



Public Works Department
2525 13th Street, Boulder, CO 80306
Phone: 303-441-3900
Fax: 303-441-4594

Guidelines for Preparing an Operation and Maintenance Plan for Post-Construction Controls

Overview

Boulder County requires that an Operation and Maintenance (O&M) Site Plan (Plan) be submitted for all local projects including a permanent post construction control measure. The Plan shall consist of a single sheet, 22"x34" that includes all the necessary information for long-term maintenance of the site, and shall generally conform to the guidelines that follow. Graphical elements included on the sheet are to reflect as-built Record Drawing information associated with the completed project.

Contents of Maintenance Site Plan

The following outline shall be used to guide the development of the Maintenance Site Plan. Some items may not apply to all projects, and any unique features may warrant inclusion of additional information if pertinent to the anticipated maintenance of the site.

Section 1 - Project Information- can be listed in drawing title

1.0 General Information

- A. Property Owner - Including contact number
- B. Design Engineer- Including contact number
- C. Project Completion Date
- D. County Approval Block

1.1 Hydraulic Information

- A. Flow Rates- All applicable flow rates should be listed, e.g. base flow, design flow, any storm flows that were evaluated, etc. Detention facilities should include inflow and outflow rates.
- B. Facility Description- Include additional design information for the facility, including volumes, water surface elevations, and surface types for forebays and micropools.
- C. Outlet Type
- D. WQCV Drain Time

1.2 Miscellaneous Information

- A. Project Survey Information- Include survey control information and at least one on-site "Maintenance Control Point" established during construction for use during maintenance activities.
- B. Seed Mix



- C. Mow Area- Include area in acres and description of mow limits.
- D. Long Term Monitoring Requirements- If applicable, list monitoring requirements such as 404 Permit Reports or any other required monitoring.

Section 2 - Project Notes

- 2.0 General Facility Description- Include function, flow source, flow pattern through project, any special features, and any additional information that may be helpful in understanding the basic workings of the facility.
- 2.1 Maintenance Notes
 - A. Maintenance Frequency
 - B. Equipment and Special Tools Required
 - C. Power Source (*if applicable*)
- 2.2 Maintenance Procedure
 - A. Dewatering
 - B. Sediment Removal
 - C. Debris Removal
 - D. Site Inspection- List all general features and equipment that should be inspected to ascertain additional maintenance needs. See attached examples.
 - E. Materials Testing- List any contaminant testing requirements for sediment removed from the pond.
 - F. Post-Maintenance Considerations- Any additional maintenance-related tasks should be listed here. These may include restoring flow patterns, replacing or removing stoplogs, or additional cleanup requirements.

Section 3 – Site Plan

- 3.0 Vicinity Map
- 3.1 Plan View- All major features of the facility should be labeled, including the following:
 - Trickle Channel
 - Forebay, longest reach distance required from access road
 - Micropool, longest reach distance required from access road
 - Entrance Structure
 - Outlet Structure

In addition, special maintenance-related information should be identified:

- Maintenance Control Pont location and elevation



- Maintenance entrance / access road / gates / turnarounds. List applicable information such as road material, width, maximum grade, etc.
- Power source
- Weight-restricted areas
- Wetland or natural areas to avoid

3.2 Hydraulic Profile

- Major features
- Permanent pool elevations
- Other applicable water surface elevations
- Flow direction
- Shading identifying forebay and micropool sediment removal zones

Section 4 – Details (relevant to the BMP on site- Rain Garden/PLD, EDB, Sand Filter Basin, etc)

4.0 Trickle Channel Section

4.1 Maintenance Road/Access

4.2 Inlet Structure(s)

4.3 Forebay Release Structure

4.4 Outlet Structure

Submittal Requirements

The Engineer shall submit one 22"x34" Maintenance Site Plan with the project's post-construction submittal package that is required for applicable development sites that disturb an acre or greater within the County's urbanized area. Any comments shall be addressed by the Engineer until approval has been granted by the County. Once approval has been granted, the final submittal shall include:

- One Electronic PDF of an 22"x34" Maintenance Site Plan (P.E., stamped)
- CAD Files

Project Information - Pond A

1.0 General Information

A. Property Owner

ADD CONTACT INFORMATION

B. Design Engineer

ADD CONTACT INFORMATION

C. Project Completion Date

Phase 1 completed 2005 (included detention ponds)

Phase 2 completed December-2019

1.1 Hydraulic Information

A. Flow Rates-

CONTROL	INFLOW (CFS)	RELEASE (CFS)
WQCV	N/A	40-hour
10-YEAR	20.78	3.14
100-YEAR	54.04	21.50

B. Pond Description- Extended Detention Basin, earthen with concrete outlet structure and buried Rip Rap emergency overflow. There is no forbay or Micropool.

C. Outlet Specifications

DESCRIPTION	TYPE	VOLUME (AF)	WSEL
INVERT	N/A	0	5141.18
WQCV	ORIFICE PLATE	0.156	5142.30
10-YEAR	REC. ORIFICE	0.173	5143.20
100-YEAR	WEIR	0.324	5144.00

1.2 Miscellaneous Information

A. Project Survey Information- Survey control information shown on drawing.

B. Seed Mix- Boulder County, Plains Seed Mix, for specifications see:

Common Name	Species Name	Variety	% of Mix	lb/acre
Side Oats	Grama Bouteloua curtipendula	Vaughn	15%	2.74
Blue Grama	Bouteloua gracilis	Native, Alma, or Hachita	20%	0.84
Buffalograss	Buchloe dactyloides	Native	15%	9.33
WesternWheatgrass	Pascopyrum smithii	Arriba	12.5%	3.96
WesternWheatgrass	Pascopyrum smithii	Native	12.5%	3.96
Little Bluestem	Schizachyrium scoparium	Cimarron	13%	1.74
Green Needlegrass	Stipa viridula	Lodorm or Native	12%	2.31
Totals:			100%	24.88

C. Mow Area= 0.2 acres

Section 2 - Project Notes

2.0 General Facility Description-

Runoff generated from a portion of the subdivision is routed to roadside ditches and storm culverts to the pond. The water quality ponds and outlet structures are designed to detain a water quality volume, 10-year flood control volume and 100-year flood control volume. The ponds will have release rates for the WQCV, and the 10-year and 100-year rates controlled by an outlet structure.

2.1 Maintenance Notes

A. Maintenance Frequency

Routine Maintenance typically consists of regularly scheduled mowing and trash and debris pickups for 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. These activities normally will be performed numerous times during the year and following significant rainfall events.

B. Equipment and Special Tools Required (Routine Maintenance)

Rake or Broom
Mower
Weed eater
Shovel

Must include at least general frequencies for routine inspections and maintenance activities in the Maintenance Notes or Procedures Section.

2.2 Maintenance Procedure

A. Dewatering-should not be required at this facility.

B. Sediment Removal- Major sediment removal (if required) consists of removal of large quantities of sediment or removal of sediment from vegetated areas. When removing large quantities of sediment typically deposited in vegetated areas. The volume of sediment removed should return the pond to design volumes and grades. The removed sediment shall be transported and disposed of.

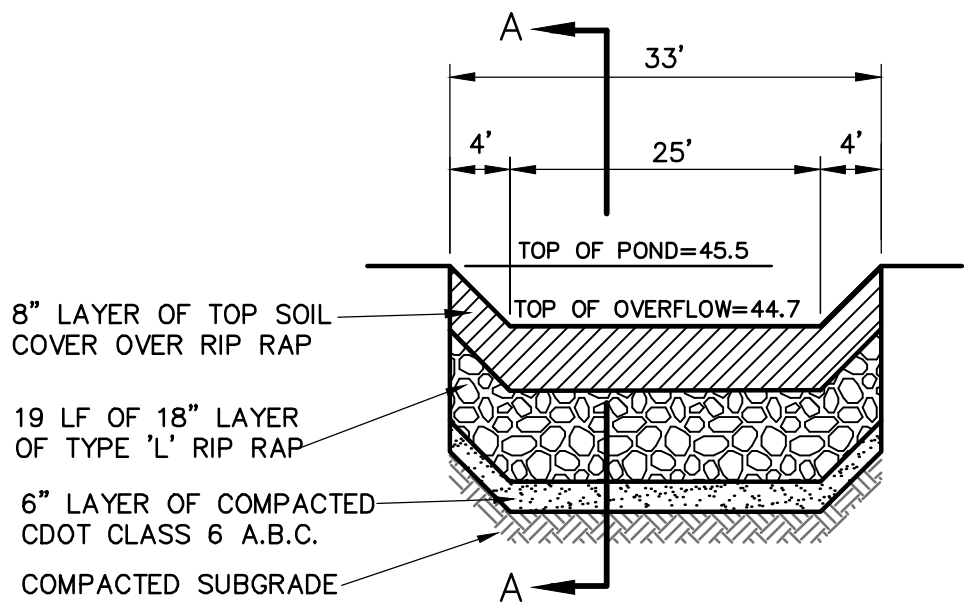
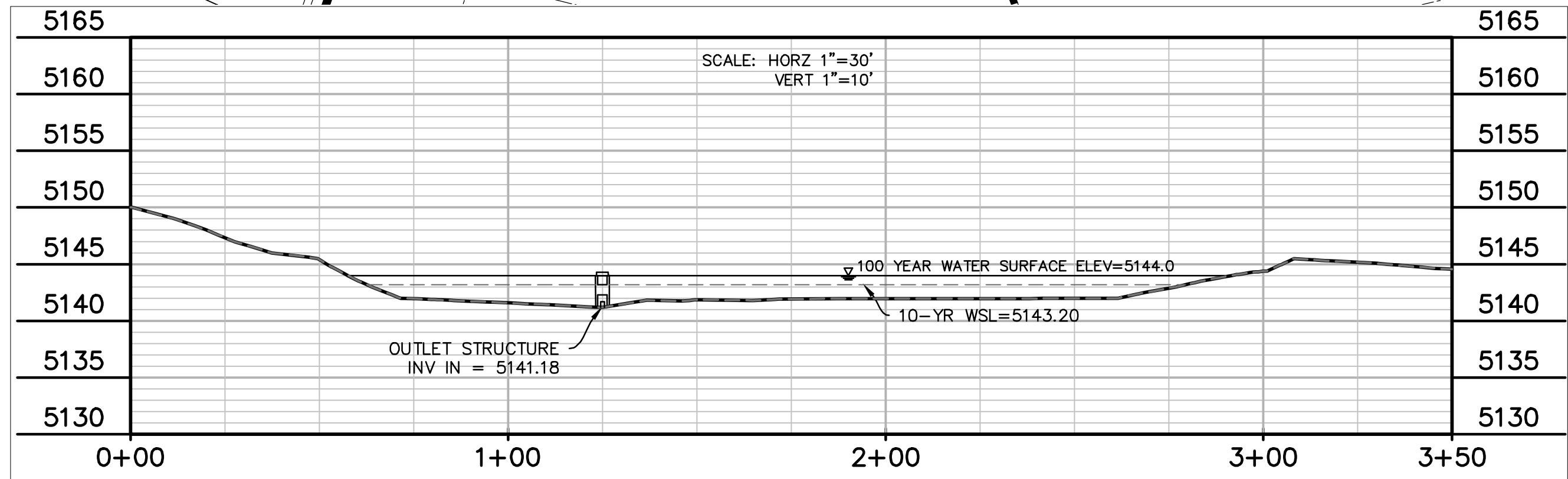
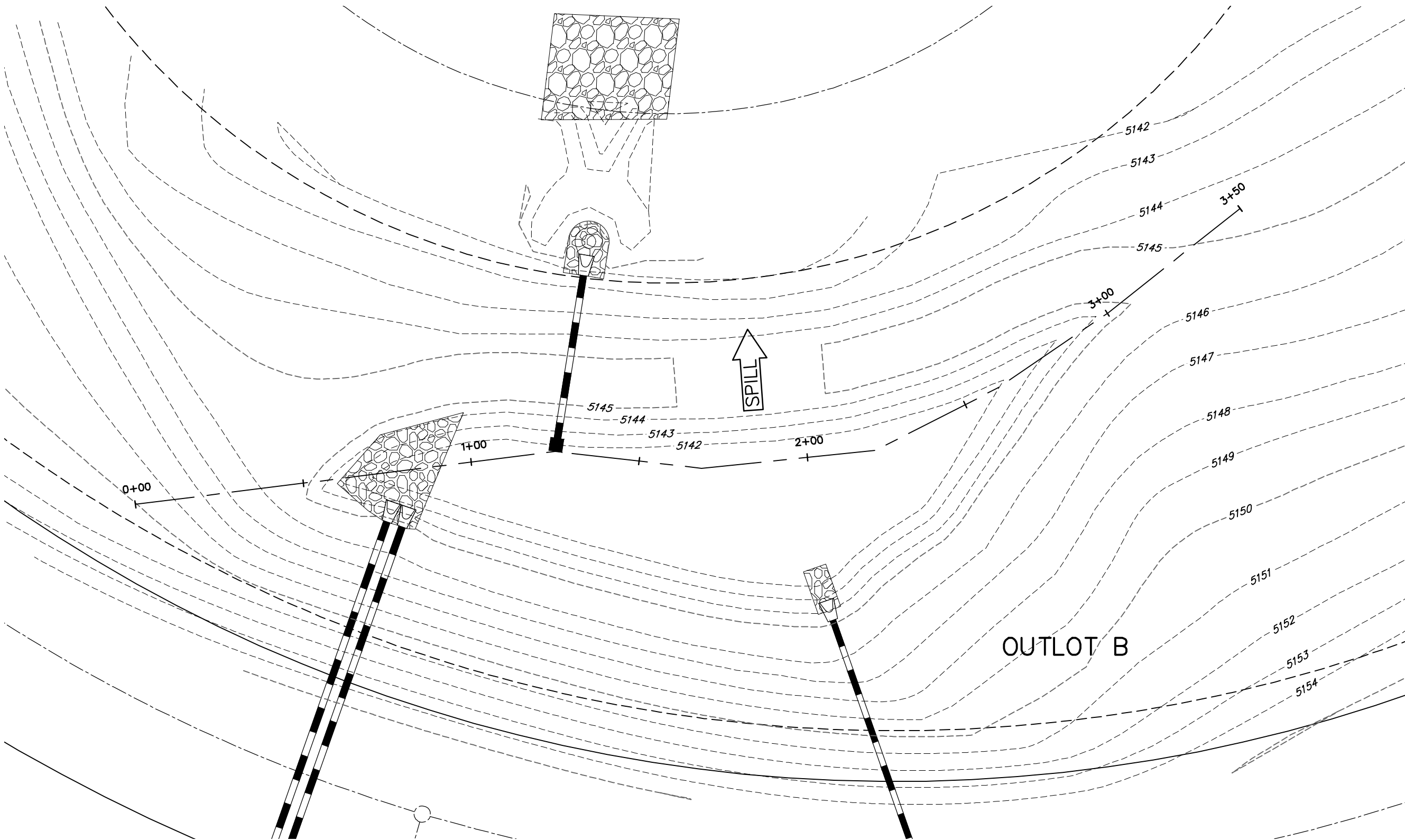
C. Debris Removal- Debris and other materials can clog the outlet work's well screen, orifice plate(s) and trash rack. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

D. Site Inspection- The facility should be inspected on an annual basis to evaluated the need for additional maintenance such as sediment removal, erosion control, riprap maintenance and structural repairs.

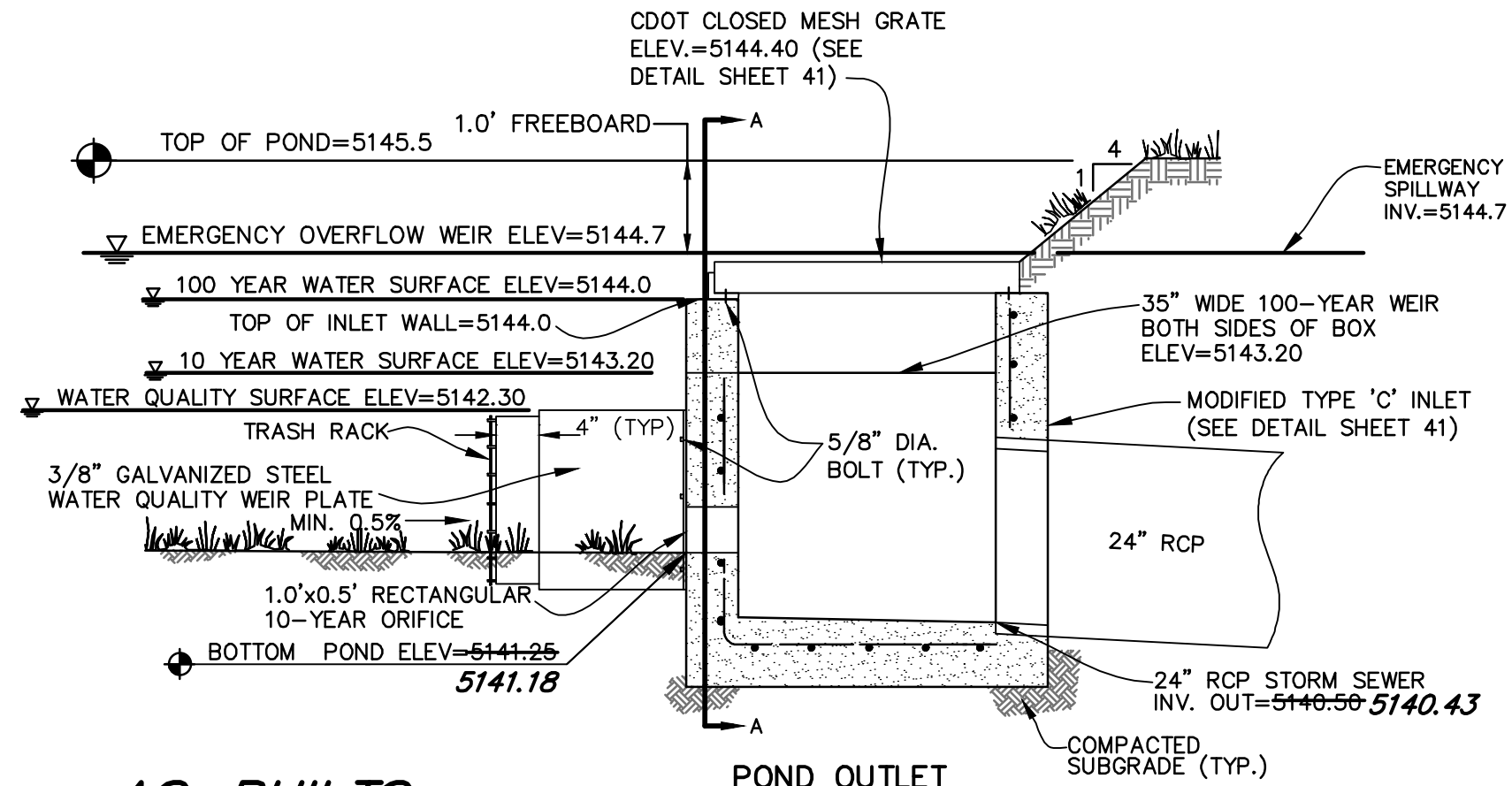
E. Post-Maintenance Considerations- After sediment removal or repairs, the disturbed area may require re-vegetation.

F. Access to detention ponds shall be from the Niwot Hills Drive, across open space, within Outlot B, and down the 4:1 slope of the pond. No access roads are provided directly to the pond. Access shall be by the least disruptive method available for required inspection or maintenance .

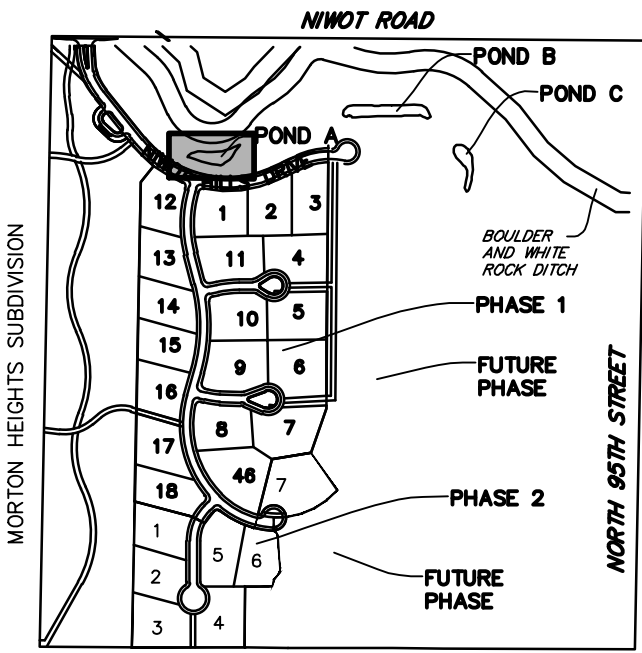
O&M Plan is to be site-specific - example language only



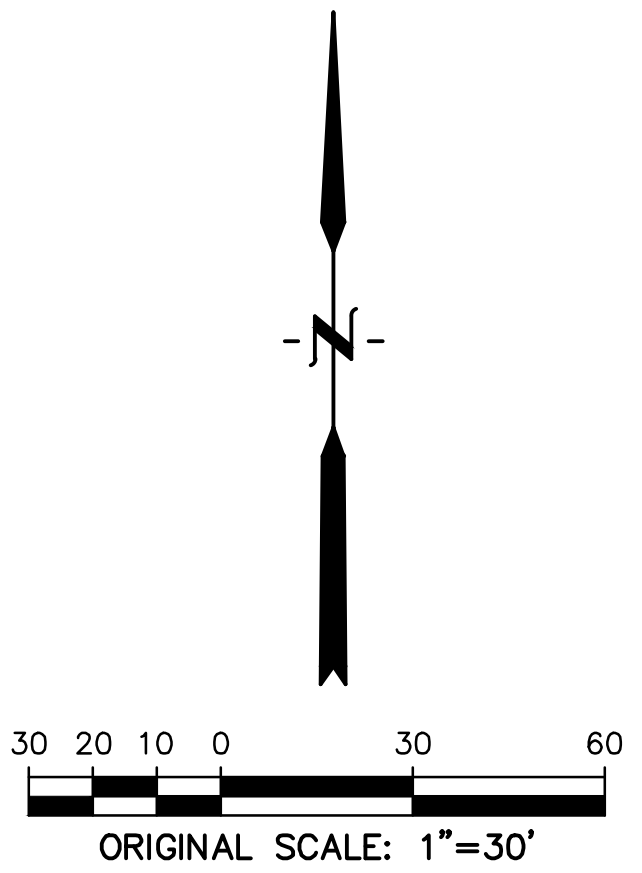
DETENTION POND EMERGENCY OVERFLOW
NO SCALE



AS-BUILT S
18 MAY 2005



KEY MAP
NOT TO SCALE



BASIS OF BEARINGS

BEARINGS ARE REFERRED TO THE WEST LINE OF THE NE 1/4 OF SECTION 32 AS BEARING S01°08'30" W PER THE RECORDED PLAT OF THIRD ADDITION TO MORTON HEIGHTS SUBDIVISION (ASSUMED MERIDIAN).

BENCHMARK

3-1/4" ALUMINUM CAP AT THE NORTHWEST CORNER OF SECTION 32, T2N, R69W OF THE 6TH P.M. ELEVATION=5119.30 NGVD 1929 DATUM.

PREPARED BY:

ADD DESIGN FIRM LOGO/ INFORMATION , ETC.

OWNER/CLIENT:

ADD OWNER/ CLIENT INFORMATION AND/OR LOGOS

MAINTENANCE SITE PLAN FOR:

ADD NAME OF PROJECT

ISSUE	DATE
O & M	1/29/2019
DESIGNED BY:	CWK
DRAWN BY:	CWK
CHECKED BY:	MDM
FILE NAME:	MSP01

DRAWING SCALE:
HORIZONTAL: 1"=30'
VERTICAL: 1"=10'

ADD NAME AS APPROPRIATE FOR TITLE BLOCK

PROJECT:20598-02BLCV
DRAWING NO.

A

EXAMPLE O&M PLAN FOR REFERENCE ONLY