TECS Training Workbook

Use this book to take NOTES and complete Class Exercises

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Module 1- Basics of Stormwater Management

Introduction:

THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) TRANSPORTATION EROSION CONTROL SUPERVISOR (TECS) TRAINING

The CDOT Transportation Erosion Control Supervisor (TECS) Certification Program is comprised of two 8-Hour training days required by CDOT for any individual designated as part of the Erosion Control Management (ECM) Team on CDOT projects.

Per specification 208.03(c): *All ECM staff shall have working knowledge and experience in construction and shall have successfully completed the TECS training as provided by the Department.*

The two-day course takes the student through each phase of construction educating the student on their roles and responsibilities needed for successfully integrating each phase of construction relative to the stormwater management requirements of CDOT specifications and Colorado Discharge Permit System-Stormwater Construction Permit (CDPS-SCP) requirements. Reference materials and student resources for the TECS training include: interactive student activities, open classroom or virtual discussion, the CDOT TECS Interactive Training Workbook, and the CDOT Student Training Stormwater Management Plan (SWMP) to assist the participants in their future career as Stormwater Management Plan Administrators (SWMP Admin) or Erosion Control Inspectors (ECIs).

One key part of the two day training is comprised of field activities (in the digital format they are videos) that include: defining and adapting the concept of watersheds/drainage basins to identify water resources unique to your construction site, identifying outfalls, understanding how to manage water, performing site assessments using the "Gauntlet," developing and implementing site specific inspection protocols, linking the SWMP document to the construction site, assessing and implementing Control Measure Treatment Trains to reduce the potential for pollutants, and evaluating control measures under simulated precipitation event conditions.

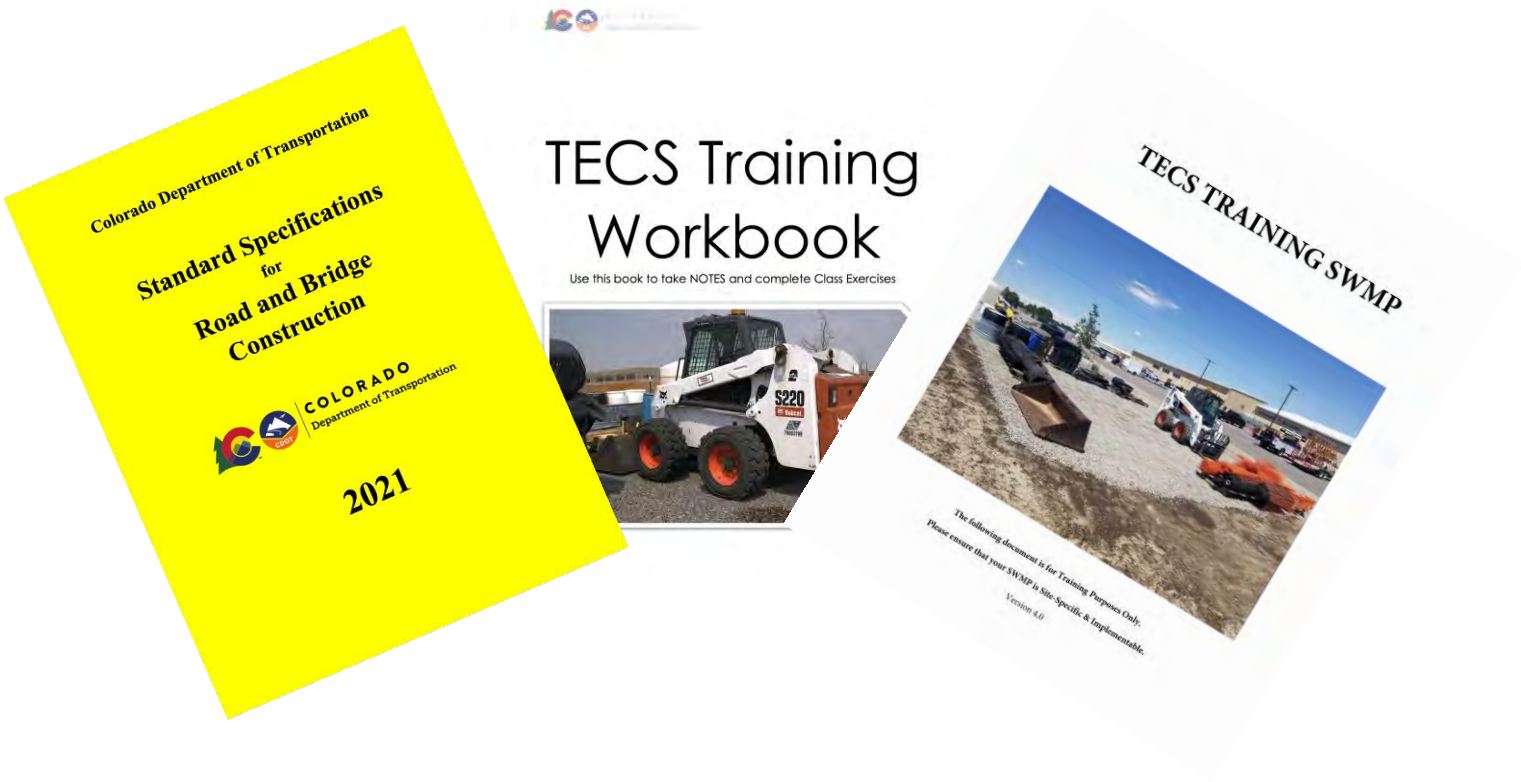
Acronym List

AD	Advertisement date for Project Construction Contract
APL	Approved Products List
BFM	Bonded Fiber Matrix
BMP	Best Management Practice, now called Control Measure
CatEx	Categorical Exclusions
CD	Check Dams
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CDPS-SCP	Colorado Discharge Permit System-Stormwater Construction Permit
CEd	Continuing Education
CM	Control Measure
CWA	Clean Water Act
CY	Calendar Year
EA	Environmental Assessment
ECI	Erosion Control Inspector
ECL	Erosion Control Log
ECM	Erosion Control Management
EDB	Extended Detention Basin
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (U.S.)
ESCAN	Erosion and Sediment Control Assessment Notebook
FIR	Field Inspection Review
FOR	Final Office Review
HQ	Headquarters (CDOT)
IGA	Intergovernmental Agreement
LD	Liquidated Damage

LDA	Limits of Disturbance Area
LOC	Limits of Construction
LF	Linear Foot
MS4	Municipal Separate Storm Sewer System
MSA	Material Storage Area
NDRD	New Development and Redevelopment
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PDD	Program Description Document
PE	Project Engineer
PWQ	Permanent Water Quality
QA/QC	Quality Assurance/Quality Control
RFI	Request for Information
ROW	Right of Way
RWPCM	Region Water Pollution Control Manager (CDOT)
SCP	Stormwater Construction Permit
SF	Silt Fence
SH	State Highway
Spec	Abbreviation of CDOT Specifications
SOP	Standard Operating Procedure
SRB	Soil Retention Blanket
SWMP	Stormwater Management Plan
SWO	Stop Work Order
SY	Square Yards
TBD	To Be Determined
TECS	Transportation Erosion Control Supervisor

TRM	Turf Reinforcement Mat
TSS	Total Suspended Solids
US	United States Route
VTC	Vehicle Tracking Control
VTP	Vehicle Tracking Pad

Student Materials:



Icons Used During The Class:

Regulation & Science

Pre-Construction

Active Construction

Post Construction

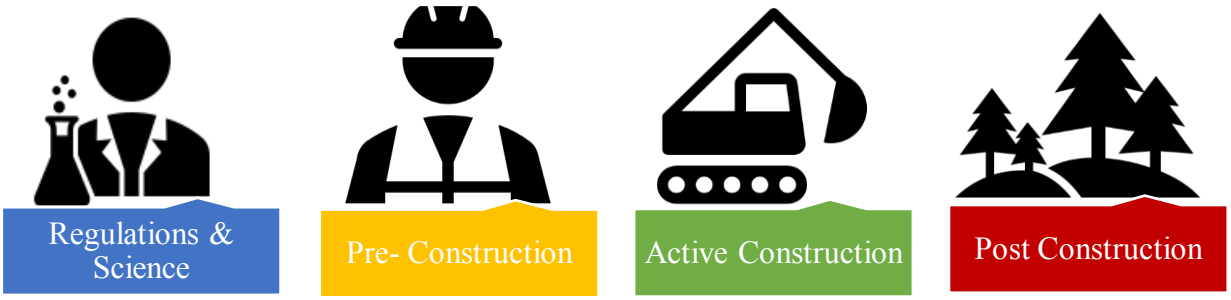
Quiz/ Consider This Questions

Open Your Workbook

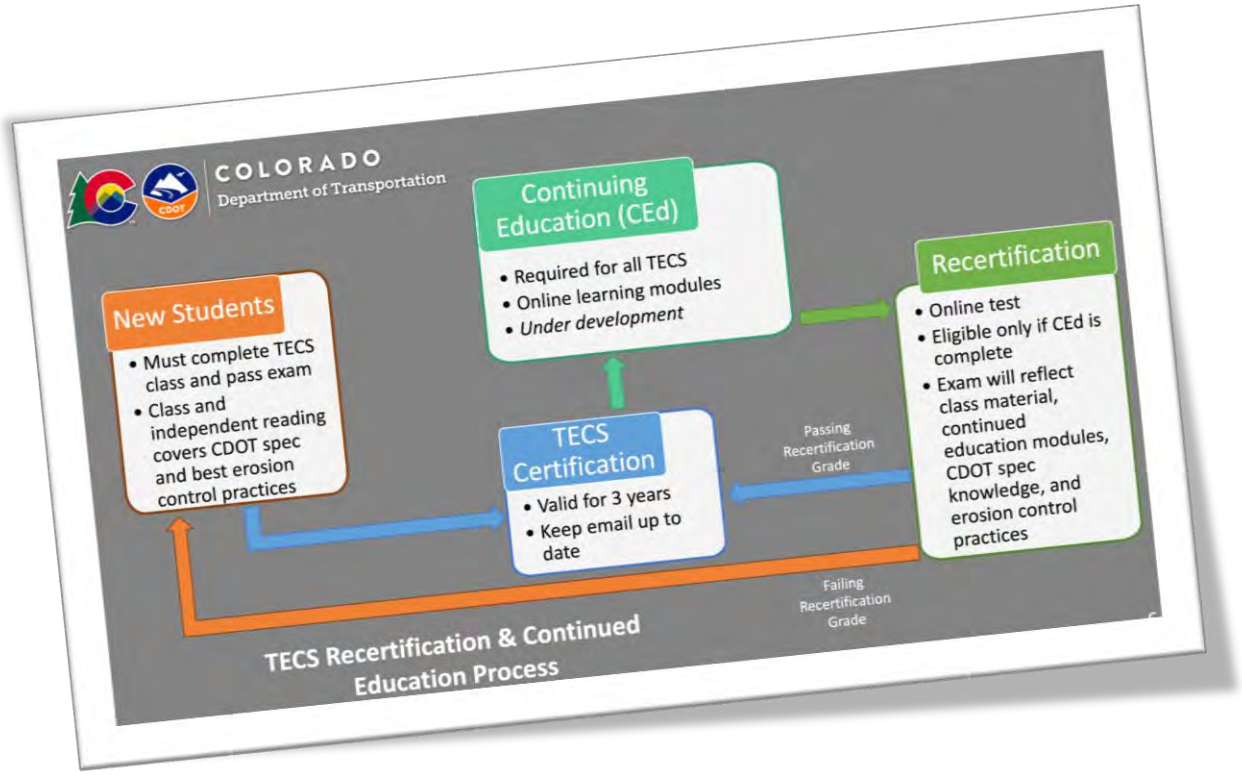
Icon Used in Workbook to Indicate Which Slide # the Section is Referring To

NOTES:

Class Overview: 5



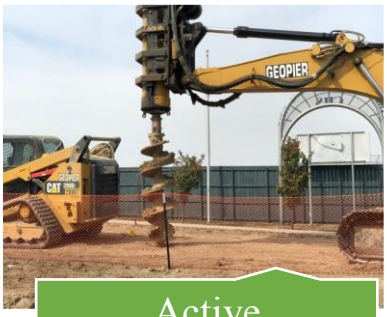
TECS Recertification & Continued Education Process: 6



Why is it Important to be TECS Certified?

208.03(c) Erosion Control Management (ECM). Erosion Control Management for this project shall consist of SWMP Administration and Erosion Control Inspection. All ECM staff shall have working knowledge and experience in construction and shall have successfully completed the Transportation Erosion Control Supervisory (TECS) Certificate Training as provided by the Department. The Superintendent will not be permitted to serve in an ECM role. The Erosion Control Inspector (ECI) and the SWMP Administrator may be the same person in projects with not more than 40 acres of disturbed area. The ECI and the SWMP Administrator are equivalent to the CDPS-SCP Qualified Stormwater Manager.

The Construction Process:

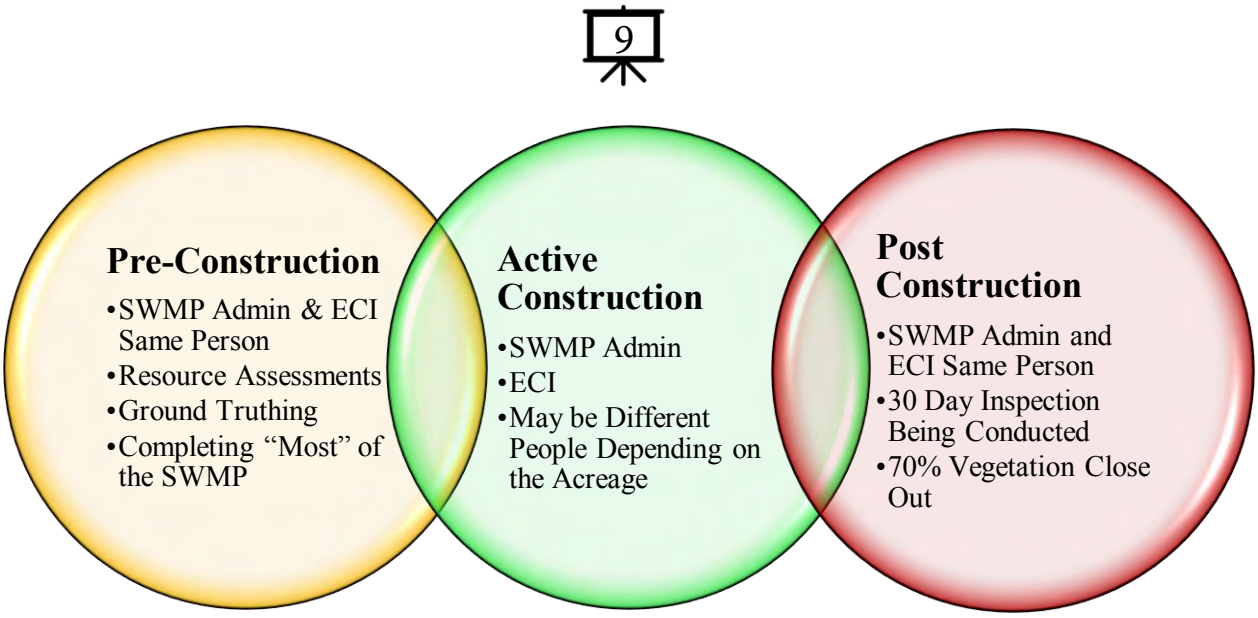


Pre-Construction:
Preconstruction encompasses the design of a project up through site mobilization and initial control measure installation.

Active Construction:
Active construction starts when ground disturbing activities such as clearing, and grubbing begin and lasts all the way through permanent stabilization.

Post Construction:
Post active construction starts after permanent stabilization is complete and lasts until final stabilization is achieved.

The Relationship Between the Construction Process and the ECM Team:



NOTES:

What is Stormwater Management? 22

The utilization of control measures (CMs) to prevent pollutant(s) from discharging off a project and entering State Waters.

NOTES:

Three Perspectives of Stormwater Management: 23

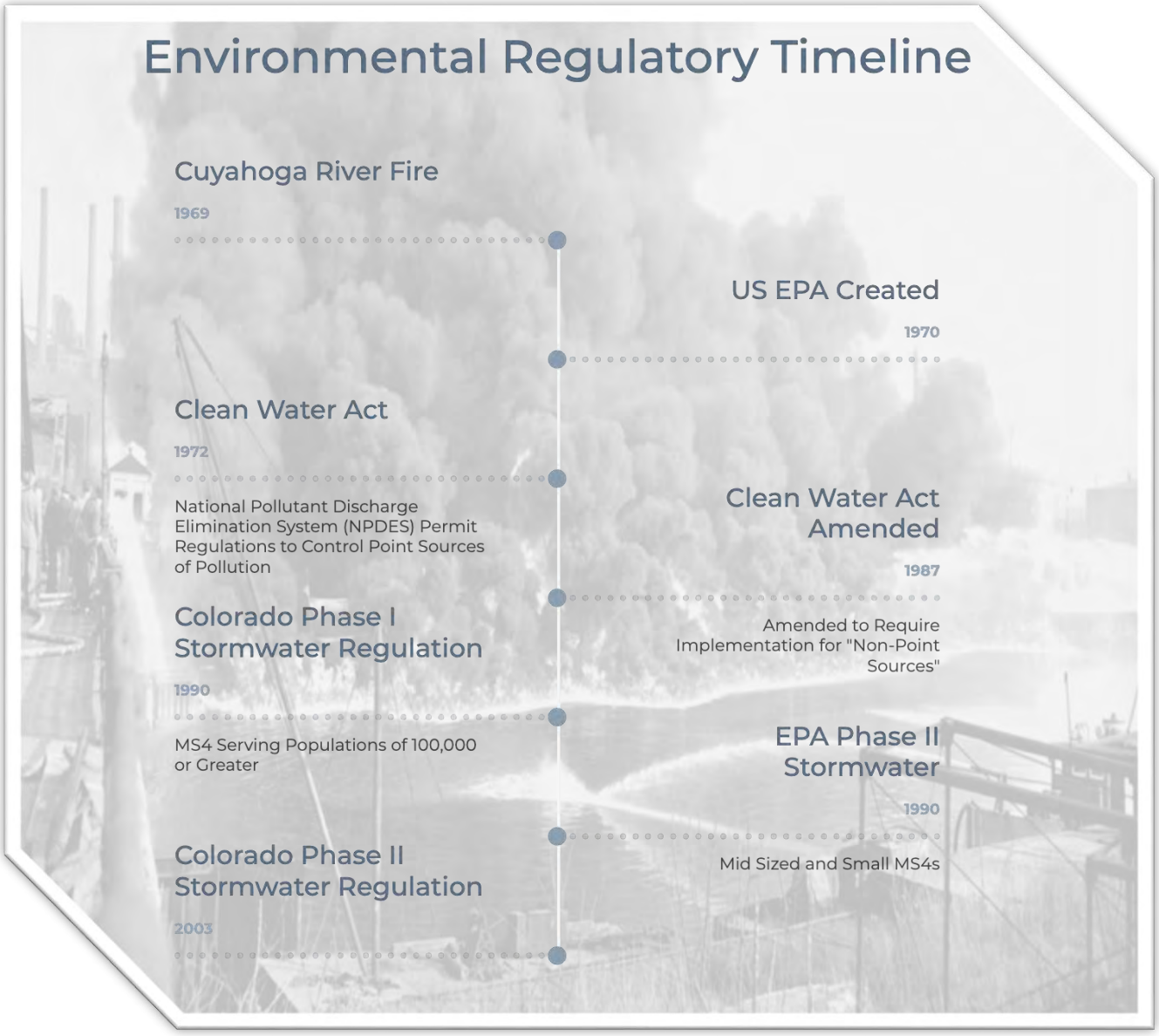
Engineers' perspective:
To manage storm flows and prevent flooding through proper design and implementation of design.

Contractors' Perspective:
To keep water from affecting the critical path and destroying aspects of the project; serious consideration for critical path timelines and budget.

Regulatory/Environmental Perspective:
To prevent the off-site movement of pollutants which can be picked up and transported via storm flows. To protect the water resources of the State of Colorado.

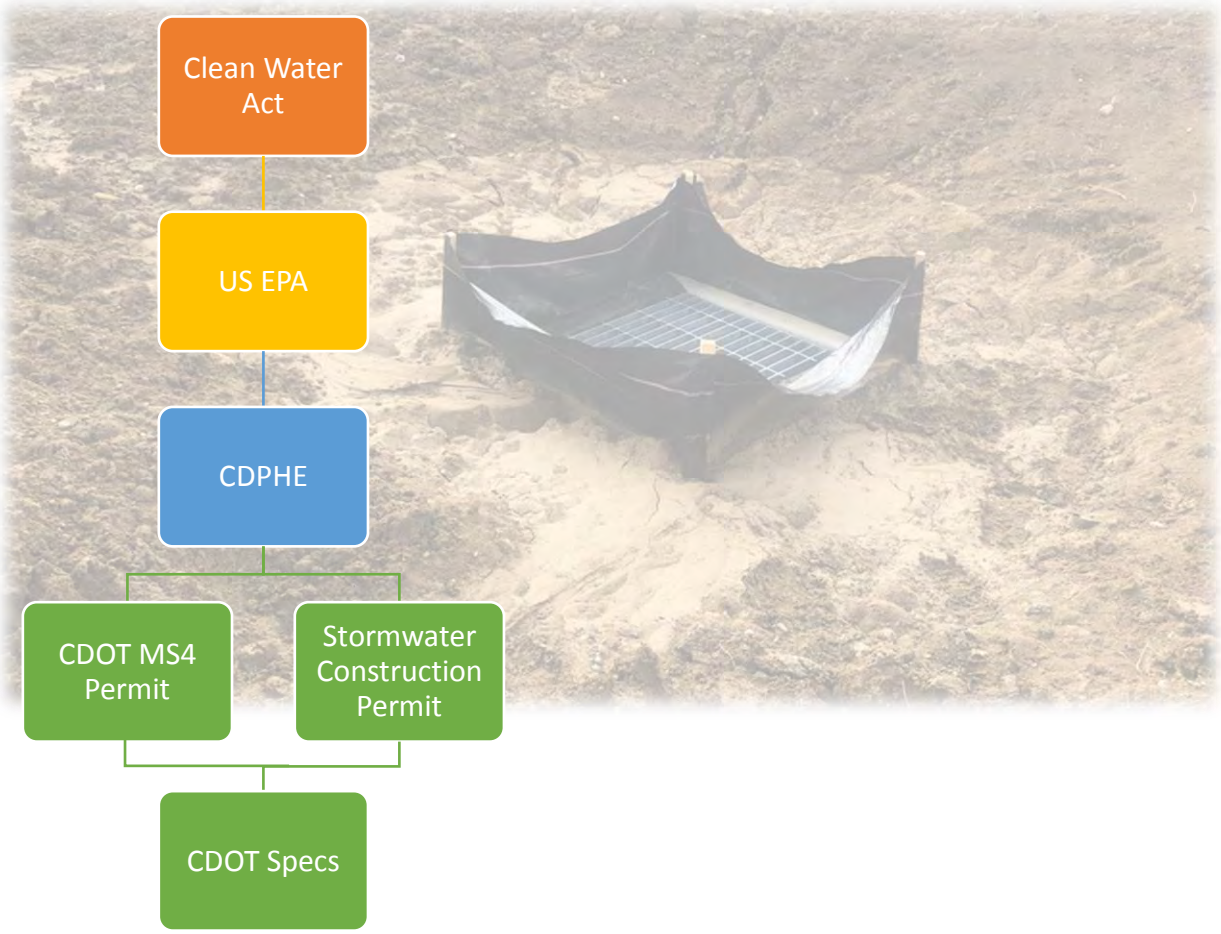
NOTES:

Regulatory Overview: 24-26



NOTES:

Regulatory Hierarchy: 27



NOTES:

Clean Water Act Violations: 28-29

Federal CWA Violations

- Violations of permit conditions subject CDOT to enforcement actions by CDPHE and/ or EPA.
- Civil penalties are up to ***$10,000 per item/per day with a maximum of $32,500 per day.***
- Criminal penalties for negligent violations are up to ***$25,000 per day*** of violation and possible ***imprisonment.***
- Third party lawsuits (common).

State CWA Violations

- Criminally negligent or reckless violation a misdemeanor and increases the penalty to $25,000, imprisonment of up to one year, or both; and

- Knowing or intentional violation a class 5 felony and increases the penalty to $50,000, imprisonment of up to 3 years, or both.

NOTES:

CDPHE Stormwater Construction Permit 

A state permit is required for all projects with 1 acre or more of disturbance or which is part of a larger plan of common development.

What is the Triumvirate of Stormwater Management?

State Permit Violations:

State Audit Process:

Response to Audits:

Types of Evidence Collected:

CDPHE Enforcement and Settlement Process:

Monetary Fines:

CDOT's MS4 Permit: 

- The State of Colorado delegates authority and oversight to MS4's and issues them an MS4 Permit.
- CDOT's MS4 Permit requires that the permittee (CDOT) manage stormwater and pollutants in accordance with their permit provisions.
- CDOT ensures compliance through contract language, specifications, and MS4 program areas which provide necessary oversight.

The Permits and "Our" Roles/Responsibilities 

CDOT's Roles/Responsibilities:

CDOT Non-Standard MS4

The Contractor's Roles/Responsibilities:

CDOT Specifications

CDPS-SCP/ COR400000

Consider This…

If faced with multiple Permit/ Spec Violations (see below) which violations should be addressed first if you have limited resources (labor etc.)? Why?

- COR400000 Off-Site Discharge to a live inlet at station 625.
- CDOT Severe Finding ie an off-site discharge to a live inlet at station 625.
- CDOT Spec 208.05(f) violation – SF needs maintenance on the SE corner.
- Grading outside the LDA into an area with cattails.

RESPONSE:

CDOT'S Regulatory Authority: 

Specification 208.09

Liquidated Damages

Stop Work Orders

NOTES:

Specification 208.09 38

CDOT Process Via the Form 105…	Roles and Responsibilities of the Contractor
Liquidated Damages are a subtraction of monies owed to the contractor	Understand that you are co-permittees with CDOT and that a 7-day timeline until LDs are assessed under 208.09 does not relinquish your requirement to always adhere to the terms and conditions of your State Permit.
7-Day timeline before Liquidated Damages are assessed	Your State Permit requires that all control measures be fixed "immediately in most cases".
Additionally, the CDOT Engineer CAN stop the contractors' work.	

Definitions Associated with 208.09 39

Compliance Assistance

Deferment

Location

Regular Finding

Severe Finding

Chronic Finding

Chronic Severe Finding

Recalcitrant Finding	The Contractor has shown negligence or misrepresentation or unwillingness to adhere to the Water Quality Specifications.

When are Findings Closed and the Clock Stopped?

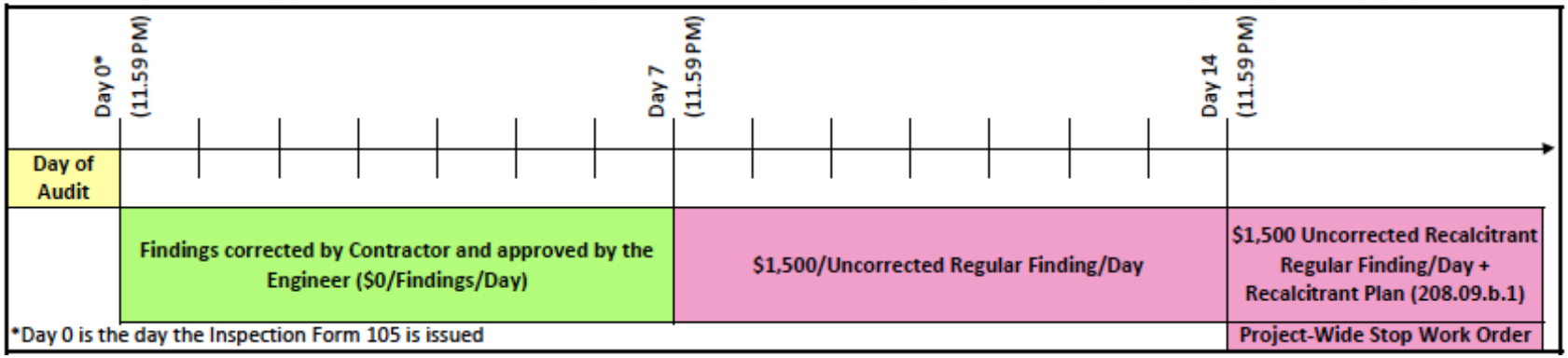
Findings are closed when...

- The corrective action is complete
- Reported to ESCAN
- Accepted by the Department

NOTES:

208.09 Liquidated Damages (LD's) Tracks:

Track 1 - Regular Finding (situation that is in noncompliance with the Water Quality Specifications) (208.09.(a).3.A) (208.09.(b).1)



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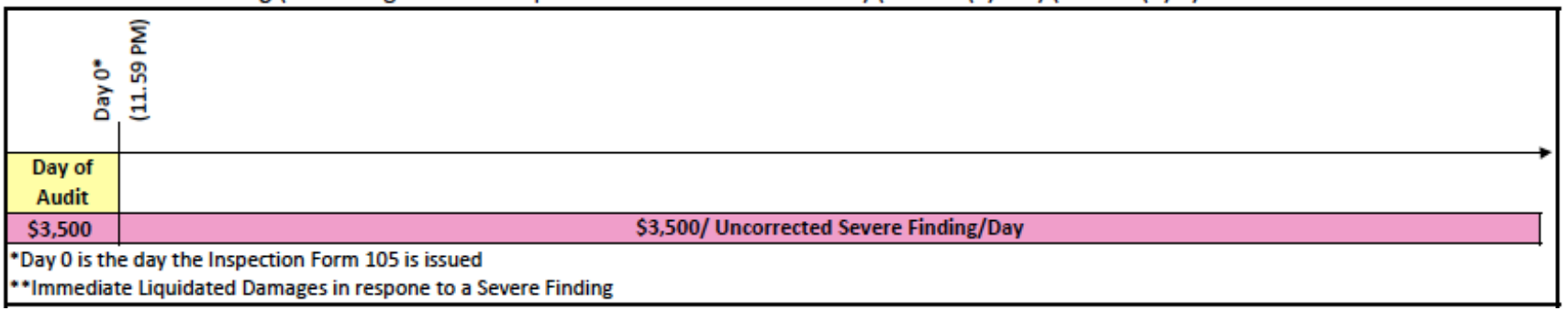
NOTES:

Track 2 - Severe Finding (a discharge where the pollutant cannot be reclaimed) (208.09.(a).3.B) (208.09.(b).2)



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How do you Handle a Severe Finding?

If the Severe Finding is a discharge to Waters of the State (including Live Inlets):

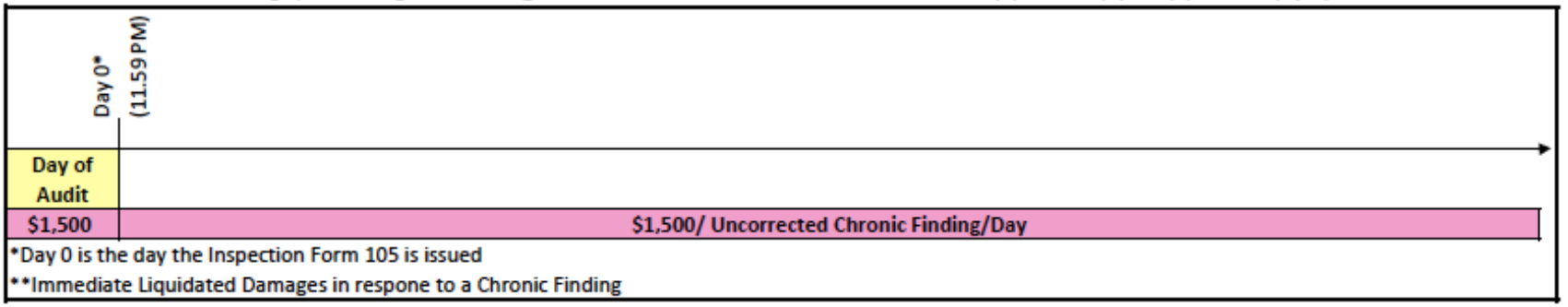
- Fully reclaim the discharge up to State Waters and Self-Report to CDPHE.

If the Severe Finding is a discharge outside the Limits of Construction:

- Fully reclaim the discharge before it enters State Waters and Self-Report to CDPHE.

NOTES:

Track 3 - Chronic Finding (same Regular Finding at same location twice in last three audits) (208.09.(a).3.C) (208.09.(b).3)



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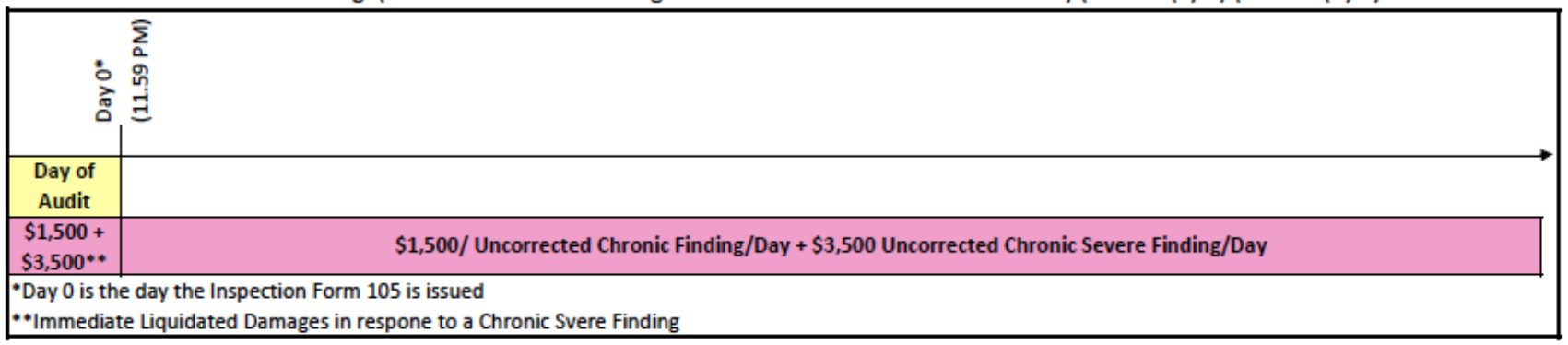
NOTES:

Track 4 - Chronic Severe Finding (2 identical Severe Findings at same location in the last 3 audits) (208.09.(a).3) (208.09.(b).3)



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NOTES:

Recalcitrant Finding: 

The Contractor shall fix each recalcitrant finding and submit a plan to avoid future instances of each recalcitrance to the Department for approval.

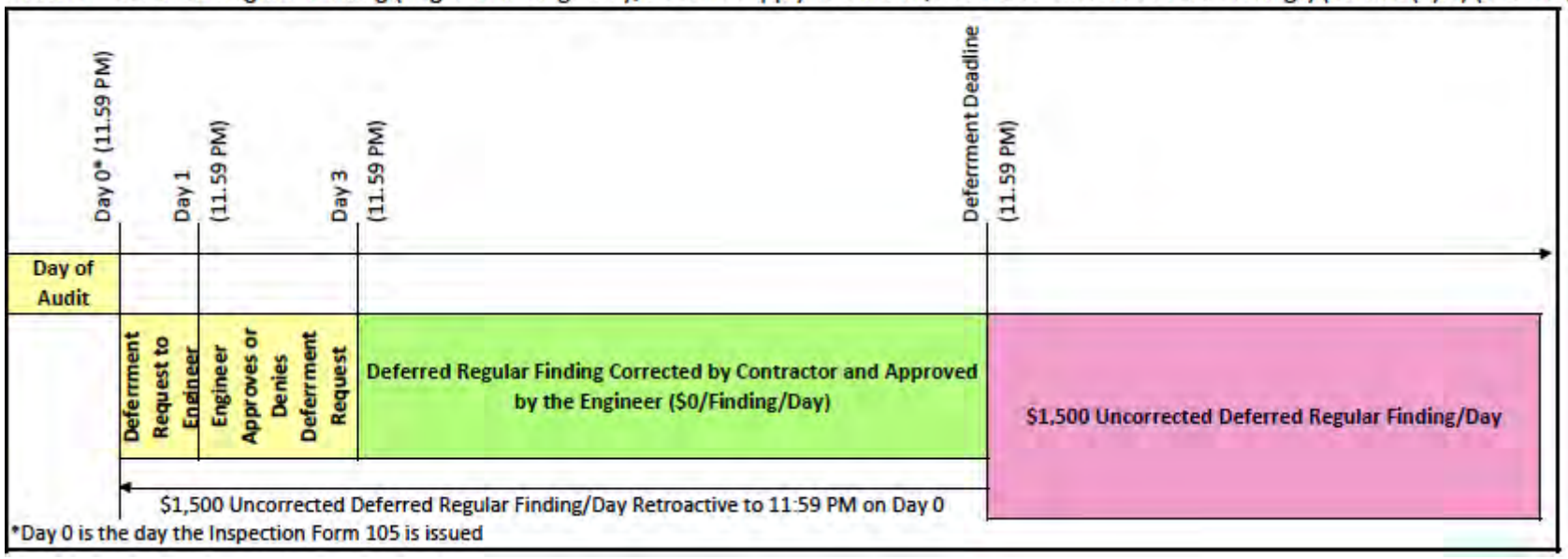
Plan must be written and signed by the Site Super.

The Plan will include the following:

(1) Each Recalcitrant Finding
(2) Why the corrective action for each Recalcitrant Finding was not implemented within 14 calendar days
(3) How the Contractor will avoid future recalcitrance

NOTES:

Track 5 - Deferred Regular Finding (Regular Findings only, does not apply to Chronic, Severe or Chronic Severe Findings) (208.09.(a).2) (208.09.(c))



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NOTES:

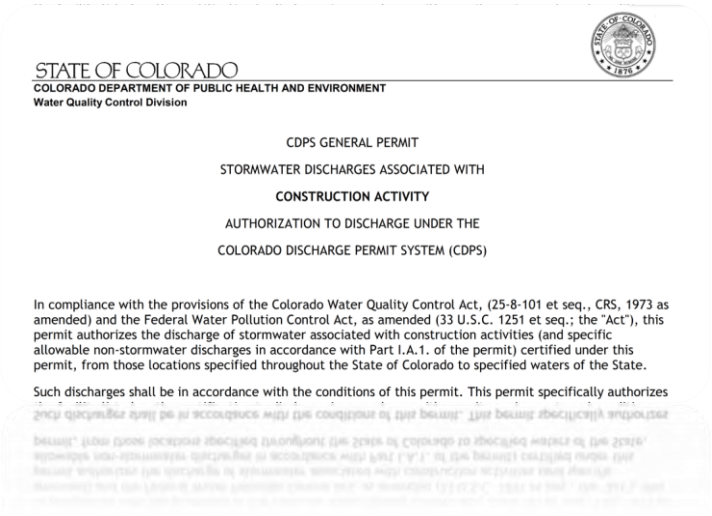
The CDOT SWMP Introduction: 51

- A SWMP is required by the State for ALL projects over 1 acre of disturbance.
- CDOT's SWMP contains 18 Tabs and is one of the most comprehensive in the industry.

Where Do We Place the TECS Certificate? Where Do We Find Our Permits? 52

Tab 14 (TECS Certificates

Tab 16 (Environmental Permits)



STATE OF COLORADO

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
Water Quality Control Division

CDPS GENERAL PERMIT

STORMWATER DISCHARGES ASSOCIATED WITH

CONSTRUCTION ACTIVITY

AUTHORIZATION TO DISCHARGE UNDER THE

COLORADO DISCHARGE PERMIT SYSTEM (CDPS)

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act"), this permit authorizes the discharge of stormwater associated with construction activities (and specific allowable non-stormwater discharges in accordance with Part I.A.1. of the permit) certified under this permit, from those locations specified throughout the State of Colorado to specified waters of the State.

Such discharges shall be in accordance with the conditions of this permit. This permit specifically authorizes

NOTES:

Group Exercise: Ordering the Most Stringent Permit / Specification Requirements

Learning Objectives: To learn how to identify the most stringent permit /specification requirements.
Instructions: Review each set of specifications or permit requirements from each topic within stormwater management specifications and permits. Identify which one is the most stringent and mark it in the column "Which one is most Stringent".

Group	COR400000	CDOT Spec	Local / Federal Requirement	Which one is Most Stringent?
A	At least one inspection every 7 calendar days, or at least one inspection every 14 calendar days, if post-storm event inspections are conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. Post-storm inspections may be used to fulfill the 14-day routine inspection requirement.	(iii) Inspect with the Superintendent and the Engineer (or their designated representative) the stormwater management system at least every seven calendar days. Post-storm event inspections shall be conducted within 24 hours after the end of any precipitation or snow melt event that may cause surface erosion. If no construction activities will occur following a storm event, Post storm event inspections shall be conducted prior to commencing construction activities, but no later than 72 hours following the storm event.	Conduct inspections on the site a) once every 7 calendar days, or b) once every 14 calendar days and within 24 hours of a 0.25-inch storm event.	
B	**Qualified Stormwater Manager.** The SWMP must list individual(s) by title and name who are designated as the site's qualified stormwater manager(s) responsible for implementing the SWMP in its entirety. This role may be filled by more than one individual.	**C)** *Erosion control Management (ECM).* Erosion Control Management for this project shall consist of SWMP Administration and Erosion Control Inspection. All ECM staff shall have working knowledge and experience in construction, and shall have successfully completed the Transportation Erosion Control Supervisory Certificate Training (TECS) as provided by the Department. The Superintendent will not be permitted to serve in the ECM role. The Erosion Control Inspector (ECI) and the SWMP Administrator may be the same person in projects with not more than 40 acres of disturbed area. The ECI and the SWMP Administrator are equivalent to the CDPS-SCP Qualified Stormwater Manager.	**N/A**	

C	Temporary stabilization must be implemented for earth disturbing activities on any portion of the site where ground disturbing construction activity has permanently ceased, or temporarily ceased for more than 14 calendar days. Temporary stabilization methods may include, but are not limited to, tarps, soil tackifier, and hydroseed. The permittee may exceed the 14-day schedule when either the function of the specific area of the site requires it to remain disturbed, or, physical characteristics of the terrain and climate prevent stabilization. The SWMP must document the constraints necessitating the alternative schedule, provide the alternate stabilization schedule, and identify all locations where the alternative schedule is applicable on the site map.	Temporary Stabilization. At the end of each day, the Contractor shall stabilize disturbed areas by surface roughening, vertical tracking, or combination thereof. Disturbed areas are locations where actions have been taken to alter the existing vegetation or underlying soil of a site, such as clearing, grading, roadbed preparation, soil compaction and movement and stockpiling of sediment and materials. Designated topsoil distributed on the surface or in stockpiles shall not receive temporary stabilization. Other stabilization measures may be implemented, as approved. The maximum area of temporary stabilization (Excluding areas of designated topsoil) shall not exceed 20 areas.	For areas of 5 acres of more of disturbance: Initiate the installation of stabilization measures immediately in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days.	
D	The permittee must ensure the washing activities do not contribute pollutants to stormwater runoff, or receiving waters in accordance Part I.A.1.b.ii. Discharges that may reach groundwater must flow through soil that has buffering capacity prior to reaching groundwater, as necessary to meet the effluent limits in this permit, including Part I.B.3.a. The concrete washout location shall be not be located in an area where shallow groundwater may be present and would result in buffering capacity not being adequate, such as near natural drainages, springs, or wetlands. This permit authorizes discharges to the ground of concrete washout waste.	Concrete Washout Structure. The following requirements shall be met: …….. (3) The site shall be located a minimum of 50 horizontal feet away from State waters and shall meet all requirements for containment and disposal as defined in subsection 107.25. (4) The site shall be signed as “Concrete Washout”. (5) The site shall be accessible to appropriate vehicles. (6) Freeboard capacity shall be included in the structure design to reasonably ensure the structure will not overtop during or because of a precipitation event. (7) The Contractor shall prevent tracking of washout material out of the washout structure. (8) Solvents, flocculants, and acid shall not be added to wash water. (9) The structure shall be surrounded on three sides by a compacted berm. (10)	Direct wash water into a leak-proof container or leak-proof and lined pit designed so that no overflows can occur due to inadequate sizing or precipitation; Handle washout or cleanout wastes as follows: Do not dump liquid wastes in storm sewers or waters of the U.S.; Dispose of liquid wastes in accordance with applicable requirements in Part 2.3.3; and Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes in Part 2.3.3; and Locate any washout or cleanout activities as far away as possible from waters of the U.S. and stormwater inlets or conveyances,	

Consider This… 61

Do all pollutants need to have an associated control measure? Why or why not?

Are there any pollutants which are allowed to come into contact with State Waters?

What control measures would be required?

Basics of Stormwater Management: 62-65

Pollutants:

Dredged spoil, dirt, slurry, solid waste, incinerator residue, sewage, sewage sludge, garbage, trash, chemical waste, biological nutrient, biological material, radioactive material, heat, wrecked or discarded equipment, rock, sand, or any industrial, municipal or agricultural waste.
See 5 CCR 1002-61.2(76).

Waters of the State (State Waters):

Any and all surface and subsurface waters which are contained in or flow in or through this state, but does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed

Some Types of State Waters: 66-70

- Rivers & Streams
- Dry Washes
- Ground Water
- Springs and Seeps

Control Measures: 

Any best management practice or other method used to prevent or reduce the discharge of pollutants to State Waters. Control measures include, but are not limited to, best management practices. Control measures can include other methods such as the installation, operation, and maintenance of structural controls and treatment devices.

Types of Control Measures: 

Structural:

Structural control measures are used to treat stormwater at the point of generation, the point of discharge, or at any point along the stormwater "treatment train."

Non-Structural:

Non-Structural control measures are typically aimed at mitigating the potential for having to "treat" stormwater leaving a site by reducing the chance of having stormwater encounter construction potential pollutants.

Group Exercise: Name the Control Measure 

Learning Objectives*:* Learn to categorize different control measures and understand why utilizing a well-balanced approach to structural and nonstructural control measures is key to garnering better compliance on a project.

Instructions: Fill in the Control Measures as you see them filled in on the Screen/ Board.

Structural	Non-Structural

Food for Thought…

What is the paradigm shift the trainers have discussed?

How will you enact this paradigm shift on your own project?

NOTES:

Principles of Erosion 74



Detachment Transportation Deposition

Soil erosion is a multi-step process consisting of sediment detachment, transport, and deposition. There must be detachment and transport for erosion to occur. At a point downstream, (the distance will depend on the soil type and energy of the water) deposition will occur. Many control measures are designed to encourage sediment deposition before water is discharged offsite, however, preventing or minimizing detachment in the first place is much more effective and proactive strategy than trying to remove sediment(s) once they have already been mobilized.

Instructions: Fill in the definitions associated with the 3 principles of erosion. 76-78

Detachment:

Transportation:

Deposition:

NOTES:

Detachment

There are many sources of energy that have the potential to detach soil particles and aggregates including raindrop impact, shallow surface flow, concentrated flow, and more at a larger scale. Even the energy from a raindrop impact on some exposed soil type can dislodge soil particles with enough force to move them up to 3 feet!

NOTES:

Transportation

The act of detaching a soil particle and transporting it a distance down gradient defines erosion. Transport is the movement of a soil particle or aggregate from one point to another. This distance may only be a few inches, or it may be many miles through a fluvial system. Many of the same processes that cause soil particles to detach contribute the energy for soil particle and aggregate transport. Once soil particles are entrained in the flow, factors such as velocity, volume, slope, and particle size will determine how far downstream the particle is carried. There are four main factors that affect erosive potential: topography (length and slope), soil type and structure, rainfall (depth, intensity, and duration), type of surface cover/management. Changes to any of these factors will affect the erosive potential of the site. Obviously, factors such as rainfall and soil type and structure cannot be controlled by a SWMP Administrator/ECI, but the factors we have the greatest control over are the type of surface cover/management measures in place and changing the topography of the site.

It is always best to promote infiltration and avoid concentrated flows where possible, however, that is not always feasible. Installing surface covers and surface management practices and breaking slope lengths down with control measures such as check dams can help to minimize erosion potential. Another way to minimize the erosion potential is to keep surface flows shallow and at a low velocity in order to reduce the potential for sediment detachment and the transportation of sediment off site.

There are two general types of flow, laminar flow and turbulent flow. True laminar flow does not occur in streams or channels—it really only occurs in pipes or groundwater but in order to discuss channel flow, we use the term “laminar-like” to relate to shallow, slow flow where the velocity, pressure, and other flow properties at each point in the fluid remain relatively stable. Laminar-like flow has low kinetic energy due to its low velocity, and hence has lower potential to detach soil particles. Turbulent flow refers to high energy, chaotic/irregular flow that has high kinetic energy due to high velocity and results in a higher erosion potential.

Channel shape can affect the type of flow. V-shaped channels encourage turbulent flow while U-shaped channels, with their larger cross-sectional area/wetted perimeter, encourage more laminar-like flow.

NOTES:

Deposition

Deposition (also known as sedimentation) occurs when the velocity of water slows enough to allow for gravitational settling of suspended sediments. Although it is best to prevent soil particles from becoming detached in the first place, you can never assume that erosion control control measures prohibit all sediment from eroding. For this reason, structural control measures are mandatory to control pollutants in stormwater discharges. Most structural control measures are designed to encourage deposition of sediments and are often the last line of defense before stormwater leaves the site. Silt Fence, Erosion Control Logs, Aggregate Bags, Sediment Basins, Compacted Earth Berms, etc. are all examples of structural control measures that will reduce flow velocities allowing sediments to settle. How long it takes a soil particle to settle out of suspension will depend on its soil characteristics (primarily size and density).

NOTES:

Types of Erosion: 79

Instructions: Fill in each type of erosion with their appropriate example.

Type	Example
	
	
	
	

NOTES:

Factors Affecting Erosion: 80

- Topography (length and slope) 
- Soil type and structure 
- Rainfall (depth, intensity and duration) 
- Type of surface cover/management 

NOTES:

Of the four factors affecting erosion, which ones do humans have control over?

Managing the Energy of Water: 81

A primary objective of the stormwater discharge permits for construction activities is to minimize this potential to discharge pollutants to State Waters by using control measures or best management practices (control measures). The most common potential pollutant on a construction site is sediment (although it is important to note that there are other potential pollution sources that must also be controlled). As water flows across disturbed ground it has the potential to detach sediment particles in the flow, which causes erosion. If you can manage water effectively on a site, erosion and sediment transport potential will be minimized. Managing the energy of water is one of the key concepts of this course. Some of the most effective control measures are to minimize disturbance by preserving existing vegetation to the extent possible and managing the energy of water. For ground disturbing activities, developing a phasing plan will both help reduce the amount of exposed soil at any one time and help conserve existing

vegetation. Precipitation may collect into concentrated flow within the construction site causing erosive velocities. Being able to manage these flows will reduce erosion, which will reduce the sediment pollution from the construction site at the outfall. One of the keys to effectively managing the energy in water is keeping flow depths shallow and velocities low. Ideally, run-on from offsite should be diverted around the construction site; however, this is not always possible. Planning check dams, retention ponds, surface roughening, and other control measures will reduce the energy of water as it flows across the site, thus reducing its ability to detach and transport sediments.

Types of Flow: 81

Turbulent

Turbulent flow refers to high energy, chaotic/irregular flow. Turbulent flow has high kinetic energy. This high kinetic energy may result in high erosion potential.

Visual Characteristics - Steep, deep, fast.

Laminar Like

True laminar flow does not occur in streams or channels--it really only occurs in pipes or groundwater but in order to discuss channel flow we are going to use the term "laminar" to relate to shallow, slow flow where the velocity, pressure, and other flow properties at each point in the fluid remain relatively stable. Laminar flow has low kinetic (velocity) energy and hence lower potential to detach soil particles.

Visual Characteristic - Low, Slow, Shallow, Spread.

NOTES:

Consider This… 82

Does the shape of the channel have anything to do with erosion potential? Explain.

RESPONSE:

Channel Geometry 83

V-Shaped

- V-Shape channels encourage turbulent flow.
- Turbulent flows increase the potential for soil erosion by increasing the ability for soil to be detached and transported.

- Visually characterized by:
  - Narrow and constrained channel bottom.
  - Relatively small wetted perimeter.
  - Steep, deep, fast flows.

U-Shaped

- U-shaped channels encourage "laminar like" flows.
- "Laminar like" flows have a larger cross-sectional area/wetted perimeter and reduce the potential for turbulent flow.
- Low, slow, shallow, spread flows.

NOTES:

Group Exercise: Lab Flume 84

Overall Learning Objectives:

Energy of water through various types of channels

- Evaluating the effects of various channel shapes on erosion potential
- Evaluating sediment transport
- Factors affecting water erosion potential

Flume

We will be discussing the general characteristics of flow and sediment transport by using a hydrologic flume. A flume is a man-made laboratory channel that can be used both for investigations and modeling of flow and sediment transport as well as for measuring water in natural channels. We will be using a flume to investigate the effects the channel shape has on sediment transport and flow characteristics through various control measures, like check dams. We will examine how control measures properly placed and properly installed can promote sediment deposition on site and before sediment can reach the site perimeters thereby reducing the risk off site discharge and reducing overall environmental liabilities.

Air-soft BB pellets will represent sediment. These pellets will flow through several types of channels. Sediment transport and flow observations will be made on the following types of channels:

- V-ditch
- U-ditch (parabolic ditch)
- Trapezoidal ditch

Flow slows down and becomes more like laminar flow (tranquil flow) when water travels through the wider cross sections of the flume. This type of flow characteristic increases sediment deposition (more time to settle out with lower velocities and lower erosion potential). Various control measures within the wide/shallow portion of the flume will be moved around to show how spacing of control measures (Silt Dike, Rock Check Dam,

Erosion Control Log and Artificial Turf) can also affect deposition and the transport of sediment.

We will discuss observations through the various portions of the flume (energy of water, movement of sediment, effects of control measures).

Instructions: Answer the following questions:

1. Which type of channel appeared to have the most turbulent flow?

2. Which type of check dam or surface appeared to "trap" sediment particles the most effectively?

3. Describe general differences observed between the various channels as they relate to channel width, depth and other geometric characteristics.

85

Clay – Settling Time = Hours – Weeks

Silt – Settling Time – Hours

Sand – Settling Time = Minuets

NOTES:

Factors Affecting Deposition:

- Particle size, shape, density
- Slope of the channel and velocity of the transporting stream
- Turbulence of flow
- Settling time

Sand, Silt and Clay

86

NOTES:

Soil Properties and Soil Erodibility Table 87

Settling rates can be fairly accurately predicted based on the soil types encountered on the site. Size, shape, and density are characteristics of soil particles and have an impact on settling time. Large particles such as sand or larger aggregates will settle out more quickly and in higher velocities than silt or clay, which often require lower energy systems to encourage settling. It is not uncommon for suspended clays in water to take several days or even weeks before deposition will occur. Knowing the characteristics of the site and soil will greatly increase your understanding of what types and how many control measures you will need to successfully treat stormwater.

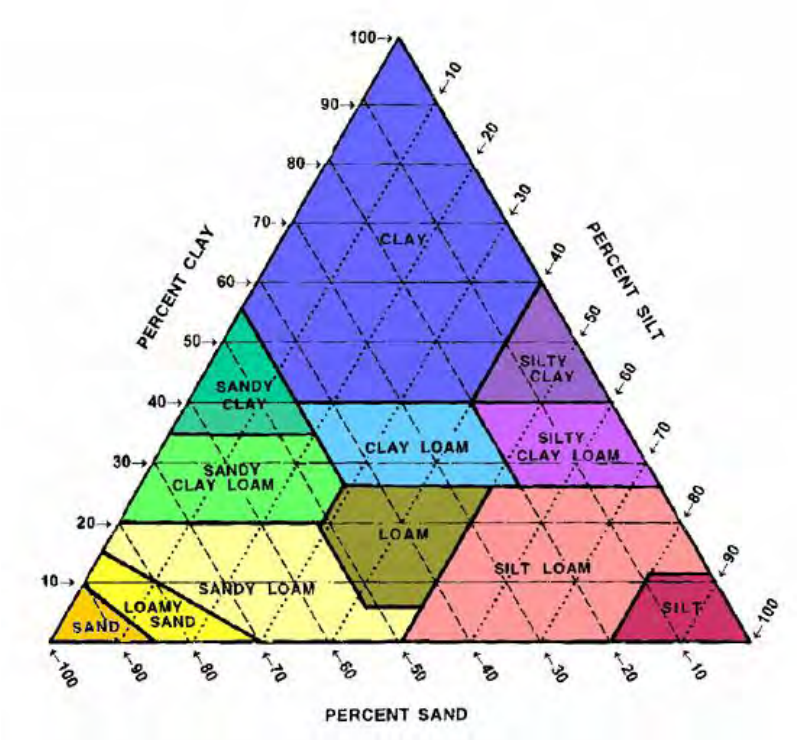
The figure below depicts a soil texture triangle, a tool to help determine what type of soil is present on your site. In order to use the soil texture triangle, the percentage distribution of the three main soil particle types (silt, clay, and sand) must be known. Each particle type will settle out at a different rate. Unfortunately, the percentage of silt, clay, and sand on a site is often unknown, so identifying soil type through a "soil texture by feel" test may be necessary. This test allows an individual in the field to observe several critical soil properties to determine the soil type.

In addition to utilizing the soil feel test, what other direct observations could you make to help determine what type of soil characteristics you may have on your site?

1. Observe what happens directly after a rain event. Does water remain sitting on top of the soil? Do you need to blade off the haul roads so heavy equipment can resume travel?

2. What happens to your boots when you walk across the site after a rain event? Do they get heavy and sticky mud or do they accumulate very little soil build up?

3. What do these direct observations mean in terms of how you may need to manage stormwater on your site?



Soil Types and Their Characteristics:

Sand

Silt

Clay

Bonus Activity: Soil Ribbon Test

Learning Objective: Observing various types of soils and exploring their properties.

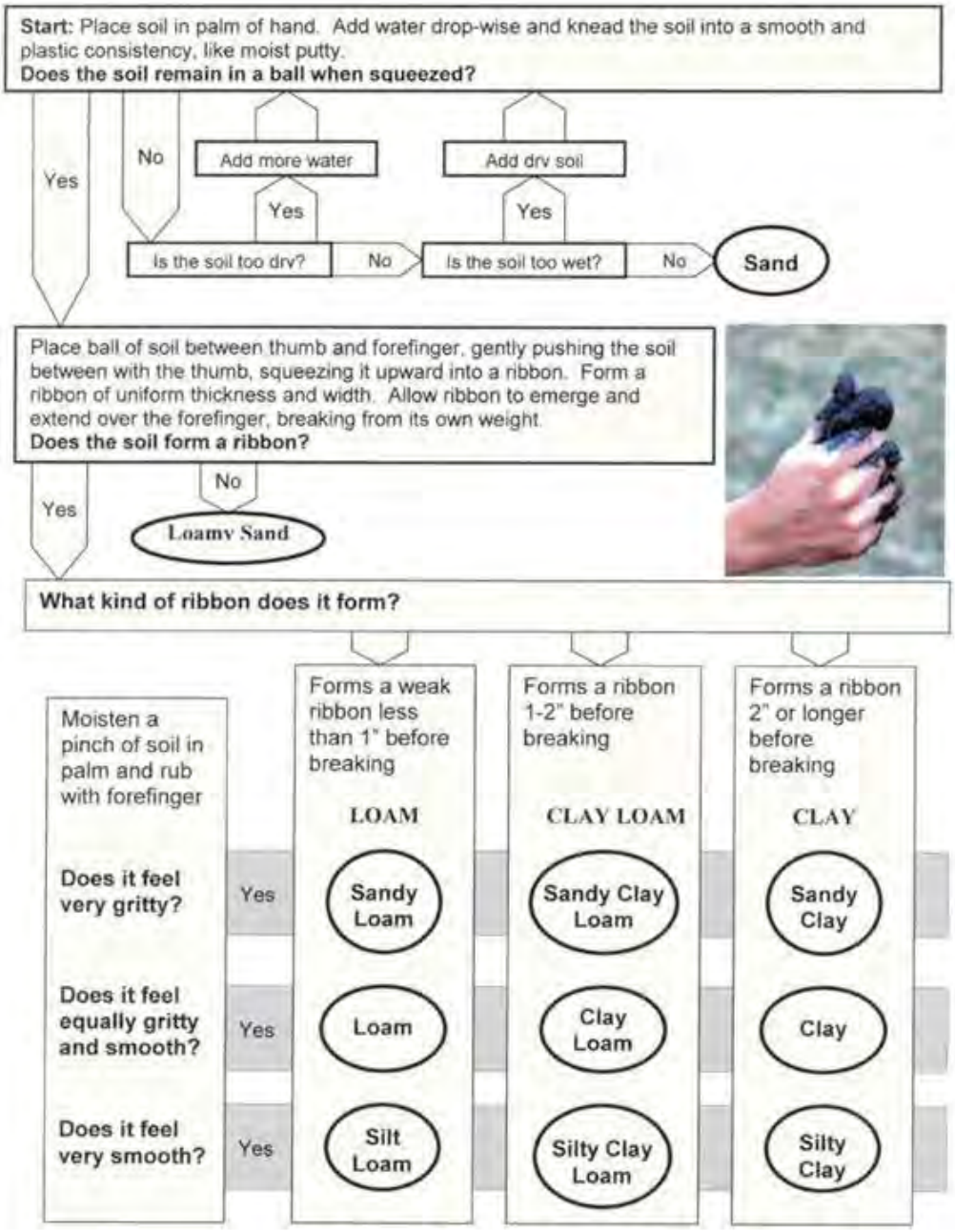
Instructions: Watch the following video: https://www.youtube.com/watch?v=fufeaLBLGlk&t=2s

Then answer the following questions:

1. What soil types were in each cylinder?

2. Which type of soil is least likely to form a ball?

Soil Texture by Feel



Control Measure Treatment Trains 88

The primary objective of the stormwater discharge permits is to keep pollutants from construction activities from leaving the site. This is reflected in the permit language about keeping pollutants onsite and not discharging them offsite or into State Waters. Managing the energy of water, and promoting infiltration through the installation of both structural and non-structural control measures (aka Control Measure Treatment Trains) are all ways to keep pollutants from leaving the construction site. A control measure Treatment Train is the use of various structural and non-structural control measures in series to prevent pollutants from leaving the construction site. Implementing a treatment train requires an understanding of which control measures are most appropriate for use throughout each portion of the construction site.

The treatment train method also offers a better system for compliance than relying on one control measure. If one control measure in the treatment train were to fail, the discharge would still run through other control measures in the treatment train before being discharged offsite. By not relying on a single control measure, the project can save time and money on maintenance and repairs. Limiting ground disturbance and providing erosion controls are typically the most effective initial control measures. Be aware inlet protection should be viewed as the last line of defense or a polishing control measure.

As a methodology utilized in order to reduce erosion potential by combining a mixture of erosion control and sediment control, Control Measure Treatment Trains:

- Must be an effective use of each type of control measure.
- Can save money in the long run. this is because no one control measure is overloaded.
- Saves money because, with the implementation of erosion control, there is less sediment being deposited out on the front sides of the sediment control measures.
- Are a better methodology for compliance.
- Provide multiple opportunities for sediment to settle out or not detach in the first place by not relying on just perimeter control CM treatment trains.

What do you think the overall effectiveness of construction control measures are?

NOTES:

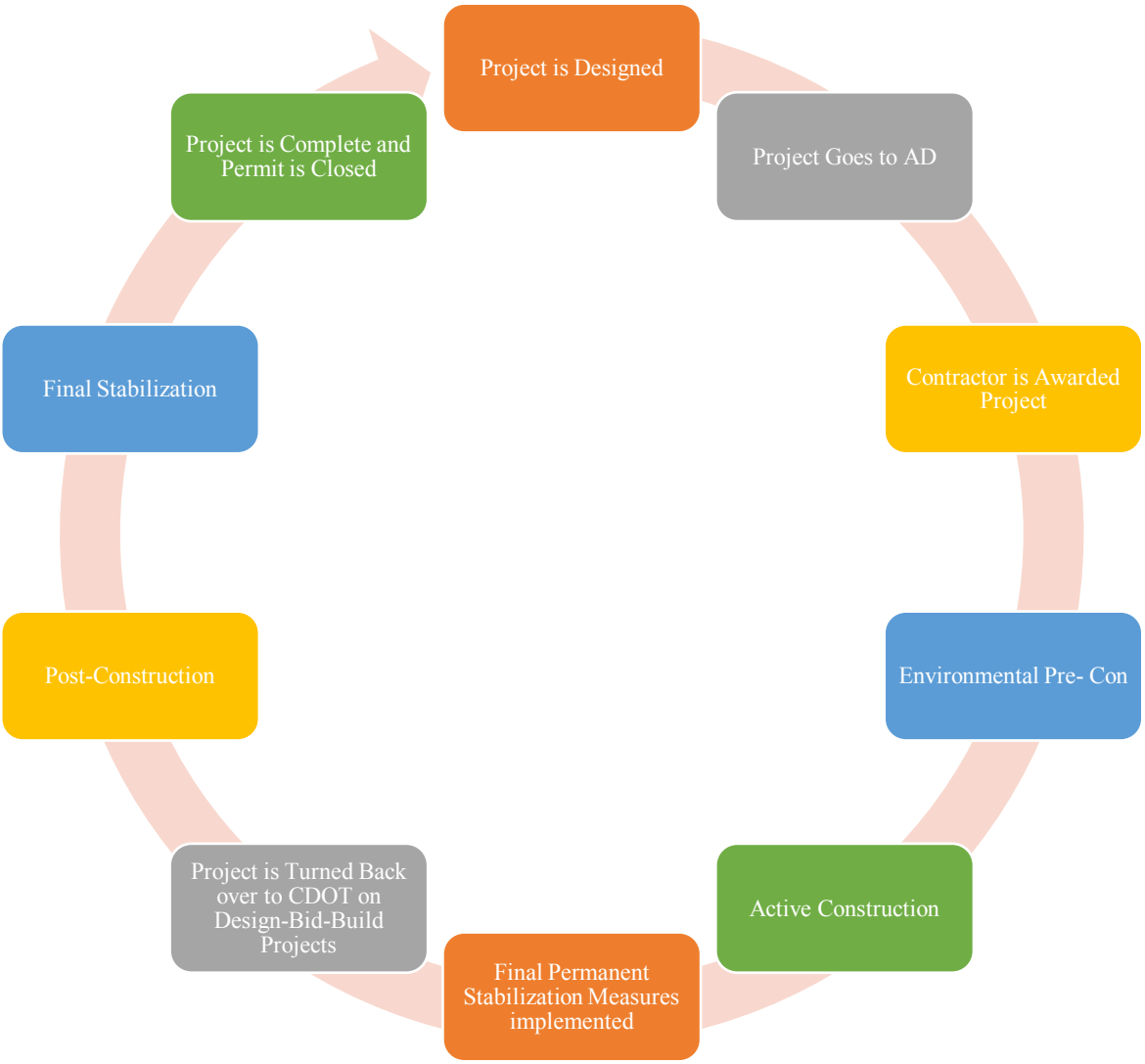
What are the Overall Goals of Stormwater Management?

Fill in the blanks below:

Identify	
Utilize	
Prevent	

Module 2 – Pre-Construction

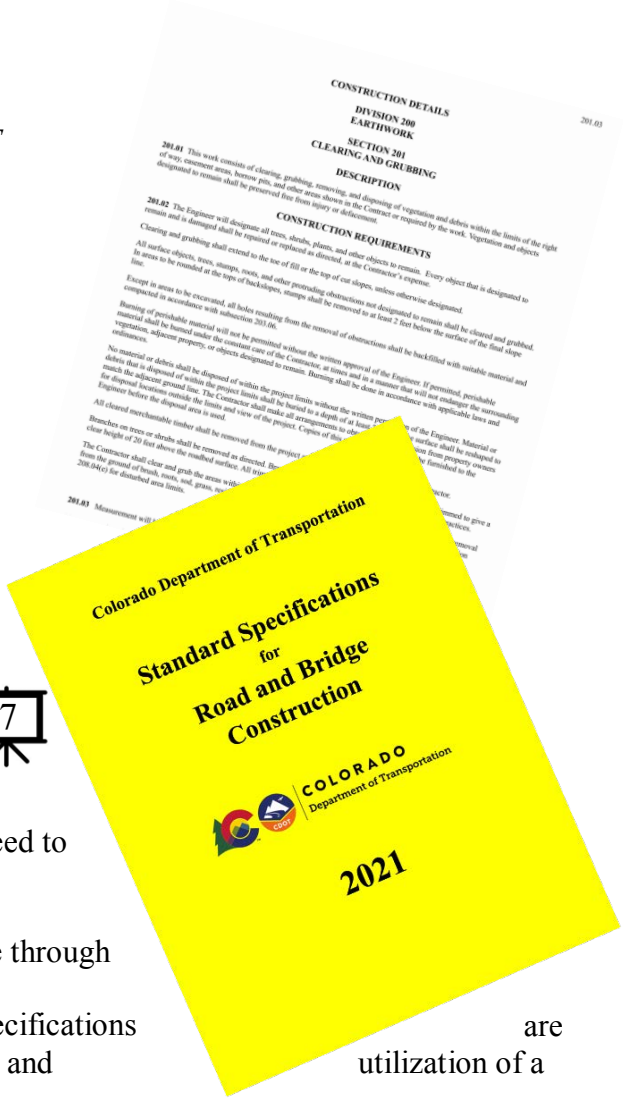
Life Cycle of a Design-Bid -Build Project



NOTES:

CDOT Specifications and Which Ones Do **You** Follow? 4

- CDOT Specifications undergo updates frequently for CDOT to maintain compliance with an ever-changing regulatory environment.
- CDOT Specification updates: *YOU MUST FOLLOW the Specification(s) revision(s) that correlate with*_____.



The CDOT SWMP 6

How many tabs are in a CDOT SWMP?

How many tabs make up the CDOT bid package?

Why is the SWMP Important? 7

- The SWMP is your Stormwater Management Plan which you will need to follow
- It is a "Living Document"
  - Tells the story of compliance through the construction life cycle
- Both the CDPS-SCP and CDOT Specifications are built around the proper management and utilization of a SWMP
- In order to effectively manage stormwater, proper documentation is key
- The SWMP Is CDOT property

NOTES:

Basic Rules for SWMPs:

- All SWMPS are different.
- SWMPs must be written, implemented, and updated to match **your** unique site conditions.
- The book and the field condition must always be congruent.
- CDOT SWMPs will have the same format but different content for every project.

NOTES:

CDOT Specification 208.03 (c)

(c) **Erosion Control Management (ECM)**. Erosion Control Management for this project shall consist of SWMP Administration and Erosion Control Inspection. **All ECM staff shall have working knowledge and experience in construction and** shall have successfully completed the Transportation Erosion Control Supervisory Certificate Training (TECS) as provided by the Department. The Superintendent will not be permitted to serve in an ECM role. **The Erosion Control Inspector** (ECI) and the **SWMP Administrator** may be the same person in projects with **not more than 40 acres of disturbed area.** The ECI and the SWMP Administrator are equivalent to the **CDPS-SCP Qualified Stormwater Manager.**

Key Tools for Achieving Compliance 10

- Communication
- Critical Thinking/ Analysis
- Ground Truthing / Site Assessment
- Phasing
- Limiting the Amount of Disturbance
- Understanding and Utilizing CDOT Spec
- Environmental Pre Con
- Setting up the SWMP For Success

Key Tools for Achieving Compliance in Pre-Construction and Ensuring a Successful Active Construction

NOTES:

Roles and Responsibilities of the SWMP Administrator: 11

Communication and Documentation

- Maintains the SWMP
- Attends the Environmental Pre-con
- Attends weekly erosion and sediment control meetings
- Attend all HQ or Region Water Quality inspections
- Updates Site Map
- Coordinates with Site Super to implement:
    - Actions to reduce anticipated or presently existing water quality or erosion problems resulting from construction activities Or to…
    - Ensure labor, materials, and equipment needed to install maintain and remove CM's are available as needed

NOTES:

Tab 1 in Depth 

Instructions: Take notes on Tab 1

NOTES:

Group Exercise: What Can Tab 1 Tell You About the Stormwater Management Which Might Be Involved in the Project?

14

Learning Objective: Learn how to analyze Tab 1 to assess the potential stormwater management items on the project.

Instructions: Pull out Tab 1 from the TECS Training SWMP. While looking at Tab 1 watch the videos provided in order to answer the following questions.

1. Look at the **Major Sequence of Construction Activities**

   a. Walk outside: Does what you see match one of the major sequences of construction activities list?

      i. If it does what is it?
         1. _____.
      ii. If it does not, what is missing?
         1. _____.
      iii. What phase of construction do you think this site is currently in?

         _____.

b. Looking at the Major Sequence of Construction Activities section what potential pollutants can you assume will be present on this project?
    1. _____.
ii. Are there any special *control measures* that need to be installed based on the construction activities?
    1. _____.
iii. Are there any construction activities that could potentially affect sensitive areas on site?
    1. _____.

2. Look at **Soils Report** data

a. Take a walk outside Does the soils data you see in Tab 1 match the soil you identify on site?
    i. _____.
        1. If it does not match, what must you do?
            a. _____.
            b. _____.
b. What does this soils data tell you about the erosion potential on the project?
c. What does the soils data tell you about what *control measures* might need to be selected?
d. Should you ask to modify the SWMP as it was originally designed based on the soils report seen in Tab 1?
    i. _____.
        1. If you do ask to modify the SWMP what are you modifying it to?
            a. _____.

2. Why are you modifying it?
    a.

3. Look at **Control Measure Quantities**

a. Do you feel the quantities are accurate? Why/Why not?
    i. _____.
b. If you don't feel the quantities are accurate what might be a good next step?
    i. _____.

c. Do you need additional quantities based on your understanding of the major sequence of construction activities?
    i. _____.
d. Based on the soil type and the erodibility do you need additional quantities based on anticipated maintenance requirements?
    i. _____.
e. Do you potentially need different *control measures* based on what you see on the project and know about Tab 1?
    i. _____.

4. Why is **Stabilization** listed in Tab 1 when it is utilized at the end of the project?
    a. _____.

    i. Based on the construction sequence are there additional areas that could potentially need stabilization earlier than the end of the project?
        1. _____.
    ii. Is there a requirement for stabilization on areas that are dormant?
        1. _____.
    iii. How does dormancy of disturbed area integrate into stabilization requirements?
        1. _____.

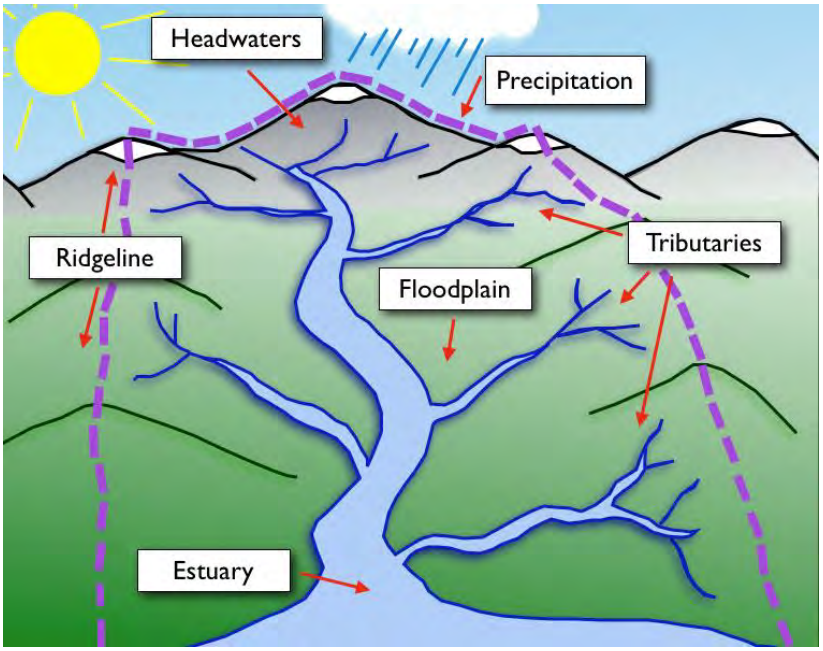
20 Consider This…

It is often said that "by failing to prepare, you are preparing to fail." What are some issues that may arise on a project that can be prevented or managed by good planning?

Response:

21 Watershed/ Drainage Basins

What is a watershed?



As defined by the United States Geological Survey (USGS), a watershed is an area of land that drains all the streams and rainfall to a common outfall such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. The word watershed is sometimes used interchangeably with drainage basin or catchment. The watershed consists of surface water—lakes, streams, reservoirs, and wetlands—and all the underlying groundwater. Larger watersheds contain many smaller watersheds. For this class, we are going to refer to smaller watersheds found on project sites as drainage basins but know that these terms are really interchangeable. Ridges and hills that separate two watersheds are called drainage divides. All of the land that drains water to the outfall point is the watershed for that outfall location. Watersheds provide vital habitat for flora and fauna. Construction related earth disturbing activities within a drainage basin can impact the

water quality of the entire watershed. Construction activities associated with land disturbance within a watershed can increase the erosion potential within a watershed or drainage basin and reduce water quality. If not properly, managed construction activity within a watershed/drainage basin can have the potential to reduce water quality and can interfere with the overall health of the watershed. According to the Environmental Protection Agency (EPA) more than $450 billion in foods, fiber, manufactured goods and tourism depend on clean healthy watersheds. CDOT's Environmental stewardship program and your CDPS SCP requires that we leave the watersheds that we construct highways through in the same natural state that we found them in prior to our road building activities. The leading causes of pollution in our watersheds or drainage basins are sediments, bacteria (E.coli) and excess nutrients (phosphorus and nitrogen). Once we are able to see how all of our rivers, streams, wetlands, lakes, irrigation canals, roadside ditches and any other conveyances of water through our construction sites are connected we can begin to realize that water quality in Colorado is protected one construction site at a time. Protecting water quality must be the goal of every ECI and SWMP administrator on CDOT construction sites.

Understanding your potential impact on watersheds begins with being able to identify where water flows on your construction site and how this water is connected to watersheds within and outside of your construction limits. Being able to identify where water flows on your construction site can greatly improve overall stormwater compliance for your site and is required on all CDOT jobs.

Identification of where water flows on your site will enable you to:

1. Improve overall site compliance
2. Allow you to identify where *control measures* may need to be installed
3. Identify key inspection points or points of compliance on your site
4. Identify sensitive areas for protection
5. Identify flow direction and where to place flow arrows on your SWMP site map
6. Identify points where water runs-on and runs-off your construction site

The concept of watershed and drainage is crucial for a TECS certification. You will want to identify the drainage basin your project site is located in—this is the area that drains to the receiving water(s) listed in your SWMP. By assessing our CDOT construction sites for where water runs, we will be able to develop stormwater management strategies that will enable us to protect water quality throughout the watershed and more fully understand the potential impacts on water quality we can have if our land disturbing activities are not properly managed.

One of the challenges associated with road construction is the fact that most road construction requires a long linear land disturbance and most natural drainage does not conform to linear drainage patterns. This means that we will need to be very aware of where water runs and how our grading can change the drainage on our construction sites many times throughout the course of our road building activities. Properly managing our land disturbances associated with construction activities is the best way to protect and preserve water quality.

Management tools directly related to water quality protection include the following:

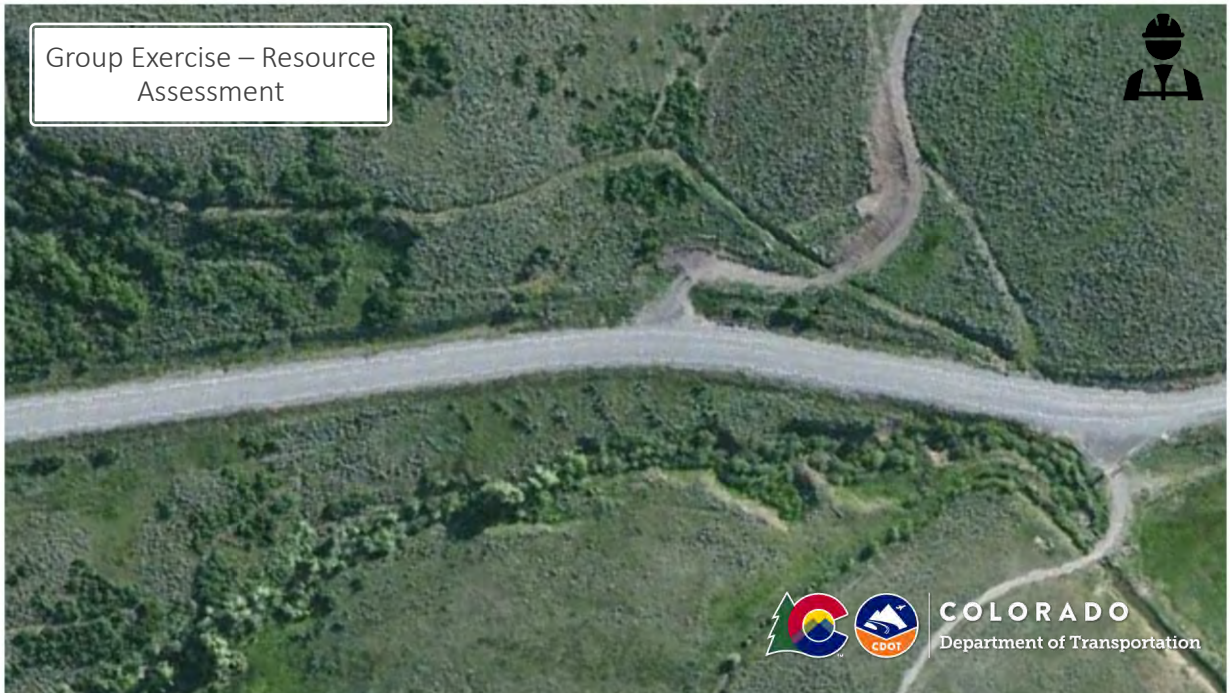
- Utilizing phasing
- Identifying where water runs on our construction sites
- Install *control measures* that are adequate for the identified potential pollutant sources
- Conduct comprehensive inspections
- Provide proper and complete documentation in the SWMP

NOTES:

Group Exercise: Resource Assessment 22

Learning Objectives:
Understand how to use aerial photography and civil engineering plan sets to identify where water flows on a project.

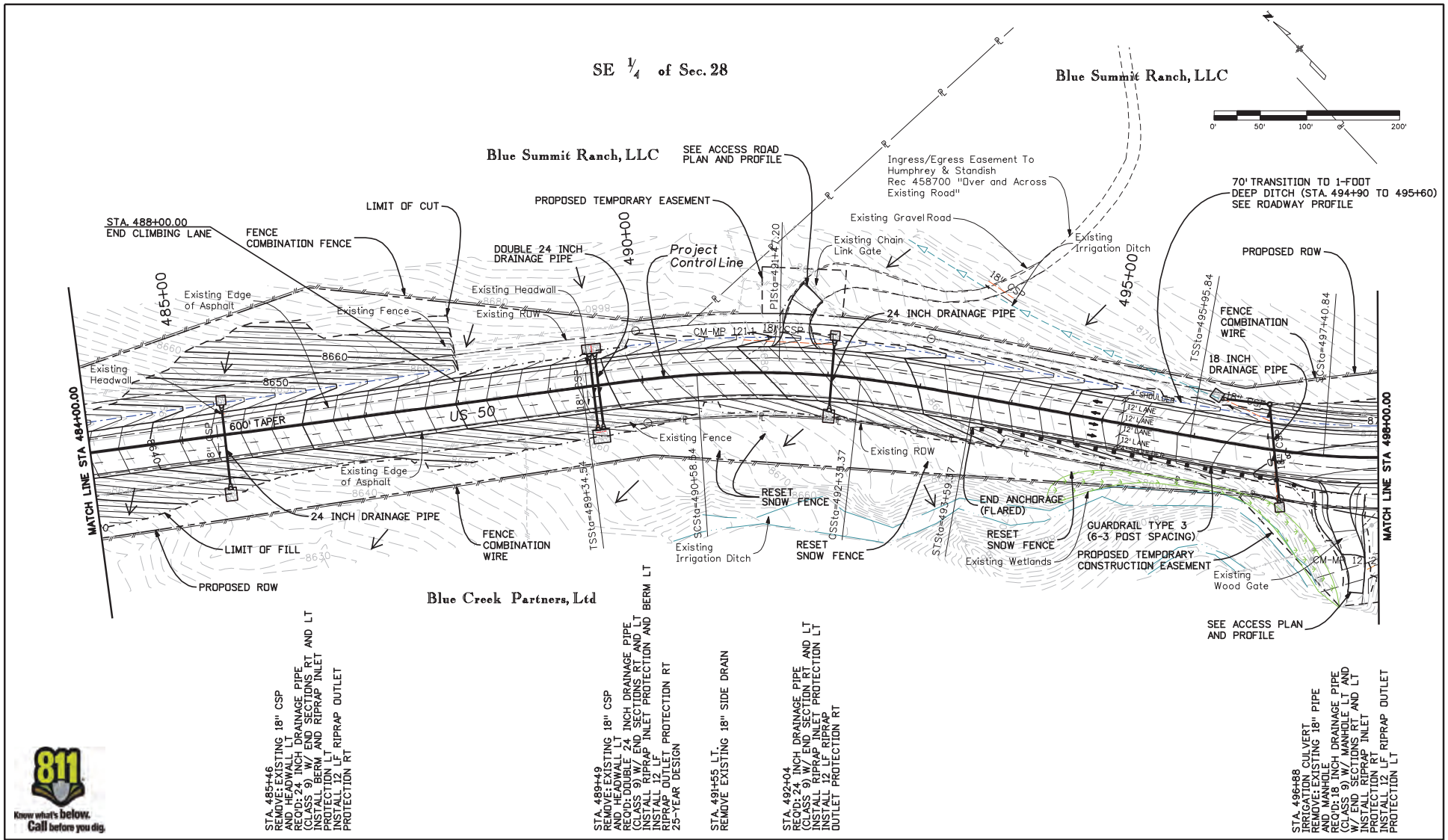
Instructions: Follow along with the instructors as they identify the water resources present with the following photographs.



What water resources can you identify in the photo above?

-
-
-
-

Why is identifying your water resources on your project important?



Print Date: 5/17/2012	0000	Sheet Revisions			As Constructed	PLAN SHEET STA. 484+00 to STA. 498+00	Project No./Code
Drawing File Name: 14933Segl-Plan11.dgn		Date:	Comments	Init.	No Revisions:		NH 050A-016
Horiz. Scale: 1:100 Vert. Scale: N/A					Revised:	Designer: NJL	17735
Unit Leader Information Unit Leader Initials					Void:	Detailer: MAM	
MULLER ENGINEERING CO, INC. 777 S. Wadsworth Blvd. #4-100 Lakewood, CO 80226 303-988-4939						Sheet Subset: ROADWAY Subset Sheets: 14 of 16	Sheet Number 94
P: 06-065.01 SH 50/14933/Design/Drawings							

Colorado Department of Transportation
2424 North Townsend Avenue
Montrose, CO 81401
Phone: 972-249-5285 FAX: 970-249-6018
Region 3 RBA

Identifying Outfalls 24

Identifying outfalls and the areas that contribute to each outfall is how you will define drainage basins on your site. It is important to be familiar with the characteristics of drainage basins within your project so you can understand the amount of drainage and what potential pollutants may contribute to each outfall. This information will help you to install measures to reduce the potential of pollutants discharging from your project's drainage basin. Outfalls are typically points of compliance, so if there is muddy water (or other pollutants) discharged from an outfall that is the site's ultimate discharge point, the site is not in compliance with applicable permits. Offsite discharges should only contain stormwater and no additional pollutants.

Construction activities have the potential to discharge pollutants to receiving waters; therefore, inspections must include the outfalls to determine if any pollutants from onsite sources are being discharged from the site. An outfall is defined as any point where runoff exits the limits of construction or discharges to State Waters and may include culverts, storm sewers, swales, and/or other channels. Inspectors should consider starting their inspections at the outfalls and working their way upstream through the site.

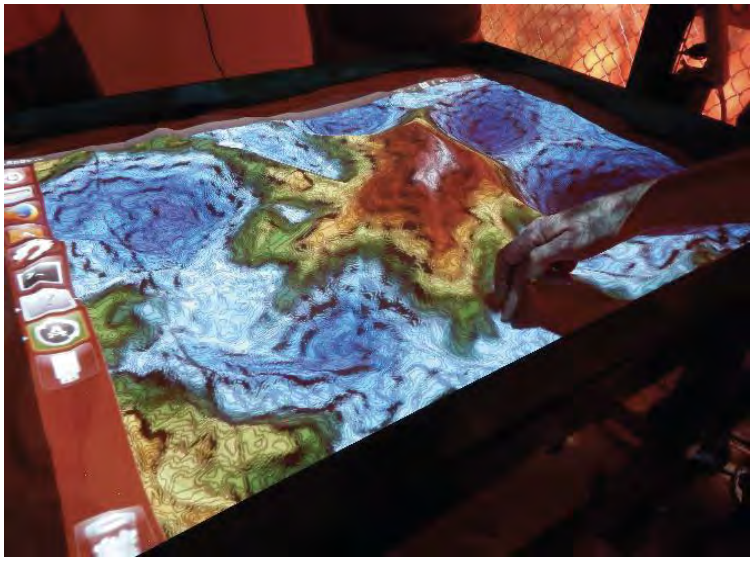
NOTES:

Why Is It Important To Assess the Site Condition Prior To Disturbance Occurring On the Project?

25

Group Exercise: Augmented Reality Sandbox 26

Learning Objectives:



- Understanding watersheds/drainage basins (basic concepts and how size and shape of the watershed can change the volume and time of concentration)
- Demonstrating how construction can alter the size and shape of drainage basins (especially by adding culverts, inlets, ponds, etc.).
- Illustrating the relationship between erosion and deposition and walking through the three-step erosion process (detachment, transport, and deposition) using the simulated rain events to discuss anticipated areas of each within the drainage basin.

Background:

CDOT saw the augmented reality (AR) sandbox in a museum in Burlington, Vermont. The software was developed at University of California at Davis. CDOT was able to work with UC Davis to build our own AR sandbox for the CDOT Tom Boyce Water Quality Training Facility (TBWQTF). This tool allows us to explore the concepts of a watershed. We will also evaluate how construction activities can impact and redefine watersheds.

As a reminder a watershed is the area of land where all of the water that falls across its topography drains to a common outfall/outlet. Watersheds can be as small as a footprint or large enough to encompass all the land that drains water into large rivers systems that eventually drain into the ocean.

It all depends on the scale you are looking at. The terms “watershed” and “drainage basin” are typically interchangeable but for the TECS certification classes, we are using drainage basins to refer to smaller drainage areas (often within project sites) and watersheds to refer to larger areas that our projects may be a part of. The shape and size of a watershed affects the volume of water and timing of water to the outlet of the watershed and these dimensions may be altered by construction activities.

Instructions: Use the AR Sandbox to make drainage basins.

1. Identify the following features:

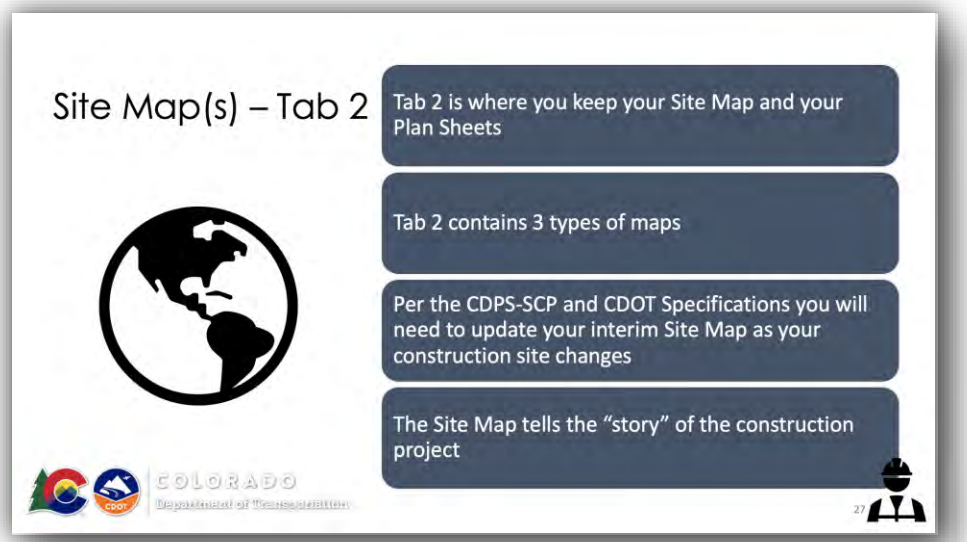
- Outfalls/Low Points
- High Points
- Flow Direction

2. What happens when a culvert is added? What happens when an elevated road is added?

3. What effects does the shape of the watershed have on the timing and volume of the discharge at the outfall? How does construction potentially change these parameters?

Tab 2: Site Map(s) 27

The SWMP Site Map must have the following features identified on it:



- Limits of Construction (LOC) Permitted Area
- Area Disturbed (AD)
- Limits of Disturbed Area (LDA)
- Areas used for storage of construction materials, equipment, soils, or wastes
- Location of dedicated asphalt, concrete batch plants, and masonry mixing machines
- Location of construction offices and staging areas
- Location of work access routes during construction
- Location of waste accumulation areas including areas for liquid concrete masonry
- Location of temporary, interim, and permanent stabilization
- Location of outfalls
- Flow arrows that depict stormwater flow directions on site and runoff direction.
- Location of structural and non-structural control measures
- Locations of springs, streams, wetlands and other State Waters including areas that require preexisting vegetation to be maintained within 50 horizontal feet of a receiving water unless infeasible
- Location of stream crossings located within the construction boundary

NOTES:

29 Consider This…

On a CDOT project the reigning authority lies with the CDOT Project Engineer.

- What could be the potential Implications of a poor relationship with the CDOT Project Engineer?
- How would you ensure that YOUR relationship with CDOT does not affect the project?

Response:

Form 105

30

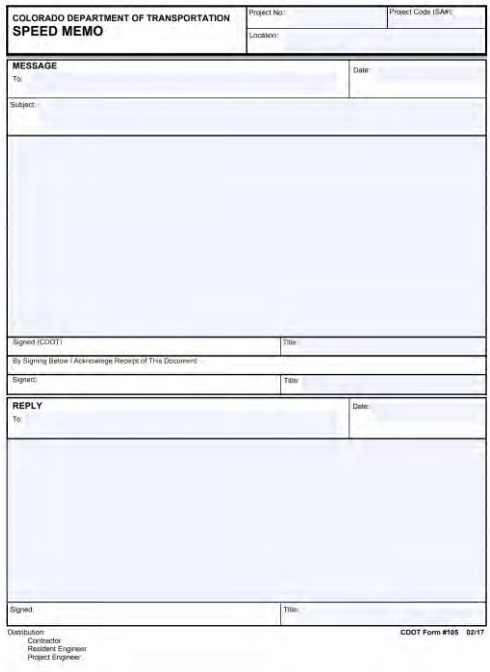
CDOT's Form 105 will be issued for various reasons or to convey various types of information.

A 105 can be issued to either:

- Communicate between the contractor and the CDOT PE
- Approve or deny a request or supplying additional information (RFI)

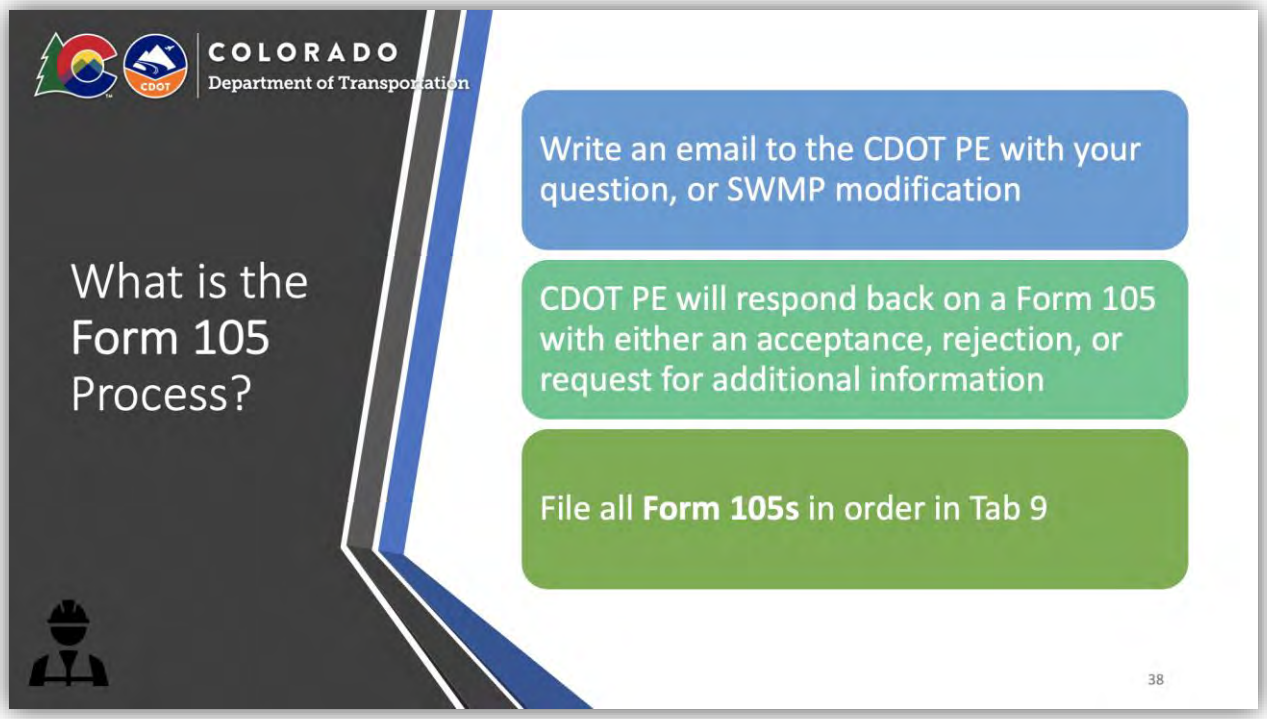
A 105 can be issued to notify the Contractor of CDOT inspection results:

- We will go over this more in **Active Construction**



COLORADO DEPARTMENT OF TRANSPORTATION
SPEED MEMO
Project No.:
Project Code (SA#):
Location:
MESSAGE
To:
Date:
Subject:
Signed (CDOT):
Title:
By Signing Below I Acknowledge Receipt of This Document
Signed:
Title:
REPLY
To:
Date:
Signed:
Title:
Distribution:
Contractor
Resident Engineer
Project Engineer
CDOT Form #105 02/17

What is the Form 105 Process? 31



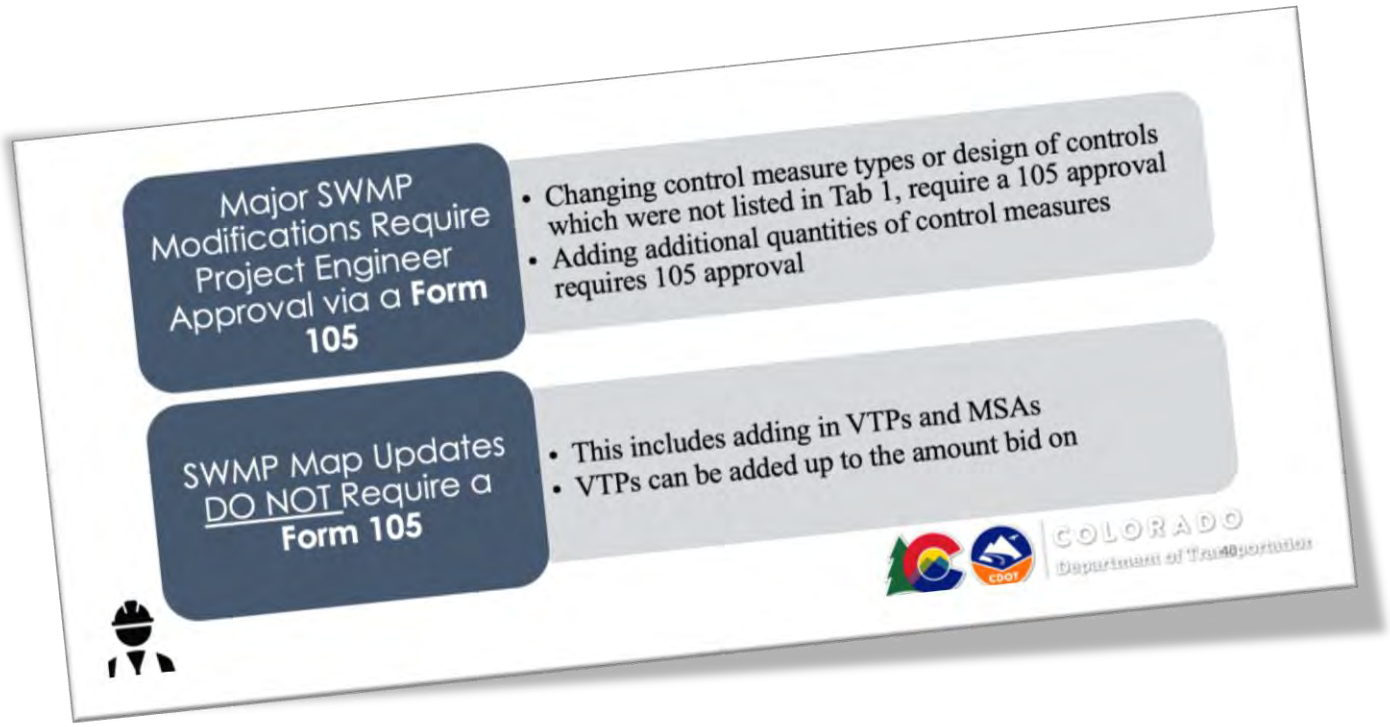
What should you do if there is a discrepancy between the field conditions and Tab 1/Tab 2 in the initial map/ initial site condition (pre-disturbance)? 32

Response:

NOTES:

What is the Difference Between SWMP Map Updates and Major SWMP Modifications (Design Revisions)?

33



NOTES:

What is the nature of Specification 208.03(a)?

34

Group Exercise Ground Truthing – Utilizing Tab 2 to Validate or Refute the Field Condition

Learning Objectives:

- Map updating
- Field/ documentation analysis
- Critical thinking

Instructions: Watch the following videos to assess the following.

- Does *the topography* match what you are seeing in the field?
- What would your thoughts be on initial control measure installation?
- Do modifications need to be made to the SWMP prior to construction? *Look at the initial maps.*

Mark up your initial site map (found below) based on the field condition. If you are in the digital class watch the different location videos to make your assessment.

PRELIMINARY PLANS

DATE 7/16/20

LEGEND

- INTERIM STABILIZATION AREA
- AREAS OF RIPRAP (FINAL STABILIZATION AREA)
- MEDIAN COVER MATERIAL(STONE) 610-00050 (703.10 AGGREGATE FOR MEDIAN COVER) (FINAL STABILIZTIONAREA)
- NATIVE VEGETATION (FINAL STABILIZATION AREA)
- LDA — LIMITS OF DISTURBED AREA
- CONSTRUCTION SITE BOUNDARY LIMITS OF CONSTRUCTION (LOC)
- ROCK CHECK DAM
- EROSION LOG CHECK DAM
- SILT BERM CHECK DAM
- EROSION LOG
- EROSION LOG
- SF — SF — SILT FENCE
- PF — PF — PLASTIC FENCE
- ① X
- ② X
- ③ X
- ④ X
- ⑤ X
- ⑥ X
- ⑦ X
- ⑧ X
- ⑨ X
- ⑩ X
- ⑪ X
- ⑫ X
- ⑬ X
- ⑭ X

CWA — Concrete washout

N

0' 15' 30' 60'

SCALE 1"=30'-0"

CONCRETE WASHOUT STRUCTURE M-208-1 (SHEET 1 OF 11)

EROSION LOG CHECK DAM M-208-1 (SHEET 6 OF 11)

SILT BERM CHECK DAM M-208-1 (SHEET 6 OF 11)

PLASTIC FENCE

VEHICLE TRACKING PAD M-208 (SHEET 1 OF 11)

CONCRETE PAD

BUILDING

STABILIZED CONSTRUCTION ENTERANCE

Location #1

Location #2

Location #3

Location #4

Location #5

TEMPORARY SLOPE DRAIN M-208 (SHEET 7 OF 11)

EROSION LOG TOE OF SLOPE PROTECTION (M-208-1 SHEET 3 OF 11)

SILT FENCE TOE OF SLOPE PROTECTION (M-208-1 SHEET 3 OF 11)

ROCK CHECK DAM M-208-1 (SHEET 1 OF 11)

STORM DRAIN INLET PROTCTION(TYPE III) M-208-1 (SHEET 5 OF 11)

PRE-FABRICATED VEH.-TRACKING PAD

MATERIAL STORAGE AREA

COVERED MATERIAL STORAGE AREA

EROSION LOG FILTER AT DROP INLET M-208 (SHEET 2 OF 11)

CWA

13+00 13+50 12+00 11+00 10+00 104+00 103+00 102+00 101+00 100+00

PRELIMINARY PLANS

DATE 7/16/20

Print Date: 7/15/2020	0000	Sheet Revisions			Colorado Department of Transportation
File Name: KOA BMP 1176 Inspection Graphic 062520.dgn		Date:	Comments	Init.	2829 W. Howard Denver, CO 80204 Phone: 303-322-2020 FAX: N/A
Horiz. Scale: 1"=30'-0" Vert. Scale:					Region 1 PH

As Constructed	STORMWATER MANAGEMENT PLAN SITE MAP - INTERIM TOM BOYCE CENTER			Project No./Code
No Revisions:				
Revised:	Designer: DAF	Structure Numbers		
Void:	Detailer: DAF			Sheet Number
	Subset: SWMP	Subset Sheets: 6 of 8		

fischerga 2:17:22 PM F:\BMP Research Lab\New facility Colfax and Tower\1176 inspection graphic requested by Paul\H_062520VKDA BMP 1176 Inspection Graphic 062520.dgn

Group Exercise – Initial Site Maps for Ground Truthing - Utilizing Tab 2 to Validate or Refute the Field Condition

Location #1

Location #2

Location #3

Location#4

Location #5

Tab 3 – Project Specifications

CDOT Water Quality Specifications:

- 101 – Definitions and Terms
- 107.25 – Water Quality Control
- 207 – Topsoil
- 208 – Erosion Control
- 212 – Seeding, Fertilizer, Soil Conditioner, and Sodding
- 213 – Mulching
- 214 – Planting
- 215 – Transplanting
- 216 – Soil Retention Covering

What type of standards are in Tab 3?

Tab 4 – Standard Plans

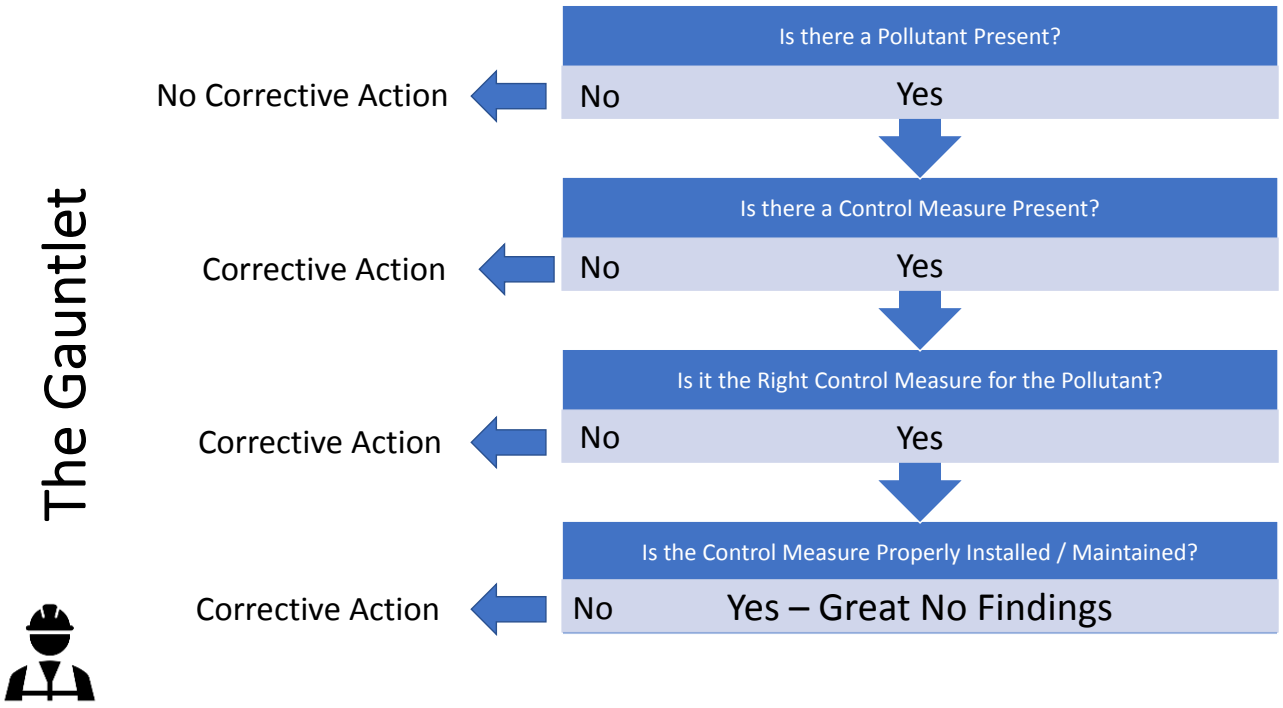
CDOT Standard Plans

- M-208 – Temporary Erosion Control
- M-216 – Soil Retention Coverings

What do the Standard Plans tell YOU the SWMP Admin/ECI?

NOTES:

The Gauntlet 44



NOTES:

Group Exercise: Resource Assessment and Implementation of the Gauntlet

Instructions: Watch each film. With each film, use the gauntlet to assess the adequacy of the construction site. Additionally, assess where water runs on the project. Write your thoughts down below.

Film 1:

Film 2:

Film 3:

What did you learn from this exercise?

48

Consider This…

- What new methodology might you use prior to commencing earth disturbing activities to ensure that the project is a success and not an environmental mess?
- Why do we require environmental pre-construction conferences?

Response:

Tab 10 - Description of Inspection and Maintenance Methods

49

This tab is designed to capture “The Contractors Inspection and Maintenance Methodology”.

- The CDPS-SCP & CDOT Specifications require that the Contractor describe the inspection process and what methodology will be utilized to ensure each type of control measure is properly installed & maintained at all times
- Indicate which TECS(s) will be performing the inspections and functioning as the ECI on site (cross reference with Tab 1)

- Maintenance methodology needs to either cross reference 208.04(f) or have narratives on how each control measure that does not fall into 208.04 (f) will be maintained and at what threshold
- Letter certifying all equipment which has been mobilized onto site is clean and weed free

Why work on Tab 10 during pre-construction?

50

NOTES:

Tab 11 – Spill Response Plan 51

Spill Response Plan. A Spill Response Plan shall be developed and implemented to establish operating procedures for handling potential pollutants and preventing spills.

The Spill Response Plan shall contain the following information:

- Identification and contact information of each spill response coordinator.
- Locations of areas on the project site where equipment fueling, and servicing operations are permitted.
- Location of clean-up kits.
- Quantities of chemicals and locations stored on-site.
- Label system for chemicals and Safety Data Sheets (SDS) for products.
- Clean-up procedures to be implemented in the event of a spill that does not enter State waters or ground water.
- Procedures for spills of any size that enter surface waters or ground water or have the potential to do so. CDOT's Erosion Control and Stormwater Quality Guide contains spill notification contacts and phone numbers required in the Spill Response Plan.
- A summary of the employee training provided.

**Information in items (1) through (8) shall be updated in the SWMP when they change. **

What is CDOT’s requirement for freeboard capacity?

NOTES:

Why Work on Tab 11 During Pre-Construction?

52

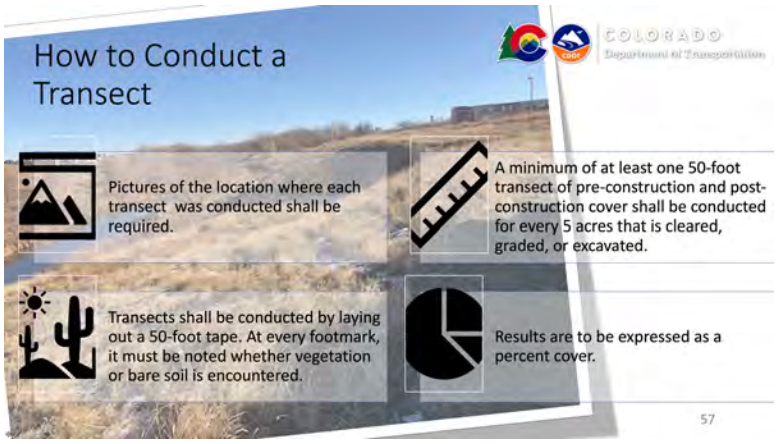
Contractor Review of The Site Prior to Commencing Construction (208.03)

53-54

What is the contractor expected to do per 208.03 project review, schedule, and erosion control management?

What must the SWMP Administrator do prior to commencing construction ?

Tab 17 – Photos Documenting Existing Vegetation 56-57



Vegetative Buffers... 58

- Per the Stormwater Construction Permit, Contractors are required to minimize the amount of disturbance and leave existing vegetation, where possible.

- Vegetative buffers are considered a secondary control measure and cannot be used as a form of perimeter control.

- When using vegetative buffers, sediment control measures should be in front of them and there must be a narrative with maintenance procedures documented in the SWMP.

59-61

Tab 18- Permanent Water Quality

NOTES:

Permanent WQ is Designed for Stabilized or Developed Flows….

NOTES:

How to Use Permanent Water Quality Pond Areas as Temporary Sediment Basins…

Temp Sed Basins Require the Following Documentation in YOUR SWMP:

- Appropriate Size
- Appropriate Residence Time for Soil Type
- Appropriately Installed Outlet

NOTES:

Tab 12 – List of Potential Pollutants 62

Review the scope of work, Tab 1 and Information gleaned from the Environmental Pre-con to assess the following pollutants.

The State of Colorado and CDOT Specifications require that 12 specific pollutants at a minimum be addressed and noted if they will be a potential on the construction site.

- Disturbed and stored soils
- Vehicle tracking of sediments
- Management of contaminated soils
- Loading and unloading operations

- Outdoor storage activities (erodible building materials, fertilizers, chemicals, etc.)
- Vehicle and equipment maintenance and fueling
- Significant dust or particulate generating processes (e.g., saw cutting material, including dust)
- Routine maintenance activities involving fertilizers, pesticides, herbicides, detergents, fuels, solvents, oils, etc.

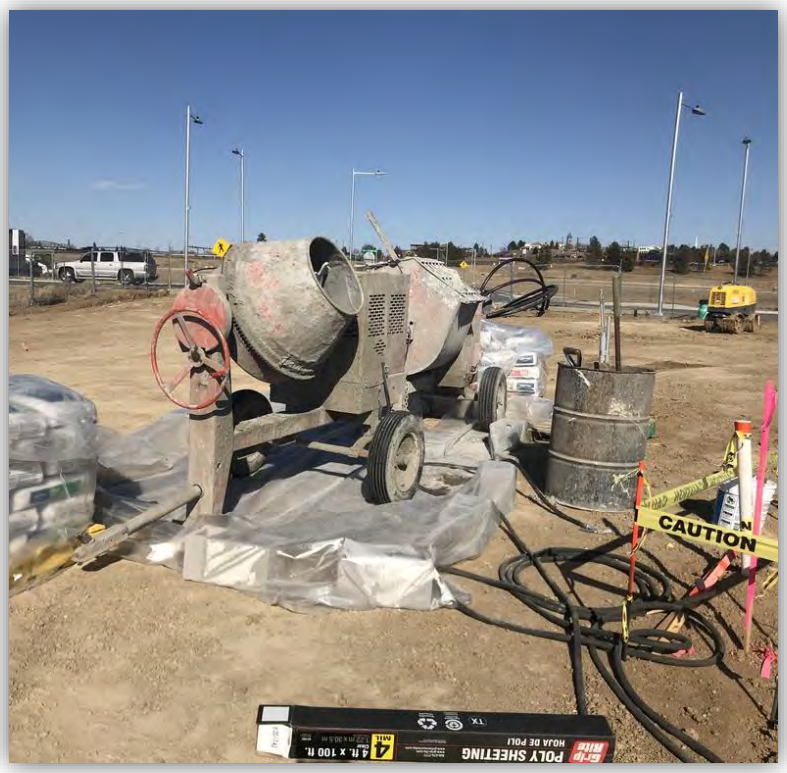
- On-site waste management practices (waste piles, liquid wastes, dumpsters)
- Concrete truck/equipment washing, including washing of the concrete truck chute and associated fixtures and equipment
- Dedicated asphalt, concrete batch plants and masonry mixing stations
- Non-industrial waste sources such as worker trash and portable toilets

A good practice is to indicate which control measures you intend to use to manage each of the identified pollutants on site.

NOTES:

Tab 12 – Method Statement for Containing Pollutant Byproducts

64



Per CDOT Specifications the Contractor is required to submit Method Statements for containing pollutant byproducts at least 10 days prior to commencing the following construction activities:

- Concrete
- Asphalt
- Solids
- Sludges
- Pollutants removed in the course of treatment of wastewater
- Excavation or excess fill material
- Material from sediment traps

NOTES:

Tab 15 – Environmental Pre-Construction Conference

65

Who Attends?	What is Covered?

Additional **Environmental Pre-cons** will need to be held for all incoming sub-contractors who have the potential to adversely affect water quality.

Tab 16 – Environmental Permits 

CDPS-SCP

Dewatering Permit

NPDES

Local Permits

OTHERS????

Module 3 – Active Construction

What Is Active Construction?

Key Tools to Achieve Compliance During Active Construction…

4

- Communication
- Phasing
- Limit Area of Disturbance (this is a permit requirement)
- Monitoring the weather
- Implementing CDOT Specifications
- Thorough site inspections
- Critical thinking/analysis
- The Gauntlet
- Proper application of stormwater/erosion control principles
- Routine SWMP updates
- Follow all permit requirements

Roles and Responsibilities of the ECI

- Conduct weekly inspections and record on the Form 1176 (inspections must be conducted with Site Super and CDOT PE)
- Conduct post -storm event inspections
- Coordinate with the SWMP Admin on inspection result & communicate how to install the control measure so that the SWMP Admin may communicate to the Site Super the appropriate corrective actions that need to be taken
- Assess the construction site for compliance with the CDPS-SCP
- Complete spill reports on Form 1176 when spills are identified
- Immediately notify the appropriate personnel of anything that may endanger health and environment
- Must be TECS Certified

5

NOTES:

Control Measure Installation: 6

Initial CMs should only be installed after:

-
-
-

NOTES:

Tab 5 – Control Measure Non-Standards

When are non-standards a good option?

What standards **must** non-standards meet?

The non-standard must have the following components to be in line with the CDPS-SCP guidance:

- Description
- Implementation
- Installation procedures
- Inspection expectations
- Maintenance requirements
- control measure detail

NOTES:

10

Permit Mod 17.

Tab 6 – Weekly Meeting and Weekly Meeting Sign-In Sheet

Who Attends?

-
-
-

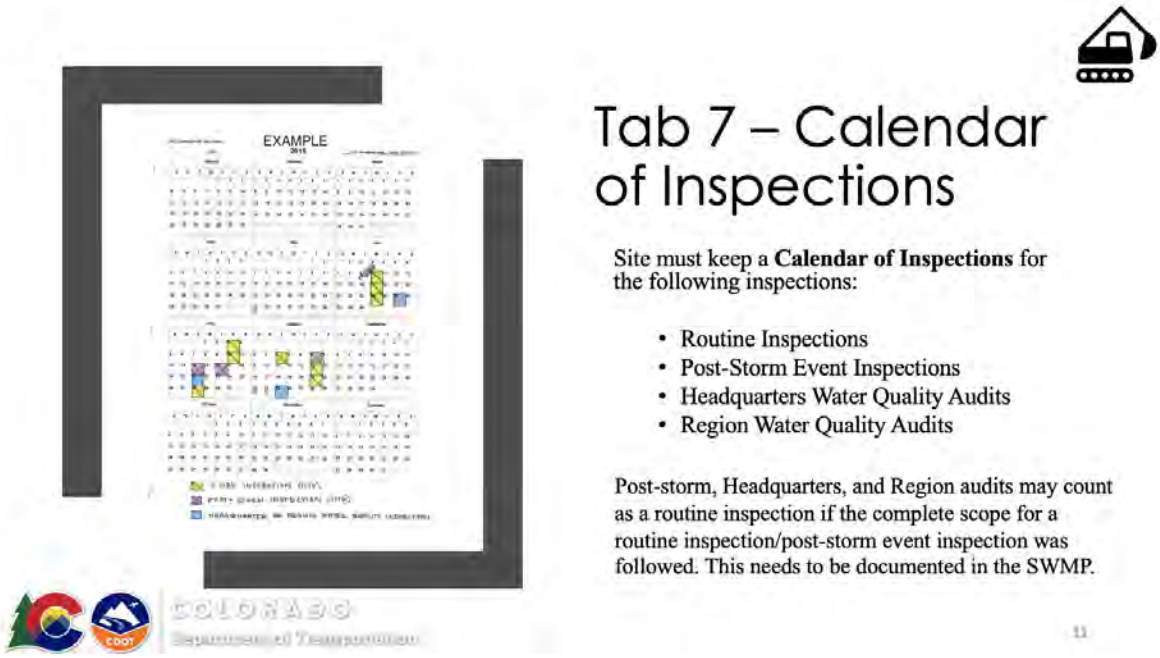
11

Who makes the agenda?

What is required documentation?

What must be discussed?

Tab 7 – Calendar of Inspections



12

Tab 8 – Routine Seven-Day and Post-Storm Inspections

13

When are routine seven-day inspections conducted?

When are post-storm inspections conducted?

How to Conduct an Inspection:

Routine seven-day inspections and post-storm inspections shall include inspection of the following areas, if applicable, for evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to State waters:

-
-
-
-
-
-

14-15

Inspections shall include the following:

-
-
-
-

In Depth Look at the 1176

Instructions: Follow along with the instructors as they go through an 1176 in detail. Ask questions where necessary. You may fill in the following 1176 with notes as you see fit.

NOTES:

COLORADO DEPARTMENT OF TRANSPORTATION

STORMWATER FIELD INSPECTION REPORT - ACTIVE CONSTRUCTION

(1) Project Name:	(2) Project Contractor:	(3) SWMP Administrator (Qualified Stormwater Manager) /Erosion Control Inspector:	
(4) CDOT Project Engineer/CDOT Designee:	(5) Other Attendee(s) (Name and Title):		
(6) CDOT Project Number:	(7) Project Code (Sub Account #):	(8) CDPS-SCP Certification#:	(9) CDOT Region:
(10) Date of Project Inspection:	(11) Weather at Time of Inspection:		

(12) REASON FOR INSPECTION / EXCLUSION

❑ Routine Inspection: (A routine erosion control inspection shall be conducted at a minimum, once every 7 Calendar Days)

❑ Runoff Event: (Post-storm event inspections must be conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion. If no construction activities will occur following a storm event, post-storm event inspections shall be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event. The occurrence of any such delayed inspection must be documented in the inspection record.) Routine inspections still must be conducted every 7 calendar days.

Storm Start Date: Approximate End Time of Storm (hrs):

❑ Third Party Request:

❑ Winter Conditions Inspections Exclusion: Inspections are not required at sites where construction activities are temporarily halted, snow cover exists over the **entire site** for an extended period, and **melting conditions posing a risk of surface erosion do not exist**. This exception is applicable only during the period where **melting conditions do not exist**, and applies to the routine 7-day inspections, as well as the post-storm-event inspections. If **visual inspection** of the site verifies that all of these conditions are satisfied, document the conditions in section 17 (General Notes) and proceed to section 18 (Inspection Certification). Documentation must include: dates when snow cover existed, date when construction activities ceased, and date when melting conditions began.

❑ Other:

(13) SWMP MANAGEMENT	Yes	No	N/A	(g) Reason for N/A
(a) Is the SWMP located on site?				
(b) Are changes to the SWMP documents noted and approved?				
(c) Are the inspection reports retained in the SWMP?				
(d) Are corrective actions from the last inspection completed?				
(e) Is the Spill Response Plan updated in the SWMP?				
(f) Is a list of potential pollutants updated in the SWMP?				

(14) CURRENT CONSTRUCTION ACTIVITIES

(a)Describe current phase of construction activities

(b)Estimate of disturbed area at the time of the inspection, use guidance found in 208.04 (e):

	Acres	Notes
Temporary Stabilization (includes areas of vertically tracked and/or surface roughened temporary stabilizing surface treatments) +		
Interim Stabilization (spray on soil tackifier such as organic mulch tackifier, bonded fiber matrix, wood cellulose fiber with tackifier, etc.) +		
Permanent Stabilization (includes areas of permanent seeding that have not achieved 70% of pre-disturbance vegetation levels) +		
Other (Includes ground disturbing, clearing and grubbing, materials storage, equipment staging, haul roads) +		
Total acres of disturbance (includes cumulative total number of acres including: temporary, interim, permanent stabilized and other) =		

(c) Has the SWMP Phased Control Measure Implementation Matrix been updated? ❑ Yes ❑ No

(15) CONSTRUCTION SITE ASSESSMENT & CORRECTIVE ACTIONS *****Off-site Pollutant Discharges are a Violation of the Permit and Reason for Immediate Project Suspension*****

The Construction Site Boundary/Limits of Construction (LOC), all disturbed areas, designated haul roads, material and/or waste storage areas that are exposed to precipitation, discharge locations, and locations where vehicles exit the site shall be inspected for evidence of, or the ***potential*** *for, pollutants leaving the LOC, entering the stormwater drainage system, or discharging to State waters. If there is evidence of sediment or other pollutants discharging from the site, see section 16 (Construction Site Assessment).*

*All erosion and sediment control practices identified in the SWMP shall be evaluated to ensure that they are maintained and operating correctly. Identify the condition of the control measure, using more than one letter if necessary: (**I**) **I**nadequate control measure; (**M**) **M**aintenance is needed; (**A**) **A**dditional control measure is needed; (**R**) **R**emove control measure. Keep copies of this blank page for additional room if needed.*

Continuous maintenance is required on all Control Measures. ***As per CDPS-SCP: "Control Measures that are not operating effectively, have proven to be inadequate, or have failed must be addressed as soon as possible, immediately in most cases."***

Location	Control Measure	Condition	Comments: Description of Corrective Action and Preventative Measure Taken	Date Completed & Initials

(16) CONSTRUCTION SITE ASSESSMENT **Off-site Pollutant Discharges are a Violation of the Permit and Reason for Immediate Project Suspension**

(a) Is there evidence of discharge of sediment or other pollutants from the site? ❑ Yes ❑ No
*If yes, explain the discharge, the location and the associated corrective actions in section 15 (Construction Site Assessment & Corrective Actions) or section 18 (General Notes).

(b) Has sediment or other pollutants discharging from the site reached State waters? ❑ Yes ❑ No
*If yes, see subsection 208.03(c) and Part I.L.6 of the permit for reporting requirements.

(17) GENERAL NOTES

(18) INSPECTION CERTIFICATION

By signing this form, I certify that I attended the inspection in accordance with specification 208.03.

Contractor's SWMP Administrator (Qualified Stormwater Manager)

Print Name:	Signature Required:	Date:

Contractor's Erosion Control Inspector (If Needed):

Print Name:	Signature (if needed)	Date:

(19) COMPLIANCE CERTIFICATION

I verify to the best of my knowledge and belief, all corrective actions and maintenance items identified during the inspection are complete, and the site is currently in compliance with the permit (Part I.A.3.f).

Contractor's SWMP Administrator/ECI

Print Name:	Signature Required:	Date

Contractor's Superintendent/Approved Designee

Print Name:	Signature Required:	Date:

CDOT Project Engineer/CDOT Designee

Print Name:	Signature Required:	Date:

Consider This…

17

Does it matter where your construction dewatering sampling point is located?

How does understanding the regulatory requirements of different "regulated waters" affect your overall construction project? Please have a response for both understanding the regulation as well as a lack of understanding and its commensurate outcom

Managing Water on a Construction Site

18

Why is managing water on your project important?

Types of Water Encountered on a Construction Site:

19

Stormwater:

Run On:

21

Concrete Wastewater/ Wash Out Water:

22

Off-Site Discharge: 23

Construction Dewatering:

24-28

Stream Crossing: 29

Stream Diversions: 30

Consider This… 32

How would you work on your professional relationship with CDOT if you had a poor audit?

What field measures would you enact, SWMP measures you would undertake, and what communication techniques would you apply in order to reconcile with your project owner.

Tab 9 – Regions and Headquarters Water Quality Audits

Who Conducts the Water Quality Audits?

-
-
-

33

The Region / Headquarters Water Quality Audit May Count as a Seven-Day Inspection If…

NOTES:

How to Prepare for a Regulatory Audit

37

-
-
-
-

How a State Audit is Conducted

38

Limited Notification

Start with Auditor Q/A

SWMP Compliance Overview

Field Compliance Walk

Debrief

Final Report Issued within 30 Days

NOTES:

Tab 13 – Other Correspondence

Any Audit Reports Issued by Other MS4s, State or Federal Agencies	Permit Modifications
CDOT Agreements with Other MS4s	Water Quality Permit Transfer to Maintenance Punch List
Audits by Other Agencies	Revisions to the SCP
Notifications of Non-Compliance to CDPHE	Non-Compliance Reporting /Upset Conditions

NOTES:

Module 4 – Stabilization and Post Construction

When is Stabilization Required?

Temporary Stabilization:

4-5 Interim Stabilization:

Permanent Stabilization:

Seeding Windows and Topsoil (Spec 212.03)

8

Zone	Spring Seeding	Fall Seeding
Areas other than the Western Slope		
Below 6000'	Spring thaw to June 1	September 15 until consistent ground freeze
6000' to 7000'	Spring thaw to June 1	September 1 until consistent ground freeze
7000' to 8000'	Spring thaw to July 15	August 1 until consistent ground freeze
Above 8000'	Spring thaw to consistent ground freeze	
Western Slope		
Below 6000'	Spring thaw to May 1	August 1 until consistent ground freeze
6000' to 7000'	Spring thaw to June 1	September 1 until consistent ground freeze
Above 7000'	Spring thaw to consistent ground freeze	

Post Construction

9

Transfer Permit to CDOT Maintenance

Transfer COR400000 Back to CDOT Maintenance by attending and responding to the CDOT Permit Transfer to Maintenance Punch List

Stay on with Post-Construction Establishment

30 Day Inspection Frequency Conducted on Form 1177

NOTES:

214.04 Landscape Establishment

10

From the time of installation, during construction, and throughout the landscape establishment period the Contractor shall maintain all plant material and seeded areas in a healthy and vigorous growing condition and ensure the successful establishment of vegetation.

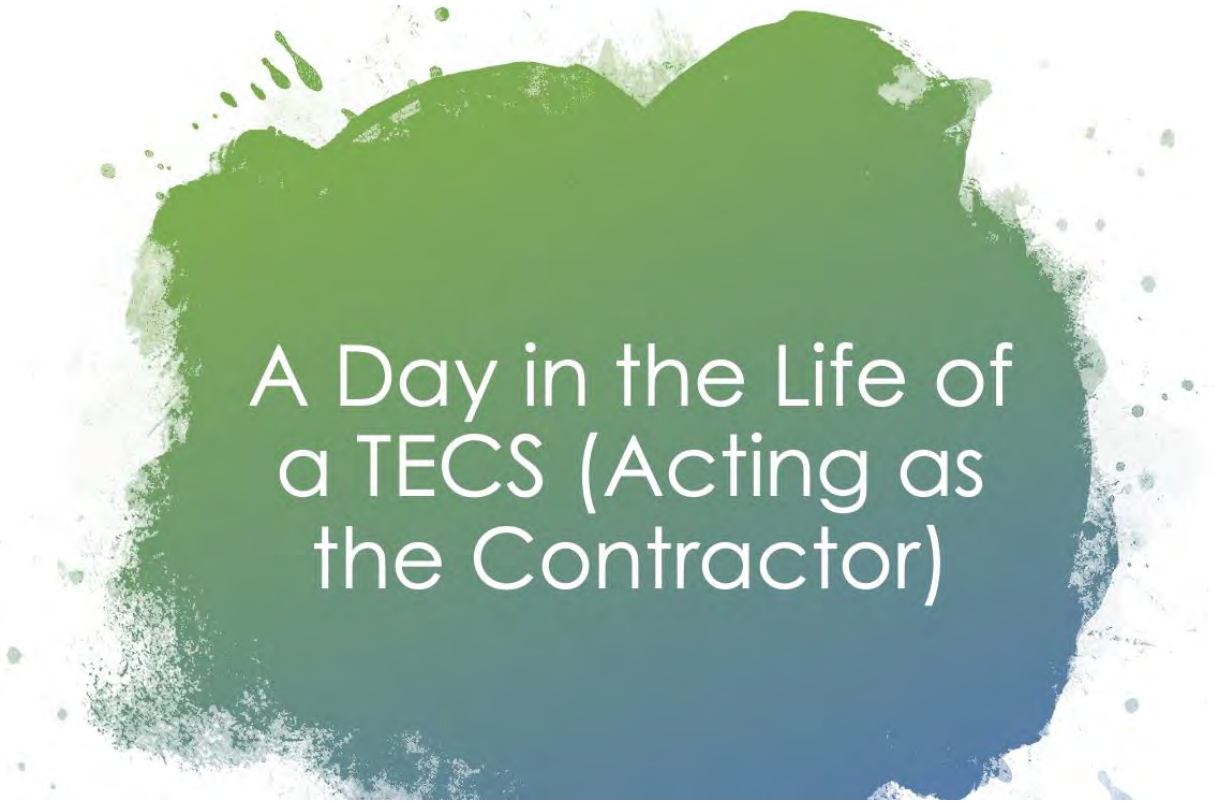
Final Stabilization 11

- Compare the pre-construction vegetative photos to visually identify whether enough vegetation has been garnered to close out permit.
- Before closing a permit, a vegetative survey should be conducted to ensure appropriate vegetation has been achieved. No longer necessary construction control measures when 70% re-veg has occurred, must be removed as directed by the CDOT Project Engineer.

Final stabilization is reached when (1), (2), and (3) below are complete:

- (1) All construction activities are complete .
- (2) Permanent stabilization methods are complete. Permanent stabilization methods include, but are not limited to, permanent pavement or concrete, hardscape, xeriscape, stabilized driving surfaces, vegetative cover, or equivalent permanent alternative stabilization methods. Vegetative cover must meet the following criteria:
    - a. Evenly distributed perennial vegetation, and
    - b. Coverage, at a minimum, equal to 70 percent of what would have been provided by native vegetation in a local, undisturbed area or adequate reference site.
- (3) The permittee must ensure all temporary control measures are removed from the construction site once final stabilization is achieved, except when the control measure specifications allow the control measure to be left in place (i.e. biodegradable control measures).

NOTES:


A Day in the Life of a TECS (Acting as the Contractor)

Group Activity: A day in The Life of a TECS

13

Instructions: Follow along with the instructors. Fill in each blank in order to learn how a routine inspection day may go for you as a TECS.

Prior to Arriving on the Project

Prior to arriving on the project what must you know / be aware of?

What is your inspection frequency?

Who needs to be notified of your upcoming inspection?

Who is walking with you on your inspection?

Arrive on the Project

15

Where do you go when you arrive on site?

Who do you speak with if they are on site and what is the general dialogue?

What questions should you ask and to whom?

CDOT PE

16

What should you talk to the CDOT PE about when arriving on the project?

Project Manager

17

What should you talk with the project manager about when you arrive on the project?

If you are the SWMP Admin what tabs should you check and update?

Are there any other items that you should be checking up on?

Site Superintendent

18

What should you talk to the Site Superintendent about?

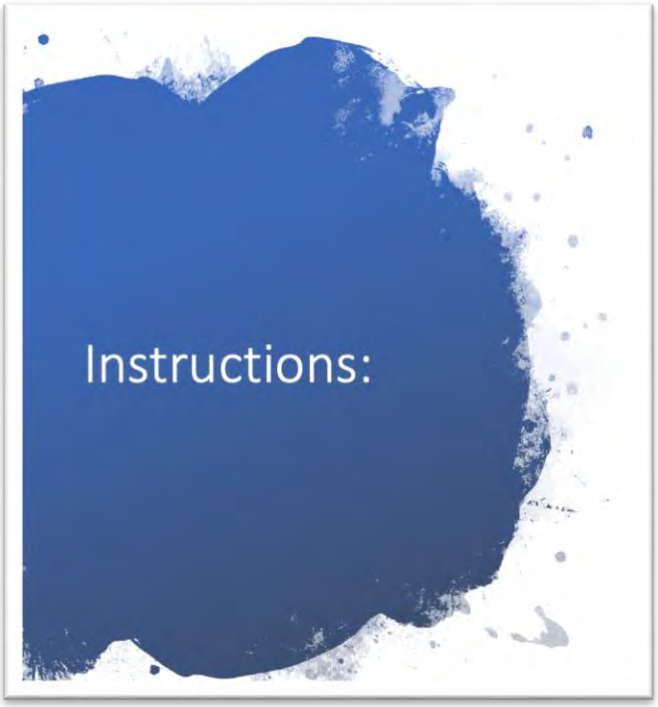
Site Walk

19

What needs to be assessed?

-
-
-
-
-
-
-
-

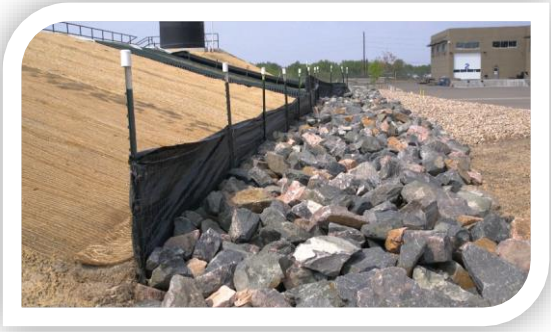
Instructions:
Make note of the control measure deficits either on paper or via screen shots. We will use the notes made later to fill out a Form 1176. If you do not take screen shots, include the location, and other pertinent information in your notes.



SITE WALK NOTES:

North Perimeter

21-24



South Perimeter

25-26

Up-Gradient Tributary Area to PWQ Outfall

27

EDB Forebay Trickle Channel 28

EDB Outlet Structure 30

Outfalls

31

Ingress/Egress

32

Internal Control Measures

34

35

36 Material Storage Area

Equipment Maintenance/ Fueling Area 38

Additional Construction Pollutants

39

Stockpiles & Stockpile Containment

40

Interim Stabilization

41

Concrete Batch Plant

42

Concrete Washout

Construction Dewatering

Additional Outlets that Daylight onto the Project

COMMUNICATION OF FINDINGS

47

What needs to be discussed now that the mock inspection is complete?

UPDATE THE SWMP

48

What updates in the SWMP need to be made after the mock inspection?

Instructions: Fill in the 1176 below as it pertains to the mock inspection.

COLORADO DEPARTMENT OF TRANSPORTATION

STORMWATER FIELD INSPECTION REPORT - ACTIVE CONSTRUCTION

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❑ Other:

(13) SWMP MANAGEMENT

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Other (Includes ground disturbing, clearing and grubbing, materials storage, equipment staging, haul roads) +		
Total acres of disturbance (includes cumulative total number of acres including: temporary, interim, permanent stabilized and other) =		

(c) Has the SWMP Phased Control Measure Implementation Matrix been updated? ❑ Yes ❑ No

(15) CONSTRUCTION SITE ASSESSMENT & CORRECTIVE ACTIONS ***Off-site Pollutant Discharges are a Violation of the Permit and Reason for Immediate Project Suspension****

The Construction Site Boundary/Limits of Construction (LOC), all disturbed areas, designated haul roads, material and/or waste storage areas that are exposed to precipitation, discharge locations, and locations where vehicles exit the site shall be inspected for evidence of, or the ***potential*** *for, pollutants leaving the LOC, entering the stormwater drainage system, or discharging to State waters. If there is evidence of sediment or other pollutants discharging from the site, see section 16 (Construction Site Assessment).*

*All erosion and sediment control practices identified in the SWMP shall be evaluated to ensure that they are maintained and operating correctly. Identify the condition of the control measure, using more than one letter if necessary: (**I**) **I**nadequate control measure; (**M**) **M**aintenance is needed; (**A**) **A**dditional control measure is needed; (**R**) **R**emove control measure. Keep copies of this blank page for additional room if needed.*

Continuous maintenance is required on all Control Measures. ***As per CDPS-SCP: "Control Measures that are not operating effectively, have proven to be inadequate, or have failed must be addressed as soon as possible, immediately in most cases."***

Location	Control Measure	Condition	Comments: Description of Corrective Action and Preventative Measure Taken	Date Completed & Initials

(20) CONSTRUCTION SITE ASSESSMENT ****Off-site Pollutant Discharges are a Violation of the Permit and Reason for Immediate Project Suspension****

(a) Is there evidence of discharge of sediment or other pollutants from the site? ❑ Yes ❑ No
*If yes, explain the discharge, the location and the associated corrective actions in section 15 (Construction Site Assessment & Corrective Actions) or section 18 (General Notes).

(b) Has sediment or other pollutants discharging from the site reached State waters? ❑ Yes ❑ No
*If yes, see subsection 208.03(c) and Part I.L.6 of the permit for reporting requirements.

(21) GENERAL NOTES

(22) INSPECTION CERTIFICATION

By signing this form, I certify that I attended the inspection in accordance with specification 208.03.

Contractor's SWMP Administrator (Qualified Stormwater Manager)		
Print Name:	Signature Required:	Date:
Contractor's Erosion Control Inspector (If Needed):		
Print Name:	Signature (if needed)	Date:

(23) COMPLIANCE CERTIFICATION

I verify to the best of my knowledge and belief, all corrective actions and maintenance items identified during the inspection are complete, and the site is currently in compliance with the permit (Part I.A.3.f).

Contractor's SWMP Administrator/ECI		
Print Name:	Signature Required:	Date
Contractor's Superintendent/Approved Designee		
Print Name:	Signature Required:	Date:
CDOT Project Engineer/CDOT Designee		
Print Name:	Signature Required:	Date:

Stormwater Management Field Inspection Report Instructions

State waters are defined to be any and all surface and subsurface waters which are contained in or flow through the state, including, streams, rivers, lakes, drainage ditches, storm drains, ground water, and wetlands, but not including waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed. (Per subsection 107.25 and 25-8-103 (19) CRS)

(3) SWMP Administrator (Qualified Stormwater Manager) and Erosion Control Inspector: Indicate the name(s) of the individual responsible for implementing, maintaining and revising the SWMP. An Erosion Control Inspector(s) may be the SWMP Administrator in projects with not more than 40 acres of disturbance (see 208.03(c)).

(4) CDOT Project Engineer/CDOT Designee: Indicate the name of the CDOT representative performing the inspection with the SWMP Administrator/Erosion Control Inspector(s). This person should be the Project Engineer or an authorized representative.

(9) CDPS-SCP Certification #: Indicate the Colorado Discharge Permit System (CDPS) Stormwater Construction Permit (SCP) (for Stormwater Discharges Associated with Construction Activities) certification number, issued by CDPHE, for the project which the report is being completed. Certification number can be found on the first page of the SCP.

(12) Reason(s) for Inspection / Exclusion: Indicate the purpose for the inspection or exclusion. These inspections are required to comply with the CDOT Specifications and the CDPS-SCP.

❑ Routine Inspections. These inspections are required at least every 7 calendar days during active construction. Suspended projects require the 7-calendar day inspection unless snow cover exists over the entire site for an extended period of time, and melting conditions do not exist (see, Winter Conditions Inspections Exclusions). ❑ Runoff Event Inspection for Active Sites. See page 1 for definition.

❑ Third Party Request. Indicate the name of the third party requesting the inspection and, if known, the reason the request was made.

❑ Winter Conditions Inspections Exclusions. See page 1 for definition. An inspection does not need to be completed but use this form to document the conditions that meet the Exclusion. ❑ Other. Specify any other reason(s) that resulted in the inspection.

(13) SWMP Management: Review the SWMP records and documents and use a ✓ to answer the question. To comply with CDOT Standard Specifications and the CDPS-SCP, all of the items identified must be adhered to. If No is checked, indicate the necessary corrective action in section 15 (Construction Site Assessment & Corrective Actions). Specification 208.03(d).

a) A copy of the SWMP must be retained on site, unless another location (specified by the permit) is approved by the Division.

b) Indicate all changes that have been made to any portion of the SWMP documents during construction. Changes shall be dated and signed at the time of occurrence. Amendments may include items listed in subsection 208.03(d).

c) The SWMP Administrator shall keep a record of inspections. Inspection reports must identify any incidents of noncompliance with the terms and conditions of the CDOT specifications or the CDPS-SCP. Inspection records must be retained for three years from expiration or inactivation of permit coverage.

d) Are corrective actions from the last inspection completed? Is a description of the corrective action(s), the date(s) of the corrective action(s), and the measure(s) taken to prevent future violations (including changes to the SWMP, as necessary) documented?

e) Subsection 208.06(c) requires that a Spill Response Plan be developed and implemented to establish operating procedures and that the necessary employee training be provided to minimize accidental releases of pollutants that can contaminate stormwater runoff. Records of spills, leaks or overflows that result in the discharge of pollutants must be documented and maintained. Information that should be recorded for all occurrences include the time and date, weather conditions, reasons for spill, etc. Some spills may need to be reported to the Water Quality Control Division immediately.

f) (f) Subsection 107.25(b)6 requires the Erosion Control Supervisor to identify and describe all potential pollutant sources, including materials and activities, and evaluate them for the potential to contribute pollutants to stormwater discharge.

g) (g) If N/A is checked for any of the items (a) through (f), indicate why in the space provided, if additional space is needed indicate in section 17 (General Notes).

Stormwater Management Field Inspection Report Instructions (continued)

(14) Current Construction Activities:

a) Provide a short description of the current construction activities/phase at the project site; include summary of grading activities, installation of utilities, paving, excavation, landscaping, etc.

(1) Estimate of disturbed area at the time of the inspection, use guidance found in 208.04 (e). Estimate the acres of disturbed area at the time of the inspection. Include clearing, grading, excavation activities, areas receiving overburden (e.g. stockpiles), demolition areas and areas with heavy equipment/vehicle traffic, installation of new or improved haul roads and access roads, staging areas, borrow areas and storage that will disturb existing vegetative cover, (Areas that have been: hard armored or paved should not be counted for total disturbance).

b)

c) Has the Phased control measure Implementation Matrix on the SWMP been updated? As part of the inspection the Phased control measure Implementation matrix for both the structural and non-structural Control Measures found at the beginning of the SWMP sheets must be reviewed to ensure that "In use on site" box is checked for Control Measures currently in use at the time of the inspection.

(15) Construction Site Assessment & Corrective Actions: Inspect the construction site and indicate where control measure feature(s) identified in section 13 (SWMP Management), require corrective action. Erosion and sediment control practices identified in the SWMP shall be evaluated to ensure that they are operating correctly.

- Condition. Identify the condition of the control measure, using more than one letter (identified in section 15) if necessary.
- Location. Site location (e.g., project station number, mile marker, intersection quadrant, etc.).
- Control measure. Indicate the type of control measure at this location that requires corrective action (e.g., silt fence, erosion logs, soil retention blankets, etc.).
- Date Completed & Initials. Date and initial when the corrective action was completed and the preventative measure statement finished.
- Description of Corrective Action and Preventative Measure Taken. Provide the proposed corrective action needed to bring the area or control measure into compliance. Once corrective actions are completed, state the measures taken to prevent future violations and ensure that the Control Measures are operating correctly, including the required changes made to the
- SWMP.

Inadequate control measure: Is any control measure that is not designed or implemented in accordance with the requirements of the permit and/or any control measure that is not implemented to operate in accordance with its design, this includes Control Measures that have not been implemented for pollution sources. If it is infeasible to install or repair the control measure immediately after discovering the deficiency the reason must be documented and a schedule included to return the control measure to effective operating condition as soon as possible.

Control Measures requiring routine maintenance: Any control measure that is still operating in accordance with its design and the requirements of the permit, but requires maintenance to prevent a breach of the control measure. These items are not subject to the corrective action requirements as specified in Part I.b.1.c of the permit.

Additional: Any control measure inadequate for its application or an area with insufficient control measure(s). If it is infeasible to install revised or additional control measure(s) immediately after discovering the deficiency the reason must be documented and a schedule included to return the control measure to effective operating condition as soon as possible.

Remove: Control measure no longer necessary

(16) Construction Site Assessment: Was there any off site discharge of sediment at this site since the last inspection?

a) Is there evidence of discharge of sediment or other pollutants from the site? **Off-site pollutant discharges are a violation of the permit.** (The construction site perimeter, all disturbed areas, material and/or waste storage areas that are exposed to precipitation, discharge locations, and locations where vehicles access the site shall be inspected for evidence of, or the potential for, pollutants leaving the construction site boundaries, entering the stormwater drainage system).
b) Are pollutants discharging to State water?
c) Has sediment or other pollutants discharging from the site reached State waters? **Off-site pollutant discharges are a violation of the permit.** If off site discharge has occurred, explain the discharge and the corrective actions in section 15 (Construction Site Assessment & Corrective Actions) or section 17 (General Notes).

(17) General Notes: Indicate any additional notes that add detail to the inspection; this may include positive practices noted on the project.

(18) Inspection Certification: In accordance with 208.03, required personnel shall sign to verify that they were in attendance.

(19) Compliance Certification: After all corrections have been made, this signature must be completed in accordance with Part I.A.3.f of the CDPS-SCP.

Project Close Out: 50

What should you discuss at the end of the inspection and with whom?

HOW TO CONVEY WATER DOWN A SLOPE

Common Installation Issues

60-63

Field Analysis - Run Water Through Channels and Inspect Each Channel as if it was YOUR Project

The Good, The Bad, and the Highly Erosive

Make a hypothesis!

Which of the swales below do you think will have the best compliance?

Why do you think this swale will have the best compliance?

After watching the film clips was your hypothesis correct? Why or why not?

Most Common CDOT Audit Findings

Field Findings:

-
-
-
-
-

SWMP Findings:

-
-
-
-

65

Debreif:

What new strategies will **You** use to better manage stormwater on your project?

After two days of training what strategies will you take with you to better garner compliance on your project?

Conclusion:

66-67

Successful compliant construction projects use or implement the following:

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This Workbook Belongs To:
Having Completed the TECS Training Course on