

Stormwater Management for Design Engineers

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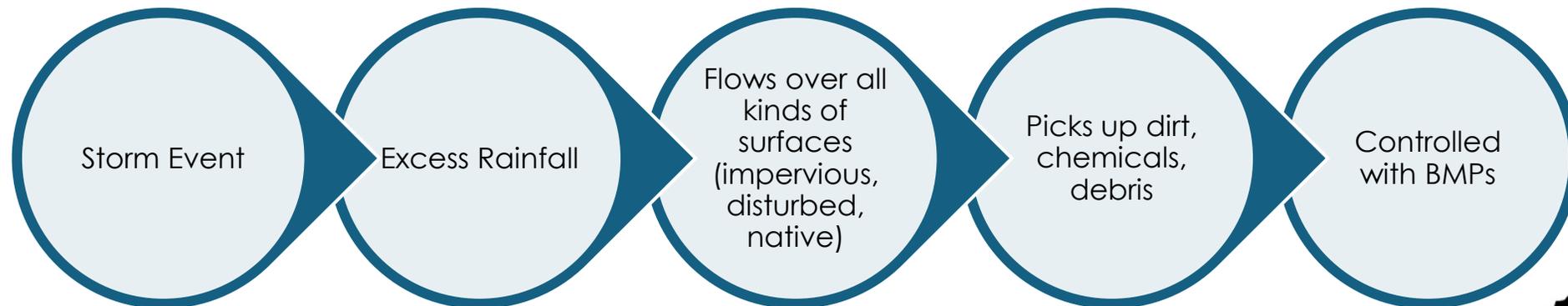
What is our Role?

- When is Stormwater Management part of the design?



What is Stormwater?

- Defined in the Clean Water Act
 - Runoff
 - From an actual storm event (excess rainfall surface runoff)
 - Snow melt



Urbanization & Development

- As areas develop to serve humanity, point discharges are created:
 - Municipal Separate Storm Sewer Systems (MS4s)
 - Active Construction Sites
 - Industrial land use continual operations



MS4s

- Defined by population from Census Data
- Exceptions
 - ODOT
 - OTA
 - OU
 - Tinker
 - Fort Sill
- OKR04
 - General Permit for discharges
 - Roads/Streets, Catch Basins, Curbs, Gutters, Ditches, Channels, Storm Drains





Construction Activities

- OKR10
 - Required if area > 1 acre
- Federally Funded Projects
 - NEPA clearance





Regulatory Authority

- MS4 Program
 - Delegated by the EPA to ODEQ in 1996
- Federally Funded Projects
 - Categorical Exclusions
 - Environmental Assessments
 - Environmental Impact Statements
 - DOTs and FHWA and EPA



Regulatory Method for MS4s

- Pollution Prevention Approach
 - SWMP
 - 6 Minimum Control Measures through Best Management Practices
 - GOAL: reduce pollutants discharged during runoff periods
 - Public Education & Outreach
 - Public Participation & Involvement
 - Illicit Discharge Detection and Elimination
 - Construction Site Stormwater Runoff
 - Post-Construction Management
 - Pollution Prevention/Good House Keeping
 - OPTIONAL: Municipal Construction Projects



Construction

- Any size municipal project
 - If implemented by the governing body
- Construction sites that meet the minimum area
- Federally funded projects



Where We Come In

- Can we be a subject matter expert?
 - Yes, there are some of you out there that offer technical assistance to MS4s and private developers
 - Design Engineers can at a minimum just know what the programs are:
 - Understand the acronyms
 - Be helpful in design considerations
 - Erosion and Sedimentation Control Plans should be consistent with BMPs for your client
 - Are you working on a project that is regulated?
 - Salt Barn in a drainage area that discharges to a 303 impaired water?
 - At least know if your client is an MS4!

Where We Come In

- When we do public meetings on projects can we also throw in stormwater considerations that our Clients can use for their reporting?





Where We Come In

- Construction Plan notes for contractors
 - Find the MS4s BMPs
 - They may even have a BMP manual
 - Know site inspection and reporting requirements
- SWMP required in federally funded plan sets





Example SWMP

STORM WATER MANAGEMENT PLAN		REVISIONS
SITE DESCRIPTION	EROSION AND SEDIMENT CONTROLS	
<p>PROJECT LIMITS: THE PROJECT IS CENTERED ON THE REPLACEMENT OF BRIDGE #10806 WITH APPROX. 33% OF ROAD IMPROVEMENTS TO THE WEST AND 36% TO THE EAST. THE BRIDGE CENTER IS 793.29' FROM THE NE CORNER OF THE SOUTHWEST ¼ OF SECTION 15, T17N, R2E.</p> <p>PROJECT DESCRIPTION: REPLACEMENT OF EXISTING DRAINAGE STRUCTURE AND FULL DEPTH REMOVAL OF EXISTING ROAD SURFACE. CONSTRUCT 24' WIDE ROADWAY WITH 4" OF ASPHALT AND 6" BASE</p> <p>SUGGESTED SEQUENCE OF EROSION CONTROL ACTIVITIES:</p> <ol style="list-style-type: none"> 1. INSTALL TEMPORARY SILT FENCE 2. INSTALL TEMPORARY SILT DIKES 2. INSTALL PERMANENT RIPRAP 2. INSTALL PERMANENT SOIL SLAB SOODING <p>SOIL TYPE: SOFT, BROWN, SILTY CLAY WITH SAND</p> <p>TOTAL AREA OF THE CONSTRUCTION SITE: APPROXIMATELY 1.1 ACRES</p> <p>ESTIMATED AREA TO BE DISTURBED: APPROXIMATELY 0.7 ACRES</p> <p>OFFSITE AREA TO BE DISTURBED (FOR CONTRACTOR USES): APPROXIMATELY 0.0 ACRES</p> <p>TOTAL IMPERVIOUS AREA PRE-CONSTRUCTION: APPROXIMATELY 0.3 ACRES</p> <p>TOTAL IMPERVIOUS AREA POST-CONSTRUCTION: APPROXIMATELY 0.4 ACRES</p> <p>POST-CONSTRUCTION RUNOFF COEFFICIENT OF THE SITE: 0.38</p> <p>LATITUDE & LONGITUDE OF CENTER OF PROJECT: LAT: 35° 58' 57.87" LONG: -97° 05' 04.28"</p> <p>PROJECT WILL DISCHARGE TO:</p> <p>NAME OF RECEIVING WATERS: CORDUROY CR.</p> <p>SENSITIVE WATERS OR WATERSHEDS: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p> <p>303(d) IMPAIRED WATERS: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p> <p>IF YES, LIST IMPAIRMENT:</p> <p>LOCATED IN A TMDL: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p> <p>LAKE THUNDERBIRD TMDL: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p> <p>MS4 ENTITY: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p> <p>IF YES, LOCATION:</p> <p><small>NOTE: THIS SHEET SHOULD BE USED IN CONJUNCTION WITH A DRAINAGE MAP THAT ILLUSTRATES THE DRAINAGE PATTERNS/PATHWAYS AND RECEIVING WATERS FOR THIS PROJECT. THIS SHEET SHOULD ALSO BE USED WITH THE EROSION CONTROL SUMMARIES, PAY ITEMS, & NOTES.</small></p>	<p>SOIL STABILIZATION PRACTICES:</p> <ul style="list-style-type: none"> ___ TEMPORARY SEEDING <input checked="" type="checkbox"/> PERMANENT SOODING, SPRIGGING OR SEEDING ___ VEGETATIVE MULCHING ___ SOIL RETENTION BLANKET ___ PRESERVATION OF EXISTING VEGETATION ___ HYDROMULCH / HYDROSEED <p><small>NOTE: TEMPORARY EROSION CONTROL METHODS MUST BE USED ON ALL DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES HAVE CEASED FOR OVER 14 DAYS. METHODS USED WILL BE AS SHOWN ON PLANS, OR AS DIRECTED BY THE ENGINEER.</small></p> <p>STRUCTURAL PRACTICES:</p> <ul style="list-style-type: none"> ___ STABILIZED CONSTRUCTION EXIT <input checked="" type="checkbox"/> TEMPORARY SILT FENCE <input checked="" type="checkbox"/> TEMPORARY SILT DIKES ___ TEMPORARY FIBER LOG ___ DIVERSION, INTERCEPTOR OR PERIMETER DIKES ___ DIVERSION, INTERCEPTOR OR PERIMETER SWALES ___ ROCK FILTER DAMS ___ TEMPORARY SLOPE DRAIN ___ PAVED DITCH W/ DITCH LINER PROTECTION ___ TEMPORARY DIVERSION CHANNELS ___ TEMPORARY SEDIMENT BASINS ___ TEMPORARY SEDIMENT TRAPS ___ TEMPORARY SEDIMENT FILTERS <input checked="" type="checkbox"/> TEMPORARY SEDIMENT REMOVAL <input checked="" type="checkbox"/> RIP RAP ___ INLET PROTECTION ___ TEMPORARY BRUSH SEDIMENT BARRIERS ___ SANDBAG BERMS ___ TEMPORARY STREAM CROSSINGS ___ FLEXAMAT / ARTICULATED CONCRETE BLOCK ___ COMPOST FILTER SOCKS ___ EROSION CONTROL MATS AND BLANKETS <p>OFFSITE VEHICLE TRACKING:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> HAIL ROADS DAMPENED FOR DUST CONTROL <input checked="" type="checkbox"/> LOADED HAIL TRUCKS TO BE COVERED WITH TARPALLIN ___ EXCESS DIRT ON ROAD REMOVED DAILY <p>NOTES:</p> <p>CONTRACTOR SHALL REMOVE ALL SEDIMENT CONTROL DEVICES FROM PROJECT LIMITS AFTER CONSTRUCTION IS APPROVED AND COMPLETED.</p> <p>REVISIONS WERE MADE TO THE MAINTENANCE AND INSPECTION PORTION OF THE CONTRACTORS RESPONSIBILITIES.</p> <p>THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE FOLLOWING:</p> <p>MAINTENANCE AND INSPECTION: ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER FROM THE BEGINNING OF CONSTRUCTION UNTIL AN ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED. INSPECTION BY THE CONTRACTOR AND ANY NECESSARY REPAIRS SHALL BE PERFORMED ONCE EVERY 7 CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCH AS RECORDED BY A NON-FREEZING RAIN GAUGE TO BE LOCATED ON SITE. POTENTIALLY ERODIBLE AREAS, DRAINAGEWAYS, MATERIAL STORAGE, STRUCTURAL DEVICES, CONSTRUCTION ENTRANCES AND EXITS ALONG WITH EROSION AND SEDIMENT CONTROL LOCATIONS ARE EXAMPLES OF SITES THAT NEED TO BE INSPECTED.</p> <p>WASTE MATERIALS: PROPER MANAGEMENT AND DISPOSAL OF CONSTRUCTION WASTE MATERIAL IS REQUIRED BY THE CONTRACTOR. MATERIALS INCLUDE STOCKPILES, SURPLUS DEBRIS AND ALL OTHER BY-PRODUCTS FROM THE CONSTRUCTION PROCESS. PRACTICES INCLUDE DISPOSAL, PROPER MATERIALS HANDLING, SPILL PREVENTION AND CLEANUP MEASURES. CONTROLS AND PRACTICES SHALL MEET THE REQUIREMENTS OF ALL FEDERAL, STATE AND LOCAL AGENCIES.</p> <p>HAZARDOUS MATERIALS: PROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE MATERIALS IS REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING MANUFACTURERS RECOMMENDATIONS STATE AND FEDERAL REGULATIONS TO ENSURE CORRECT HANDLING, DISPOSAL, SPILL PREVENTION AND CLEANUP MEASURES. EXAMPLES INCLUDE BUT ARE NOT LIMITED TO: PAINTS, ACIDS, CLEANING SOLVENTS, CHEMICAL ADDITIVES, CONCRETE CURING COMPOUNDS, AND CONTAMINATED SOILS.</p> <p>GENERAL NOTES: A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) IS REQUIRED TO COMPLY WITH THE OKLAHOMA POLLUTION DISCHARGE ELIMINATION SYSTEM (OPDES) REGULATIONS. THIS PLAN IS INITIATED DURING THE DESIGN PHASE, CONFIRMED IN THE PRE-WORK MEETINGS AND AVAILABLE ON THE JOB SITE ALONG WITH COPIES OF THE NOTICE OF INTENT (NOI) FORM AND PERMIT CERTIFICATE THAT HAVE BEEN FILED WITH THE OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY (ODEQ). THE PLAN MUST BE KEPT CURRENT WITH UP-TO-DATE AMENDMENTS DURING THE PROGRESSION OF THE PROJECT. ALL CONTRACTOR OFF-SITE OPERATIONS ASSOCIATED WITH THE PROJECT MUST BE DOCUMENTED IN THE SWPPP. I.E. BORROW PITS, WORK ROADS, DISPOSAL SITES, ASPHALT/CONCRETE PLANTS, ETC. THE BASIC GOAL OF STORM WATER MANAGEMENT IS TO IMPROVE WATER QUALITY BY REDUCING POLLUTANTS IN STORM WATER DISCHARGES, RUNOFF FROM CONSTRUCTION SITES HAS A POTENTIAL FOR POLLUTION DUE TO EXPOSED SOILS AND THE PRESENCE OF HAZARDOUS MATERIALS USED IN THE CONSTRUCTION PROCESS. THE PREVENTION OF SOIL EROSION, CONTAINMENT OF HAZARDOUS MATERIALS AND/OR THE INTERCEPTION OF THESE POLLUTANTS BEFORE LEAVING THE CONSTRUCTION SITE ARE THE BEST PRACTICES FOR CONTROLLING STORM WATER POLLUTION.</p> <p>THE FOLLOWING SECTIONS OF THE 2019 ODOT STANDARD SPECIFICATIONS SHOULD BE NOTED:</p> <ul style="list-style-type: none"> 103.05 BONDING REQUIREMENTS 104.10 FINAL CLEANING UP 104.12 CONTRACTOR'S RESPONSIBILITY FOR WORK 104.13 ENVIRONMENTAL PROTECTION 106.08 STORAGE AND HANDLING OF MATERIAL 107.01 LAWS, RULES AND REGULATIONS TO BE OBSERVED 107.20 STORM WATER MANAGEMENT 220 MANAGEMENT OF EROSION, SEDIMENTATION, AND STORM WATER POLLUTION PREVENTION 221 TEMPORARY SEDIMENT CONTROL <p>IN ADDITION: ODEQ GENERAL PERMIT (OKR10) FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA. ODEQ WATER QUALITY DIVISION, OCTOBER 8, 2022. ADDITIONAL PERMITS REQUIRED FROM OKLAHOMA WATER RESOURCES BOARD AND/OR MUNICIPALITY FOR USE OF SURFACE, GROUND OR CITY WATER SOURCES FOR ACTIVITIES SUCH AS WATERING.</p>	
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STORMWATER POLLUTION PREVENTION PLAN
 IOWA TRIBE BRIDGE #10806 REPLACEMENT
 WEST HALF, SECT. 15, T17N, R2E, 1.M.
 PAYNE COUNTY, OKLAHOMA

CROSS TIMBERS CONSULTING, LLC
 P.O. BOX 87
 Elk, Oklahoma, 70001
 Phone: (405) 292-0800

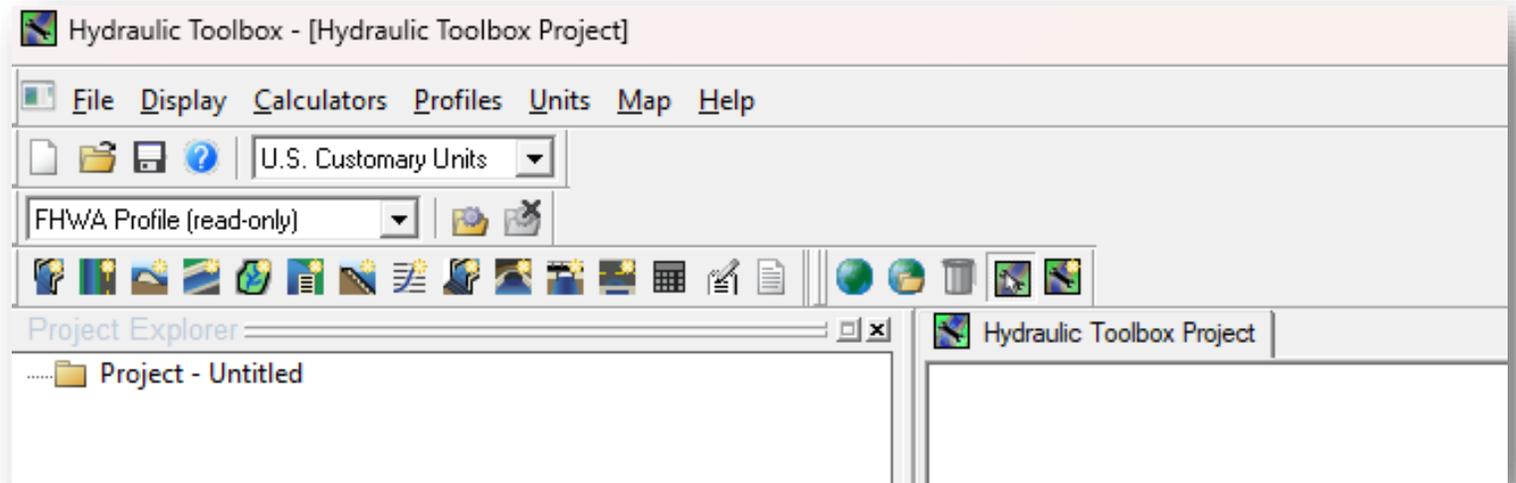


Where We Come In

- Permanent Stabilization Requires a Design
 - Ensure permanent erosion and sedimentation control measures in the plans meet the runoff volume and velocity that the area will experience
 - Sod is not always the best ditch lining
 - TRM
 - ECM
 - RIPRAP
 - Interlocking blocks

FHWA hydraulic toolbox

- Channel stability
- Scour design
- Weir Analysis
- Sediment Gradation Analysis
- Culvert Assessment



Iowa Tribal Bridge Replacement Program

- Twenty-seven bridges
- Three different counties
- FHWA funding
- Highly erodible soils



Where We come In

- Does your client have an LID ordinance or manual?



The Benefits of Low Impact Development (LID)



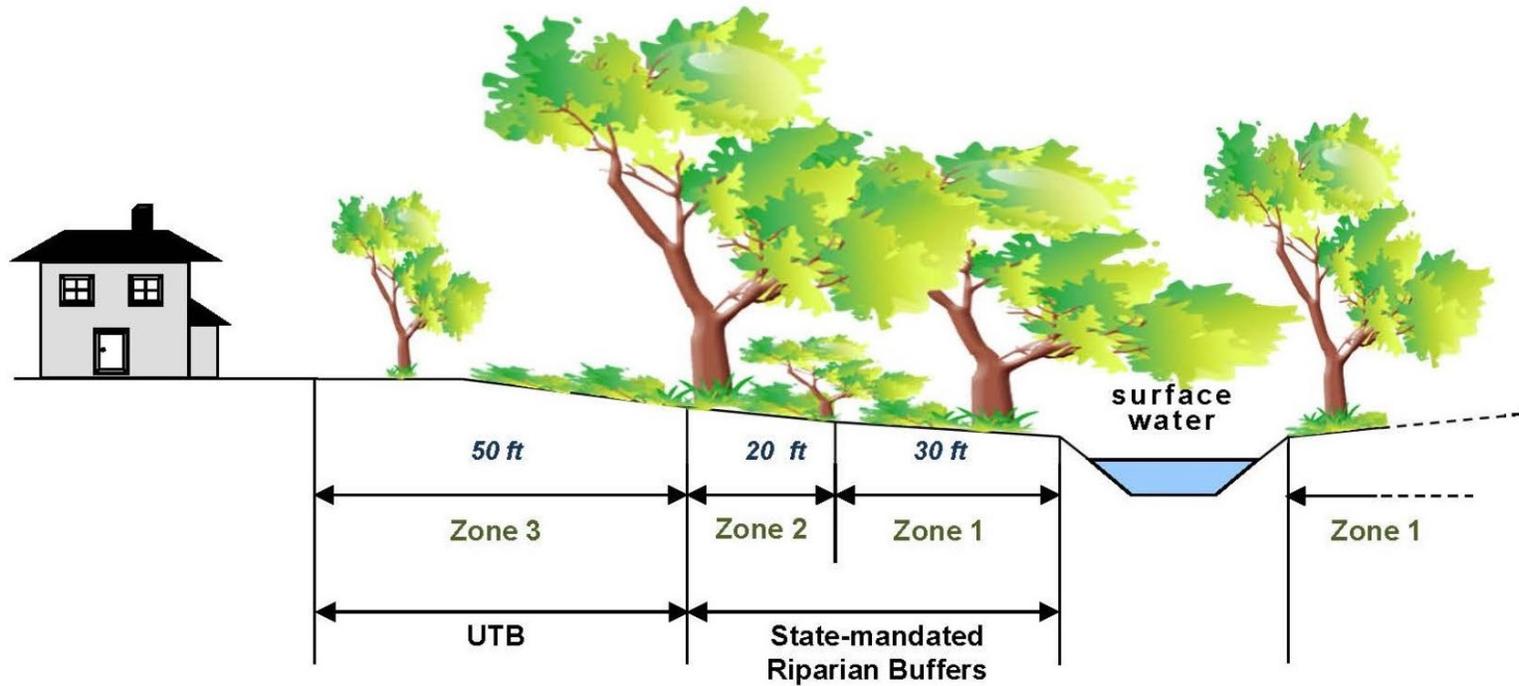
Low Impact Development (LID) guidance

Low Impact Development (LID) is a stormwater and land-use management strategy that tries to mimic natural hydrologic conditions by emphasizing the following techniques:

- Conservation
- Use of on-site natural features
- Site planning
- Distributed stormwater best management practices (BMPs) integrated into a project design

Where We come In

- Understand buffer requirements



Where We come In

DEVELOPMENTS

- Should we account for off-site flows?
- Are we evaluating flows during construction properly?
- Should we consider discharge velocities?

Where We come In

- Participate in Stormwater Training such as:
 - Oklahoma Erosion and Sediment Control Inspector Certification
 - Hosted by Oklahoma Water Survey
- Stormwater Workshops hosted by OFMA

<https://www.ou.edu/okh2o/outreach/water-inspector-training-program>



Where We come In

- Participation in OFMA





Let's be great partners to our regulated and
regulating friends!

Thank you!

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