEERING LAND SURVEYING CONSTRUCTION MANAGEMENT	
		Contact: William E. Miller 7353 S. Alton Way, Suite A115 Englewood, Colorado 80112 PH (303) 790-4969	
		Alameda Buckley Subdivision Filing No. 1	
		FINAL DRAINAGE PLAN	
		PREPARED FOR: ALAMEDA & BUCKLEY VENTURE, LLC 5990 GREENWOOD PLAZA BLVD. GREENWOOD VILLAGE, CO 80111	
		DATE:	12/12/03
		DES/DFT	WEM/KEM
		PROJ. NO.	4190043
		SHEET	2 OF 2

204090 15/15