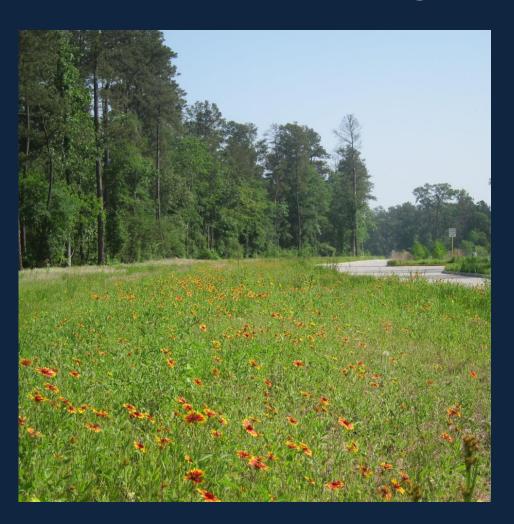
Storm Water Quality Management for Urban Roadways





Nick Russo, Environmental Compliance Officer Harris County Engineering Department

Agenda



- 1. Introduction
- 2. Project Development
- 3. Construction Phase
- 4. Post Construction
- 5. Questions



Mission

The mission of the Harris County Engineering Department is to execute the planning, study, property acquisition, design and construction of various buildings, roads, bridges, traffic signals, drainage improvements, parks, and other architectural and maintenance projects...

We create innovative customer driven solutions for all projects.

Typical County Roadway Expansion



Study Phase - Environmental Studies





- Phase I & II Environmental
 Site Assessments (ESA)
- Waters of the U.S. / Wetlands
- Threatened and Endangered Species
- Cultural / Archeological Resources
- USACE Permits

Study Phase – Other Studies

- Alignment
- Right of Way
- Utilities

- Geotechnical
- Traffic
- Drainage/Hydrology



Design Phase

- Develop Storm Water
 Pollution Prevention Plans
- Design Storm Water
 Quality Management
 Plans
- Select BMPs,
 Specifications, & bid/pay items.
- Obtain plan approvals & permits.



MAJOR SOIL DISTURBING ACTIVITIES: INSPECTION & MAINTENANCE: PROJECT NAME: Inspection and Maintenance will be performed according to SPEC 751, Inspections will be ACTIVITY (CHECK ALL THAT APPLY) conducted at least every 7 calendar days, Inspection forms will be filed with SWPPP LOCATION & LIMITS: SPEC 102 - Clearing & Grubbing supporting documents. If repair or replacement of stabilization or erosion control features SPEC 104/110/400 - Excavating is necessary, it must be completed at the earliest date possible. Amendments will be tracked on the SWPPP Amendment Log. Daily work logs related to this section will be SPEC 400 - Fill kept in CAPTRAC. Leveling/Grading See plan cover sheet for vicinity map. PROJECT SCOPE: POTENTIAL POLLUTION SOURCES: NOTES: Activity (check all that apply) Concrete Cleaning Solvents Roadway Expansion Fertilizer \checkmark Curing Compounds Roadway New Construction Pesticides Hydraulic Fluid Underground Storm Sewer \checkmark Motor Oil Asphalt Detention Pond Paint Bridge Expansion Gasoline See Site Plan for detailed planning drawings. Bridge New Construction Diesel Fuel SOIL STABILIZATION AND SEDIMENT CONTROL MEASURE: Sanitary Toilets MEASURES TEMPORARY PERMANENT SPEC 164 - Seeding TOTAL PROJECT AREA: ______Linear Feet POLLUTION PREVENTION BMPS SPEC 162 - Sodding Whenever possible all materials will be stored in their original containers in secure areas TOTAL AREA DISTURBED: Acres SPEC 165 - Hydro-mulch where spillage is protected from runoff. Stockpiles and work areas will be constructed SPEC 164 - Soil Retention Blanket in such a way to minimize the amount of sediment that enters receiving waters and EXISTING CONDITIONS OF SOIL, VEGETATION, AND DRAINAGE: wetlands. Spill prevention and control measures are included on attached site maps. SPEC 713 - Reinforced Filter Fabric Barrier Records of spills will be maintained with SWPPP supporting documents. Additional required SPEC 719 - Inlet Protection Barrier BMPs can be found in SPEC 725. Temporary materials and structures will be removed SPEC 724 - Stabilized Construction Access from waterways as soon as feasible once they are no longer required. SPEC 730 - Concrete Truck Washout Structures SPEC 741 - Inlet Protection Barrier SPEC 750 - Rock Filter Dam SPEC 725 - Watering for Dust Control PHASED CONSTRUCTION ACTIVITIES: Notes: If sediment escapes off site, these accumulations will be removed to minimize impact. Rock filter dams will be cleared before the reach 1/3 the height of the dam, other control measures will be cleared All solid waste materials will be collected and stored in secure metal dumpsters, then before their capacity has been reduced by 50%. As required in CGP TXR 150000, soil stabilization transported to appropriate disposal facilities. Collection will be completed often enough measures will be initiated in portions of the site where activities have ceased for a period exceeding to ensure that no waste materials will be lost due to overfilling of collection containers, 14 days. This stabilization will commence no later than the day following completion of work in these Liquid wastes will be stored in sealed containers in designated areas and disposed of areas. If prompt repair or replacement is not feasible, the reason will be documented in the SWPPP. DESCRIPTION OF DRAINAGE AREAS AND OUTFALLS: according to all applicable regulations. All wasted containers should meet all state and Records of dates for major grading activities, and initiation of stabilization measures will be maintained local requirements in the SWPPP, Daily work logs related to this section will be kept in CAPTRAC. The Harris County SWPPP detail sheet will be used when implementing BMP's and included with this document. All outfall structures will be constructed in accordance to Harris County Specification 461 and any applicable specification referenced by it. Drainage pathways will shown on plan sheets stored with other attachments to this SWPPP, TCEQ 303(d) listed water RESPONSIBLE PARTY/CONTRACTOR RECEIVING WATERS/CONVEYANCE: Title Current construction specification documents can be found at: Company http://www.eng.hctx.net/Consultants/Standards-Specifications/Standard-Design-Engineering-Specifications Signature PROJECT TITLE: HARRIS COUNTY REVISION_TEXT DATE

ENGINEERING DEPARTMENT

CK'D BY: J.M. SCALE: 1"=20"

DATE: 3/24/16 1

SHEET NO:

1 / 1

DO NOT SEAL

STORM WATER POLLUTION PREVENTION PLAN

Construction Phase BMPs

- TCEQ Construction General Permit
- County/City Stormwater Regulations
- Implement SWPPP & BMPs

Agencies:











Post-Construction BMPs

REGULATIONS OF HARRIS COUNTY, TEXAS

FOR

STORMWATER QUALITY MANAGEMENT



AS
ADOPTED AUGUST 21, 2001
AMENDED SEPTEMBER 25, 2001
EFFECTIVE OCTOBER 1, 2001
AMENDED APRIL 13, 2004
AMENDED APRIL 19, 2011
EFFECTIVE MAY 1, 2011
AMENDED AUGUST 9, 2016
EFFECTIVE SEPTEMBER 1, 2016

HARRIS COUNTY ENGINEERING DEPARTMENT

JOHN R. BLOUNT, P.E. COUNTY ENGINEER

- New Development greater than 5 acres
- Significant Redevelopment greater than 1 acre
- Also applies to roadways.

 Various methods used since about 2002.

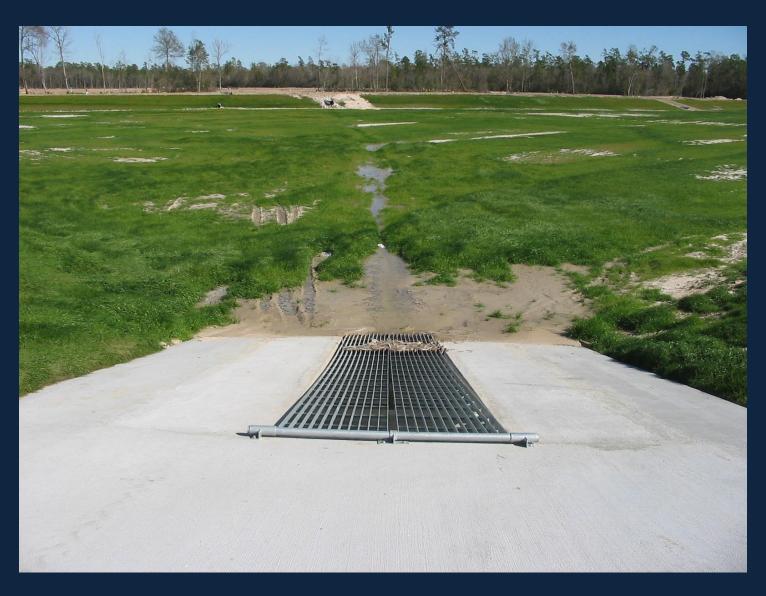
The "First Flush" Dry Basin



Dry/Wet outlet designs



Floatables Collection Screen



Wet Bottom Detention



Urban Forestry



ACCEPTABLE URBAN FORESTRY CRITERIA

WHEN URBAN FORESTRY IS CHOSEN AS A STORM WATER QUALITY BMP, THE STORM WATER QUALITY MANAGEMENT PLAN MUST BE CERTIFIED BY A DEGREED FORESTER, WETLAND SPECIALIST, BOTANIST. LANDSCAPE ARCHITECT, CERTIFIED ARBORIST, OR SIMILARLY QUALIFIED PROFESSIONAL.

TREE SIZE AND CONDITION

TREES SHALL BE A MINIMUM OF 1.5 CALPER (DIAMETER) AT THE BASE AND 4 FEET TALL WHEN PLANTED AND A MAXIMUM OF 3 INCHES IN CALIFER AND 14 FEET HIGH. AMERICAN STANDARD FOR NURSERY STOCK CRITERIA MAY BE USED AS WELL.

IT IS ESSENTIAL THAT TREES BE SELF-SUPPORTING WITH STRAIGHT TRUNKS AND LEADERS OR TOPS INTACT. TREES THAT HAVE BEEN HEADED BACK ARE NOT ACCEPTABLE. TREES SHOULD BE NORMALLY SHAPED FOR THEIR SPECIES AND WELL BRANCHED WITH FULL FOLIAGE WHEN LEAFED OUT. THE ROOTS MUST HE HEALTHY AND SUFFICIENTLY LARGE TO ALLOW RECOVERY AFTER PLANTING. THE TRUNCK MUST BE FREE OF ABRASIONS AND RECENT CUTS AND THE TREE FREE OF INSECTS AND DISEASE.

PLANTING TIME

THE RECOMMENDED TREE PLANTING TIME IN THE HARRIS COUNTY AREA IS USUALLY EARLY FALL UNTILL LATE SPRING, GENERALLY, MID OCTOBER TO EARLY MARCH IS THE BEST TIME TO PLANT TREES PLANTING IN LATE FALL OR WINTER ALLOW ROOTS TO BECOME ESTABLISHED BEFORE MOISTURE DEMANDING SUMMER SETS IN. ALL TREES MUST BE MAINTAINED (PRIMARILY WATERED) FOR A MINIMUM OF TWO YEARS.

SPACING REQUIREMENTS

THERE SHALL BE A MINIMUM OF 6 CALIFER INCHES PER 100 LINEAL FEET OF NEW SINGLE LANE PAVEMENT FOR ROAD PROJECTS AND A MINIMUM OF 1 CALIFER INCH PER 170 SQUARE FEET OF IMPERMIJOS SURFACE FOR ALL OTHER DEVELOPMENT PROJECTS.

LONG-TERM SURVIVABILITY IS THE PRIMARY OBJECTIVE IN THE URBAN FORESTRY PLANTINGS THEREFORE ALL PLANTING OF ONE LINEAR MILE OR GREATER SHALL CONSIST OF AT LEAST FOUR (4) DIFFERENT SPECIES FROM THE RECOMMENDED TREE LIST.

THE FOLLING REQUIREMENTS ARE PARTICULARLY APPLICABLE TO THE STREET PLANTINGS IN HARRIS COUNTY RIGHTS-OF-WAY (HARRIS COUNTY FLOOD CONTROL DISTRICT PROPERTIES) TO COMPLY WITH THE STORM WATER QUALITY DOCUMENT FOR NEW DEVELOPMENT / REDEVELOPMENT PROJECTS.

- NO TREES THAT WILL HAVE A MATURE TREE TRUNK CLAMETER GREATER THAN 12 INCHES AT THE BASE SHOULD BE PLANTED IN A TREE LAWN OR RIGHT-OF-WAY LESS THAN 3 FEET WIDE.
- TREES SHOULD NOT BE PLANTED WITHIN 30 FEET OF AN INTERSECTION OR WHERE THEY BLOCK MEWS FOR
- TREES SHOULD NOT BE PLANTED WITHIN 10 FEET OF UTILITY POLES OR WITHIN 15 FEET OF DRIVEWAYS AND
- MEDIUM LARGE TREES, THOSE THAT MATURE TO A HEIGHT GREATER THAN 30 FEET, SHOULD BE PLANTED 25 TO SO FEET APART.
- SMALL TREES, THOSE THAT MATURE TO LESS THAN 30 FEET IN HEIGHT, SHOULD BE PLANTED A MINIMUM OF 10 FEET APART
- . IN BUSINESS DISTRICTS AND GENERAL PARKING AREAS, TREES MUST BE PLANTED A MINIMUM OF 30 INCHES FROM THE CURB TO PREVENT DAMAGE FROM OR TO BUMPERS AND DOORS.
- ONLY TREES WITH A MATURE HEIGHT OF LESS THAN 25 FEET SHOULD BE PLANTED UNDER UTILITY LINES.

__ CALIPER INCHES REQUIRED

URBAN FORESTRY CALCULATIONS

CHECK APPROPRIATE BOX.	CALCULATE REQUIRED	CALIPER INCHES	AND COMPLETE	TREE PLANTING SCHEDULE

NEW PAVEMENT

■ IMPERVIOUS IMPROVEMENTS OTHER THAN PAVEMENT

_ CALIPER INCHES REQUIRED

SLP - SINGLE LANE PAVEMENT LENGTH MEASURED IN FEET SFI - SQUARE FOOT AREA OF IMPERVIOUS SURFACE

COMPLETE ONLY URBAN FORESTRY IS USED IN PROJECT

SWQ IMPACT EVALUATION

- THE PROJECT ENTAILS THE ROTEACE OF NET INFERNOUS COVER IN THE AUGUST OF SF or _____IF (SLP) WHICH IS NOT WITGATED IN _ITEM 2. UPBAN FORESTRY CALCULATIONS.
- THIS PROJECT NOUNCE THE PRESENTION OF ____SF OF "OPEN SPACE" NOT DEVELOPED AND USED SOLELY FOR A "OPEN CORRIGON". THIS PROJECT INVOLVED THE ROLLOMAG AUDITORIAL EMPROMENTAL FEATURES RELATED
- TO STORY WATER QUALITY
- MANHOLE LIDS INLET MARKERS OR PUBLIC INFORMATION ITEMS.
- WATERSHED AND IS LOCATED ON KEY WAP PAGE.__

COMPLETE FOR PROJECTS NOT USING 10,700 DETENTION-TRASH EACH OR OTHER METHODS FOUND IN THE MINIMUM MEANN CRITISIA FOR IMPERIORATION OF CRITIAIN 0852 MANAGEMENT PROJECTICES FOR STORM METER ROOFF TRAININGS OFFICES.

ACCEPTABLE SPECIES URBAN FORESTRY

SCIENTIFIC NAME COMMON NAME HEIGHT SPREAD GROWTH RATE COMMENTS Accer arubrum Medium Foll color Red Moole Carya Ilinoensis Peodh Large 50 FT Fruit Frakhus americana White Ash 40 FT Fost Fall color Jugiana nigra Black Walnut Large 40 FT. Slow Fall color Liquidamber stryaciflua Sweetgum 40 FT. Fall color Magnolla granditora Southern Magnolia Large 45 FT Slow Evergreer 30 FT Medium Foll color Block Gum 30 FT. Pinus taeda Lobioly Pine Large Foot Evergreen Plantanus occidentalis American Sycamore Large 50 FT. Unique leaf Quercus acutissma Sawtooth Oak Large 40 FT. Drought tolerant Querous falcata Southern Red Oak Lorge 40 FT. Fall color 40 FT. Querous laurifolia Laurel Oak Large Semi-evergreen Large 40 FT. Querous lyrata Overcup Oak Large goorn Large 50 FT Quercus macrocamo Bur Oak Large accom Swamp Chastnut Oak Quercus michauxii Lorge 40 FT. Foll color Quercus muchienbergii Chinkapin Oak 40 FT. Slow Fall color Large Quercus higher Water Oak Lorge 40 FT. Medium Deciduous Quercus nutditi Nuttel Oak Large 40 FT. Medium Fall color Querous phellos 40 FT. Willow Oak Medium Deciduous Lorge Querous polymorpha Monterrey Oak 40 FT. Foot Drought tolerant urge Loquet Leaf Oak 40 FT Drought tolerant Querous rizophylia Large Fost Quercus shumgrdfi Shumard Oak Large 40 FT. Slow Fall color Post Oak 40 FT Quercus stellata Slow Deciduous grae 50 FT. Querque virginiana Live Oak Large Slow Semi-evergreen **Bald Cypress** 30 FT. Taxodium distichum Fost Deciduous Lorge

SMALL TREES	/				
Bumelia lanuginosa*	Gum Bully	Small	30 FT.	Slow	Unique leaf
Enretia anacua*	Anacua	Small	20 FT.	Slow	Unique leaf
Frazinus texensis*	Texas Ash	Small	25 FT.	Fort	Deciduous
ax opoca*	American Holly	Small	15 FT.	Slow	Evergreen
lex X attenuata Var. East palatka*	East Palatka Holly	Small	15 FT.	Slow	Evergreen
lex X attenuata Var. savannah*	Savannah Hally	Small	15 FT.	Slow	Evergreen
Magnotia virginiana*	Sweetbay Magnofa	Small	20 FT.	Slow	Evergreen
Pistacia chinensis*	Chinese Pistoche	Small	25 FT.	Slow	Fall Color
Prunus sercting*	Block Cherry	Sma	20 FT	Medjum	Unique Leaf
Querous cambil*	Camby Oak	Small	20 FT.	Medium	Drought Tolerant
Lageratroemia indica	Orgpe Myrtle	Sma	20 FT.	Medium	Drought Tolerant
Vitex agnus-Castus	Vitex/Chaste Tree	Smgt	20 FT.	Slow	Drought Tolerant

orge

Large

40 FT. 30 FT. 30 FT.

Foot

Medium

Semi-evergreen Drought tolerant Drought tolerant

Note: Additional species maybe approved on a case—by—case basis.

Montezuma Cypress

Winged Elm Codar Elm

PLANTING SCHEDULE

TREE NUMBER	SPECIES	CALIPER INCH PROPOSED		
	TOTALS			

THIS PROJECT PROPOSED TO PLANT AND MAINTAIN _ TREES WITH A TOTAL OF F ADDITIONAL TREES ARE REQUIRED. CALIPER INCHES AS SHOWN ON SHEET(S). AN ADDITIONAL PLANTING SCHEDULE APPEARS ON SHEET(S)_

PLANTING ST PLANTING

- 1. DO NOT REMONE THEE FROM CONTAINER UNTIL HEADY TO PLACE RIVE ROOTS DRY OUT RAPPOLY WHEN EXPOSED TO AR.
 - PLANTING HILE SHOULD BE DUG AT LEAST TWO (2) TO FINE (5)
 THE SHAE DEPTH AS THE ROOT SALL.
 HE SDES OF THE HOLE SHOULD BE SLINHLY SLIPED IMMADO.
 NOTECHE HOLF FERTHARLITY INTO SUMMODIANS SOL. THESE
- OR SWALL HUMP OF UNDESTURBED SOIL TO MINIMIZE SETTLING A all containers, burlay, whe and any rope or string sho TO PLANTING. WITH THE TREE IN PLACE, THE ROOTS CAN BE S
- CHECK FOR CIRCLING ROOTS AND REJECT THOSE TREES WITH TH THE PLANTING HOLE SHOULD BE BACKRILLED WITH THE SAME SOLUNLESS IT IS CLAY FROM BASEMENT EXCAVATION OR OTHER UNIC in that case flend together one (1) part nothed sand in or grow in as much good topsol as possible. Thus, go LANCE AR STATES. DO NOTUSE EXCESSIVE FAMILIES ANGUND WAY INHIBIT THE STATES OF HOOTS. THE BACK SOIL SHOULD IS ique is hauf full. Nater can be slowly acced at this ti The soil. Finish fullac the hole to the ordinal crists at
- MULCH WITH WARRING OF FOUR (4) INCHES OF COURSE CREAMED THAT EXTENDS A MINIMUM OF THREE (3) FEET FROM THE TRUMS CENERALLY RECONNENCED BUT WAY BE RECESSARY UNDER SPE THE THEE SHOULD BE STAKED ONLY IF IT IS NOT CAPABLE OF S
- THEN ANCHORED IN NATIVE SOIL AND ARE TO BE REMOVED AFTE TO PREVENT MAIN CHANGE, KEEP THE STAKE OUT OF THE TRE THEE FOUR (4) TO SIX (5) INCHES OF MOVEMENT.
- ADBOLATE WATER IS EXSISTED AT PLANTING TIME. PLACE WATE AND ALLON WATER TO TRICKLE UNTIL SOIL IS SATURATED. AFER MATERIAG AND ACCONG MALCH TO COMPENSATE FOR ANY
- TREE TO KEEP UPRIGHT. THE ONLY PRIMING RECESSARY AT PLUEAD BRANCIES. STRUCTURAL PRIMING SHOULD BE DELAYED U

TREE LOCA

PUBLIC INFRASTRUCTURE DEPARTI

Taxadium mucronatum

Ulmus globa

Ulmus crassifolia



STORM WAT MTS

Low Impact Development

Low Impact Development (LID) is a comprehensive land planning and engineering design approach with the goal of maintaining, as the minimum, the pre-development hydrologic regime in a watershed without solely using conventional development and detention basin techniques to satisfy drainage and flood mitigation requirements..



Typical Detention Systems



Birnamwood Dr. - Bioswale

LID-Birnamwood



LID Design provided a cost effective, sustainable roadway leading to an anchor park along spring creek.

LID -Louetta



Harvey-Roadway Impacts





Public Infrastructure Roadway Damages:

- 45 Bridges
- 54 Roadways
- 58 Traffic Signals

Summary

- Harris County has been implementing post construction stormwater BMPs since about 2002.
- Various ways to treat stormwater within a roadway project.
- Available storage space and offsite drainage are significant challenges.



Questions

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