

Stormwater System Management

DFW International Airport



Eduardo N. Tovar, PE / Ada Inda
Energy, Transportation and Asset Management (ETAM)
Systems Performance Group / Watershed Management


January 8, 2020 – NCTCOG iSWM SubCommittee Meeting

A front-facing view of a large commercial airplane, likely an Airbus A320neo, on a runway. The aircraft is white with blue and white stripes on the tail. The runway is paved and has yellow and blue markings. The sky is clear and blue.

Table of Contents

Stormwater System Management

1. DFW Airport Fast Facts
2. Stormwater Drainage Master Plan
3. DFW Airport Design Criteria Manual
4. LID/GSI at DFW Airport
5. Water Quality, LID Performance and Flood Control.

An aerial photograph of the Dallas/Fort Worth International Airport (DFW) terminal and its surrounding infrastructure. The terminal is a large, circular building with a prominent central tower. It is surrounded by multiple levels of highway interchange and parking areas. The background shows a vast, flat landscape under a clear sky.

1. DFW Airport Fast Facts

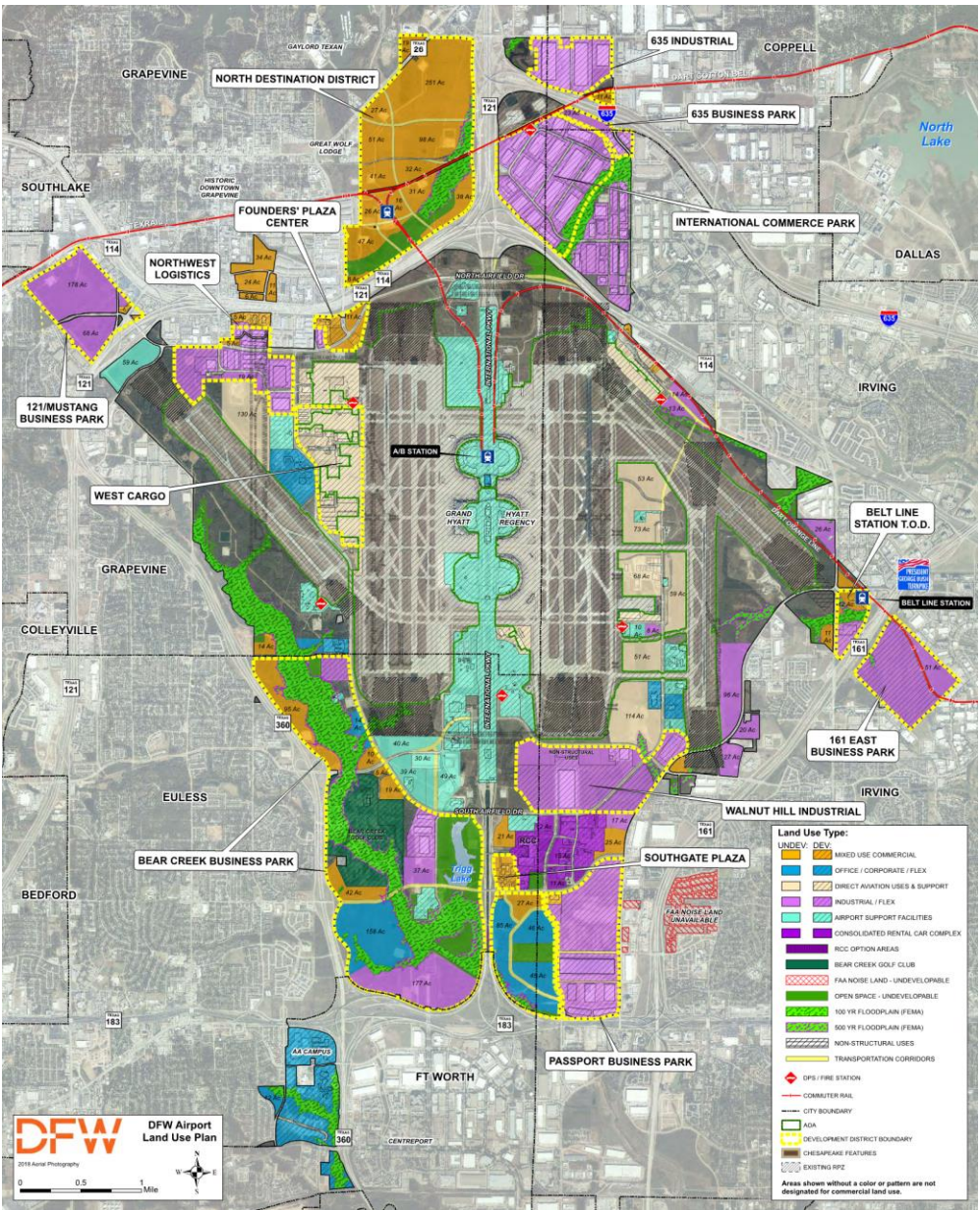
1. DFW Airport Fast Facts

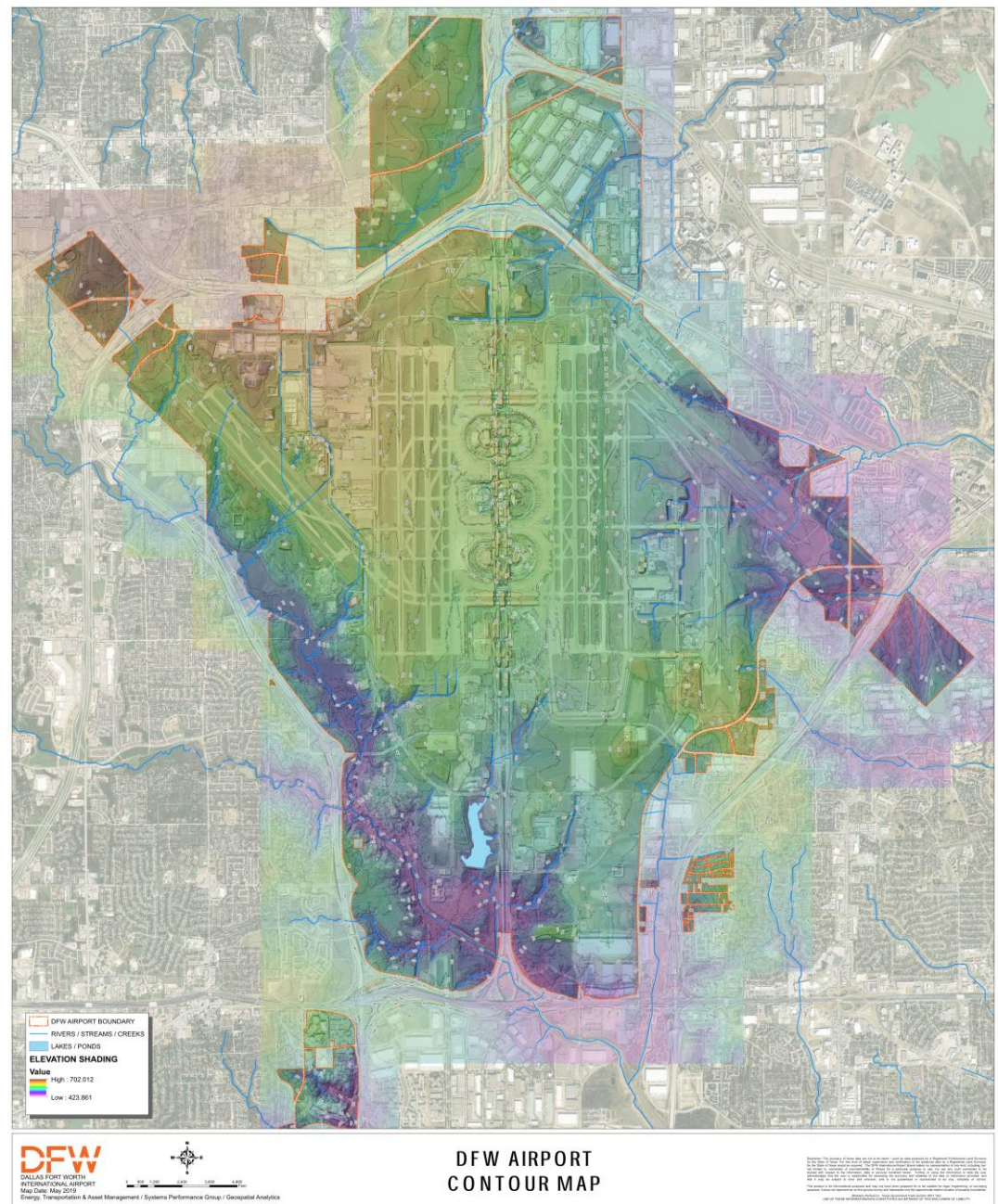
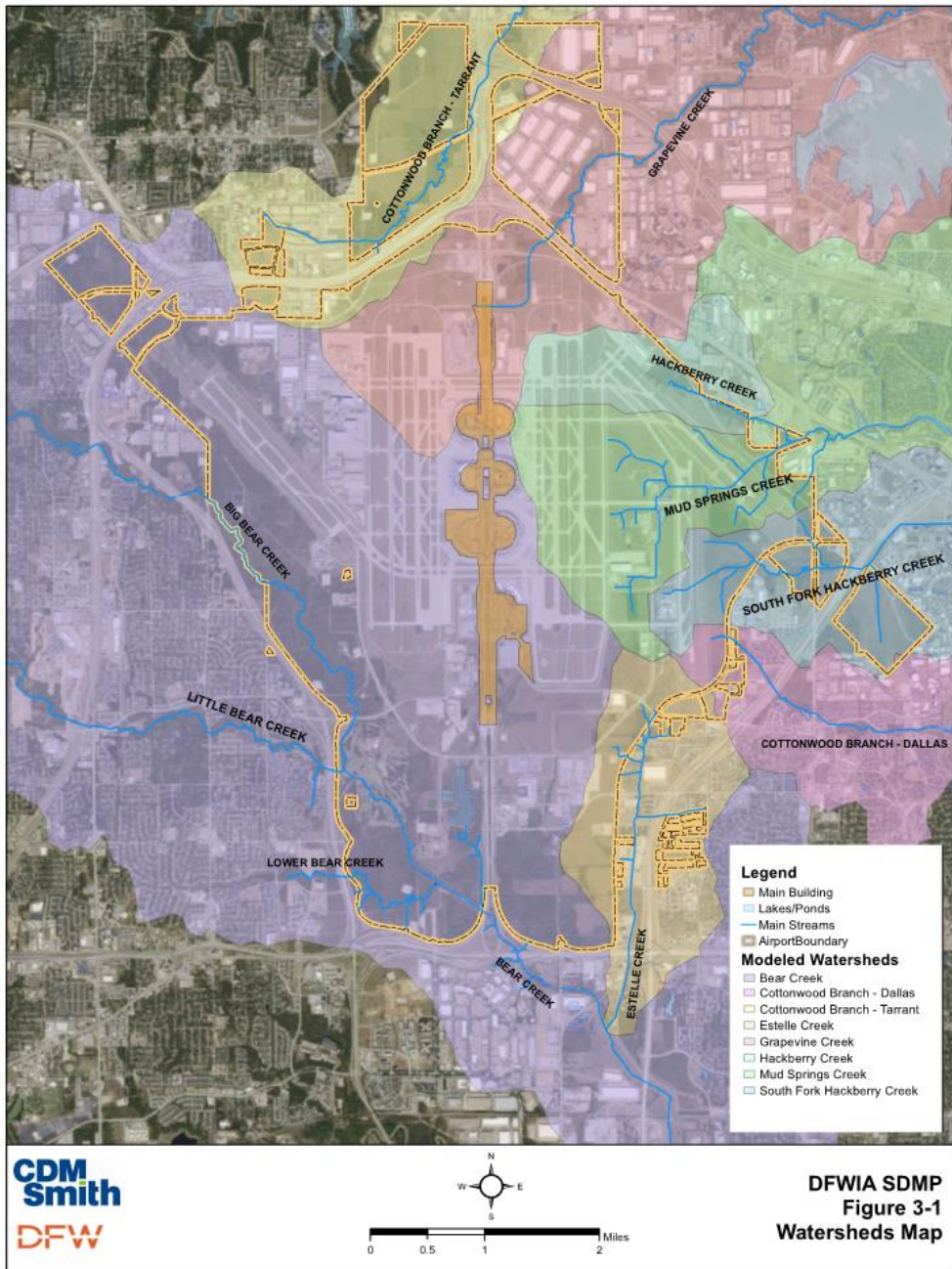
and The Stormwater System


DFW Airport Encompasses approximately 17,000+ Acres

- Developed – 2200 Acres
- Undeveloped – 3000 acres
- Situated in the City Limits of Coppell, Euless, Fort Worth, Grapevine and Irving
- Stormwater System
 - 8 Watersheds
 - 53 Miles of Streams
 - 85 Miles of Conveyance Pipe
 - 22 Miles of First Flush System Pipe
 - 58 Acre Trigg Lake
 - ~60% of area w/o drainage analysis¹

¹ 2010 DFW Hydrology Inventory & Gap Analysis Study









2. Stormwater Drainage Master Plan

2-Stormwater Drainage Master Plan

MS4 BMP No. 11 Commitment

Pollution Prevention/Good Housekeeping for Municipal Operations # 11	STORM WATER DRAINAGE MASTER PLAN		
RESPONSIBLE DEPARTMENTS ETAM, Planning Commercial Development Environmental Affairs	PROJECT DESCRIPTION: DFW Airport will work to develop a Storm Water Drainage Master Plan to identify and analyze existing drainage deficiencies, provide recommended drainage concepts for the construction of future facilities, and assist in selecting and prioritizing drainage improvement and management projects. The Storm Water Drainage Master Plan will address flood control, watershed management, conveyance deficiencies and maintenance, water quality, habitat protection, recreation, and ecosystem enhancements, while accommodating future development and land uses that will meet the overall sustainability principles of the Airport through the implementation of Low Impact Development and Green Infrastructure Strategies. 		
TARGET AUDIENCE X Board Employees Tenants Air Passengers Students Contractors Local Communities Vehicle Passengers Construction	OBJECTIVE: To work toward a more sustainable stormwater drainage and flood control system to improve public safety and preserve natural resources while supporting future growth.		
YEAR	ACTIVITY TO IMPLEMENT	MEASURABLE GOAL	
1	Begin preliminary meetings to establish specific goals and objectives of the Storm Water Drainage Master Plan	Document status of development	
2	Partnering meetings to develop the outline and content of the main sections of the Storm Water Drainage Master Plan	Draft outline with descriptions of objective and scope of main sections	
3	Begin development of the Storm Water Drainage Master Plan	75% completion of the Plan outline	
4	Conduct stakeholder review meetings of the draft Storm Water Drainage Master Plan	95% completion of the Plan outline	
5	Review by stakeholders and finalize Storm Water Drainage Master Plan	Publish on DFW Airport Website	

The 2014 MS4 Permit contained “Pollution Prevention/Good Housekeeping for Municipal Operations #11” committing DFW to develop a Stormwater Drainage Master Plan (SDMP) in five (5) years providing for the following:

- 1) Identify and analyze existing drainage deficiencies
- 2) Provide recommended drainage concepts for the construction of future facilities
- 3) Assist in selecting and prioritizing drainage improvements and management projects
- 4) Address the following:
 - a. Flood Control
 - b. Watershed Management
 - c. Conveyance deficiencies and maintenance
 - d. Water Quality
 - e. Habitat Protection
 - f. Recreation
 - g. Ecosystem Enhancements
- 5) Implement Low Impact Development (LID) and Green Stormwater Infrastructure (GSI) Strategies
 - a. Accommodate future development and land uses
 - b. Meet Sustainability principles of the Airport

2-Stormwater Drainage Master Plan

Scope of Work – Tasks and Deliverables (2017-2020)

Consultant Team

- Prime Consultant
 - CDM Smith
- Subconsultants
 - Huitt-Zollars
 - 2M Associates
 - Caye Cook & Associates
 - IEA
 - Lina T Ramey & Associates
 - Salcedo
 - Urban Watershed Research Institute

Scope of Services

- Drainage Model
 - Existing conditions drainage model for each watershed within airport property for the 1, 25 and 100 frequency storm events using EPA SWMM
- Stormwater Drainage Master Plan
 - Existing System Assessment
 - Flood and Erosion Prone Areas
 - Green Infrastructure Guidebook
 - Development Guidelines
- Stormwater Maintenance Program
 - Stormwater Improvement
 - O & M Program
 - O & M Processes



Stormwater Master Plan (PLAN)

Published December 2018

Section 1 – Introduction

- 1.1 Project Goals and Objectives
- 1.2 Facility Description
- 1.3 Plan Organization

Section 2 – Stormwater Compliance Overview

- 2.1 MS4 Program History
- 2.2 Stormwater Infrastructure System
 - 2.2.1 Primary Stormwater Management System
 - 2.2.2 First Flush System
- 2.3. DFWIA Stormwater Program
 - 2.3.1 Stormwater Quality Criteria
 - 2.3.2 Stormwater Monitoring and Sampling
 - 2.3.3 Illicit Discharge Monitoring
 - 2.3.4 Channel Inspections

Section 3 – Constraints, Strategies and Improvements

- 3.1 System Assessment
- 3.2 Climate Change
- 3.3 Improvement Strategies
- 3.4 Stormwater Master Plan Map

Section 4 – Stormwater Quantity Criteria

- 4.1 Flooding and Erosion
- 4.2 Existing Water Quantity Models
- 4.3 Development and Use of SWMM Models
- 4.4 Stormwater Flood Control and Quantity Criteria

Section 5 – Water Quality Criteria

- 5.1 Background on Regulations and Requirements
- 5.2 Existing Water Quality Features
- 5.3 Water Quality Modeling
- 5.4 Water Quality Control Criteria

Stormwater Maintenance Management Program (PROGRAM)

To be developed in 2020

Section 1 – Introduction

- 1.1 – Watershed Management

Section 2 – Inspection Program

- 2.1 – Channels and Streams
- 2.2 - Conveyance Culverts, Piping and Structures
- 2.3 – Stormwater Monitoring and Sampling
- 2.4 – Trigg Lake Dam

Section 3 – Green Stormwater Infrastructure

- 3.1 – Implementation, Operation and Maintenance
- 3.2 – Performance Testing

Section 3 – DCM Section 334 – Storm Drainage Utilities Update Management

Section 4 – Data and Model Files Management

Section 5 – Stormwater Master Plan Update Process

An aerial photograph of the Dallas/Fort Worth International Airport (DFW) terminal and its extensive highway interchange system. The terminal building is centrally located, surrounded by multiple levels of elevated roads and ramps. The surrounding landscape is flat and open, with some smaller buildings and parking areas visible in the distance. The sky is clear and bright.

3. DFW Airport Design Criteria Manual

3-DFW Criteria Manual

NEPA Environmental Categories

- Air Quality
- Biological resources
 - Threatened and Endangered Species
 - Magnuson-Stevens Act
 - Migratory Bird Treaty Act
- Climate**
- Department of Transportation Act, Section 4(f)
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, Architectural, Archaeological & Cultural Resources
- Land use
- Natural resources and energy supply
- Noise and compatible land use
- Socioeconomics, environmental justice, and children's environmental health and safety risks
- Visual effects (including light emissions)
- **Water Resources***
 - Wetlands
 - **Surface waters***
 - **Water quality***
 - Groundwater
- Cumulative Impacts

***STORMWATER MANAGEMENT**

3-DFW Design Criteria Manual

NEPA Stormwater Management

Effective Date: June 2, 2017

ARP SOP No. 5.1

APPENDIX A. DOCUMENTED CATEX

Airport sponsors may use this form for projects eligible for a categorical exclusion (CATEX) that have greater potential for extraordinary circumstances or that otherwise require additional documentation, as described in the Environmental Orders (FAA Order 1050.1F and FAA Order 5050.4B).

To request a CATEX determination from the FAA, the sponsor should review potentially affected environmental resources, review the requirements of the applicable special purpose laws, and consult with the Airports District Office or Regional Airports Division Office staff about the type of information needed. The form and supporting documentation should be completed in accordance with the provisions of FAA Order 5050.4B, paragraph 302b, and submitted to the appropriate FAA Airports District/Division Office. The CATEX cannot be approved until all information/documentation is received and all requirements have been fulfilled.

Name of Airport, LOC ID, and location:

Dallas/Ft. Worth International Airport, DFW, Dallas/Ft. Worth, Texas

Project Title:

DFW Airport Department of Public Safety Headquarters

Give a brief, but complete description of the proposed project, including all project components, justification, estimated start date, and duration of the project. Include connected actions necessary to implement the proposed project (including but not limited to moving NAVAIDS, change in flight procedures, haul routes, new material or expanded material sources, staging or disposal areas). Attach a sketch or plan of the proposed project. Photos can also be helpful.

The Dallas Fort Worth International Airport is proposing to design and build a new Department of Public Safety Headquarters (DPS HQ). The proposed project will be located on a 17-acre parcel within the southwest quadrant of DFW airport, near the corner of West Airfield Drive and 20th Avenue. [Refer to Figure 1: Project Location Map] The proposed DPS HQ project will include:

- Construction of a two-story ~130,000 square foot (sq ft.) building;
- Construction of surface and structured parking, access roadways on 20th Avenue and East Airfield Drive;
- Demolition of obsolete utility connections within the proposed project area;
- Removal of DFW perimeter (non-AOA) fence surrounding the proposed project area;
- Installation of utilities and communications infrastructure within the utility corridor;
- Construction of a detention pond and other required stormwater management infrastructure;
- Installation of lighting and other associated site improvements and landscaping in compliance with the DFW Design Criteria Manual.
- Removal of approximately 2,000 linear feet of the 16 inch polyvinyl chloride (PVC) produced water pipeline and 2,000 linear feet of the 24 inch steel natural gas pipeline that is located within the footprint of the proposed DPS HQ facility access. The removal of the pipeline is to

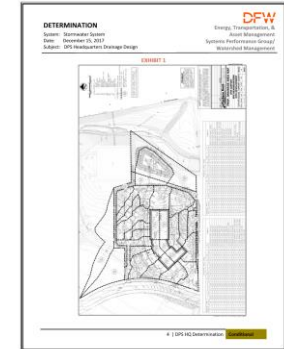
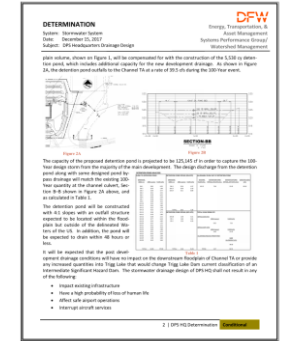
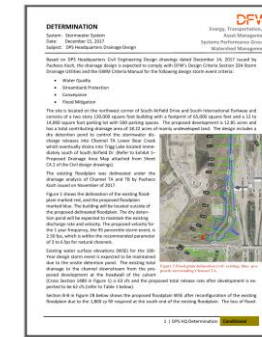
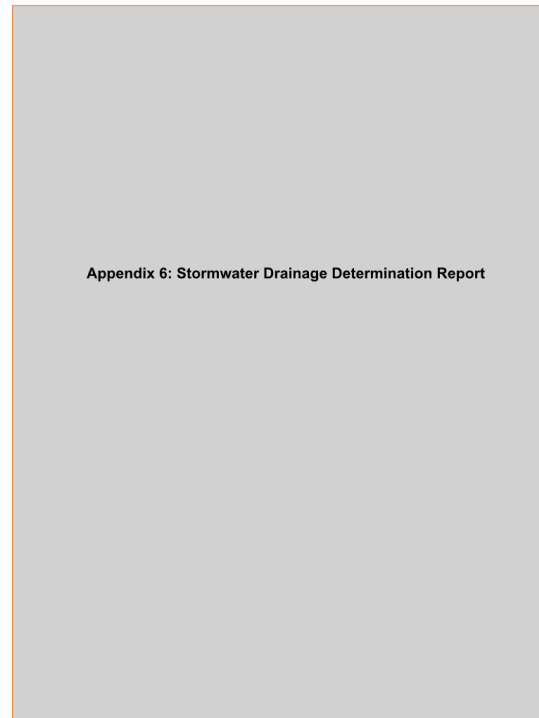
A-1

ARP SOP No. 5.1

Effective Date: June 2, 2017

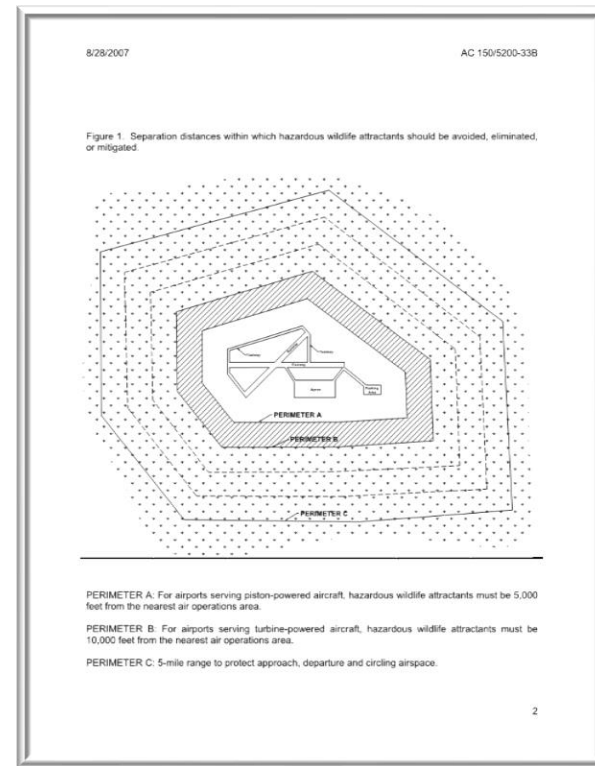
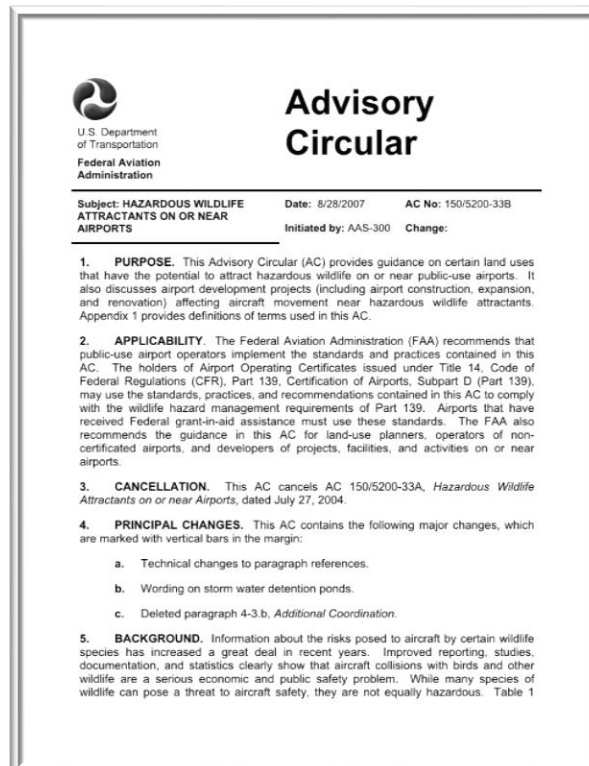
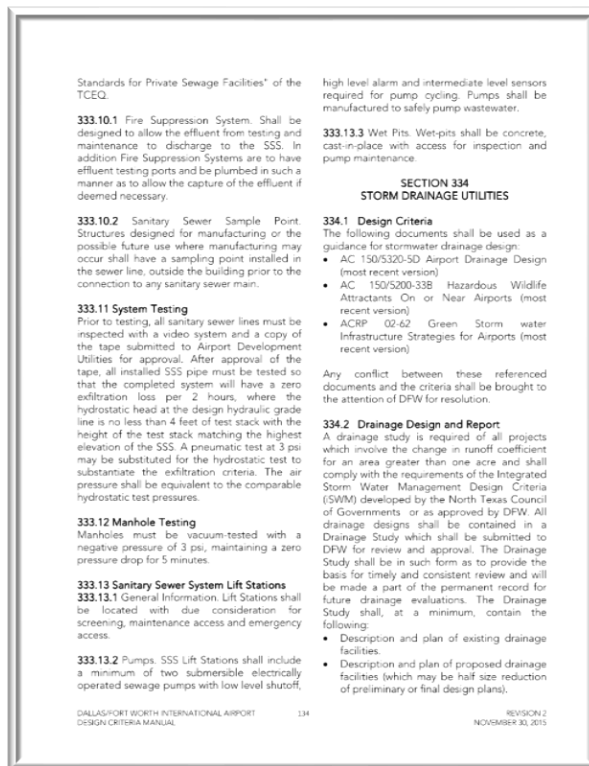
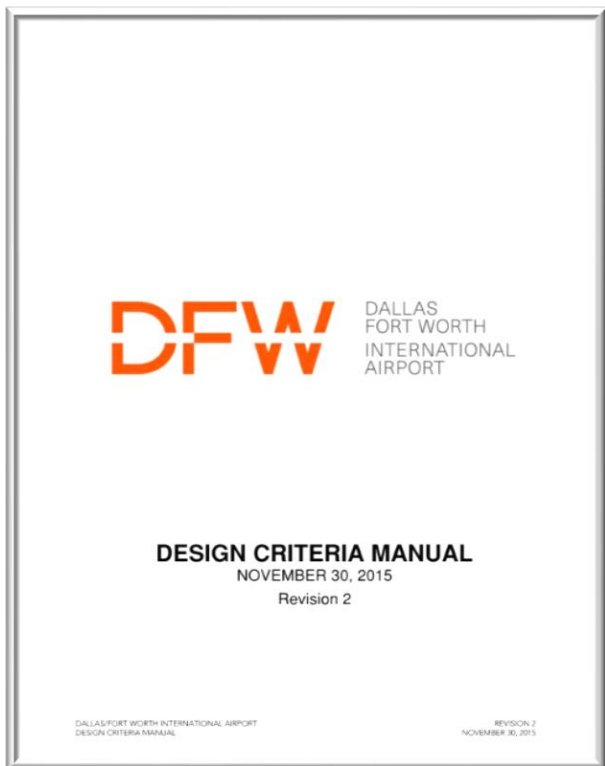
	YES	NO
<p>Will the project impact any of the identified water resources either during construction or operations? Describe any steps that will be taken to protect water resources during and after construction.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>There are no water resources within the project area. The proposed project is required to submit a Notice of Intent (NOI) application for a TCEQ TPDES Construction General Permit TXR150000. The project will comply with the Texas Pollutant Discharge Elimination System (TPDES) permit through the implementation of a Storm Water Pollution Prevention Plan (SWP3) and notification of the Municipal Separate Storm Sewer System (MS4) Operator. DFW Airport will ensure implementation of adequate erosion and sediment control measures to protect water quality. This project will comply with all TPDES permit requirements for stormwater discharges associated with construction activities.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Will the project increase the amount or rate of stormwater runoff either during construction or during operations? Describe any steps that will be taken to ensure it will not impact water quality.</p> <p>The project will not increase the rate of stormwater runoff. The project's stormwater management structures were designed to ensure that post-development runoff rates match pre-development stormwater runoff rates, in conformance with DFW Airport Design Criteria Manual. The DPS HQ's stormwater runoff will be discharged through collection inlets, underground storm drainage pipes, as well as a detention pond. The detention pond will be designed, built, and maintained in ways that avoid or minimize wildlife attractant attributes, in conformance with the requirements of FAA AC 150/5200-33B "Hazardous Wildlife Attractants on or Near Airports." The storm water conveyance systems have been strategically designed to ensure that post development runoff rates will have no effect on the water surface elevation of the nearby unnamed tributary, located to the east of the project site. [Refer to Appendix 6: Stormwater Drainage Determination Report].</p> <p>To protect water quality, the proposed project will comply with all requirements outlined in the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit (CGP). Appropriate temporary structural controls and best management practices (BMPs) will be installed during construction; erosion and sediment control measures will be implemented as specified in the Storm Water Pollution Prevention Plan (SWP3). The proposed project will not impact water quality. In the event that off-site sediment accumulation is observed, the sediment will be removed at a frequency sufficient to minimize adverse impacts to water quality.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<p>Does the project have the potential to violate federal, state, tribal or local water quality standards established under the Clean Water and Safe Drinking Water Acts?</p> <p>The project does not have the potential to violate federal, state, tribal or local water quality standards established.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

A-14



3-DFW Design Criteria Manual

And Advisory Circular Requirements



Criteria Snapshot:

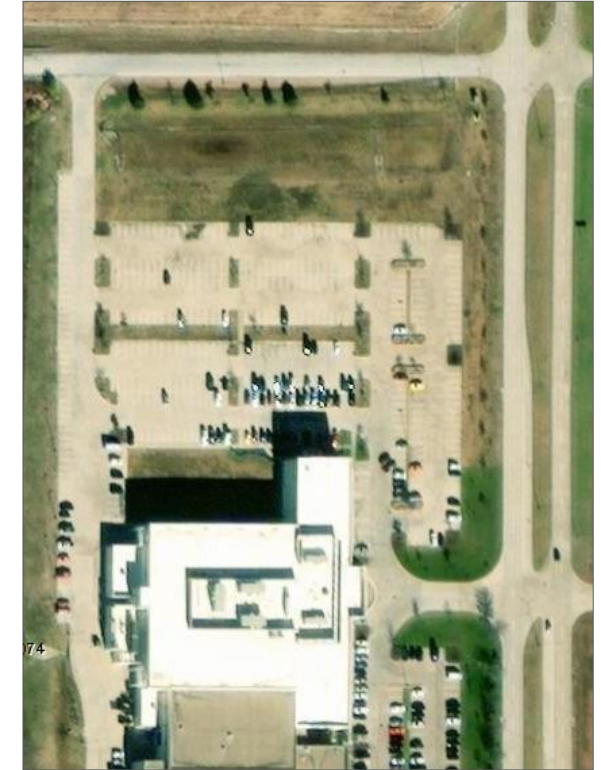
- Manage 100-Year Design Storm Event and drain within 24 hours of end of storm event
- Surface detention must have filtration media for first flush
- Underground detention must treat for fuel, oil and grease residue and suspended solids.

- Discharge velocity 6 to 7 fps or less (4 fps preferred)
- 0.25 Inches for First Flush treatment
- 25-foot Buffer from Floodplain delineation
- No vegetation clearing within 25-foot buffer and floodplain

4. LID/GSI at DFW Airport

4.LID/GSI at DFW

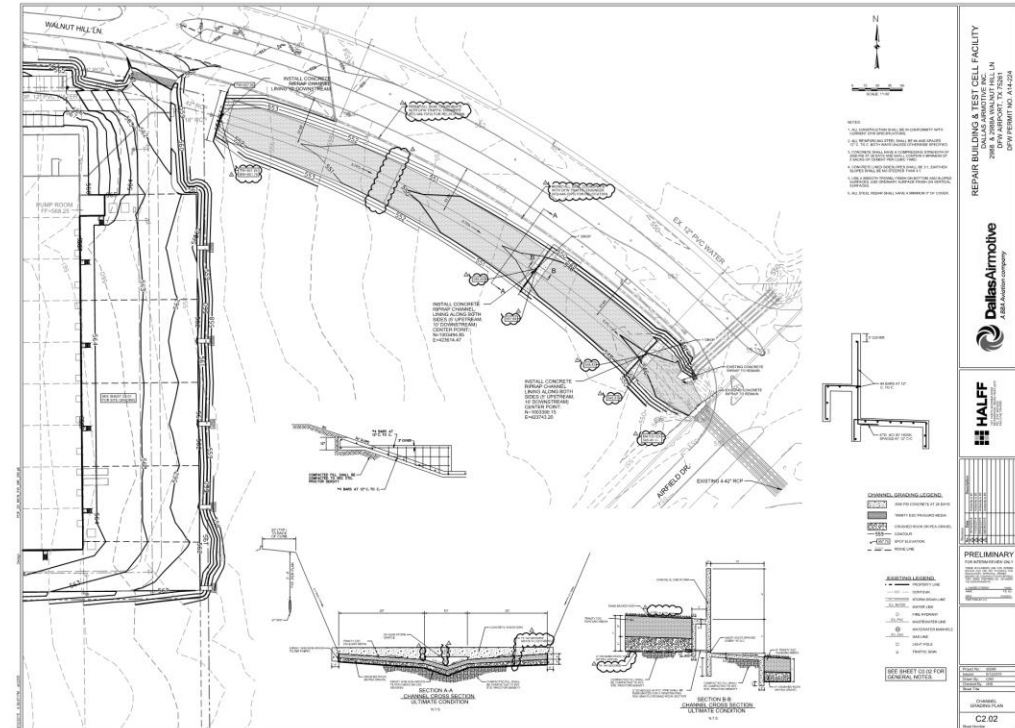
FLIGHT SAFETY (2009)



- 100-Year Design Storm Event Dry Detention
- Stormwater treatment unit for water quality for the 1-Year Design Storm Event

4-LID/GSI at DFW

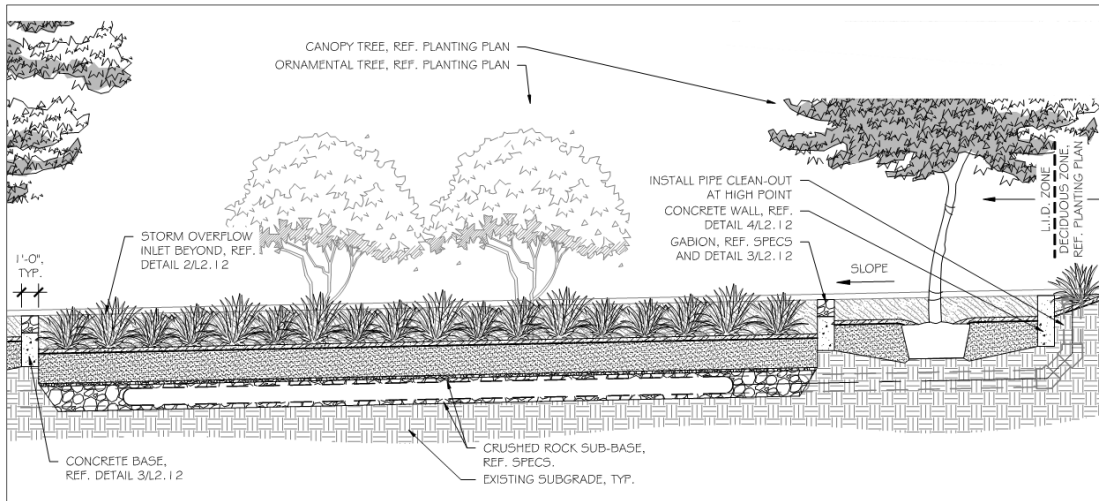
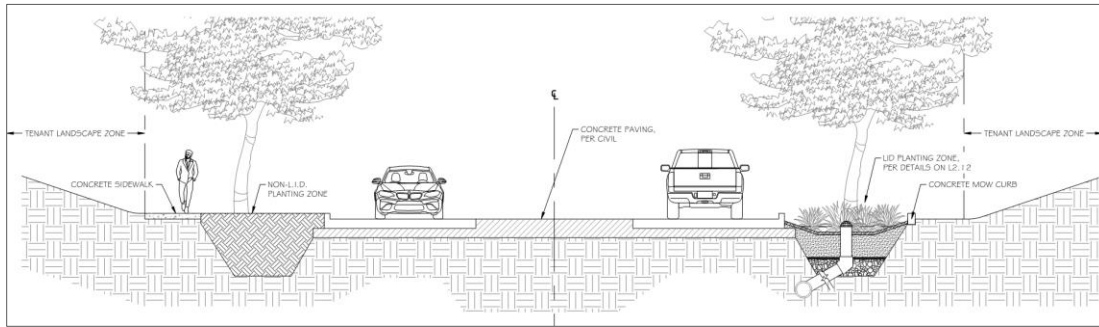
DALLAS AIRMOTIVE (2015)



- 800-foot Infiltration trench that includes a porous media for water quality, approximately 35,000 cf
- Includes two (2) weirs to manage the 25-Year Design Storm Event
- Weirs also reduce the quantity to match the 100-Year Design Storm Event (approximately 90,000 cf of storage) at existing downstream culvert and reduce velocities.

4-LID/GSI at DFW

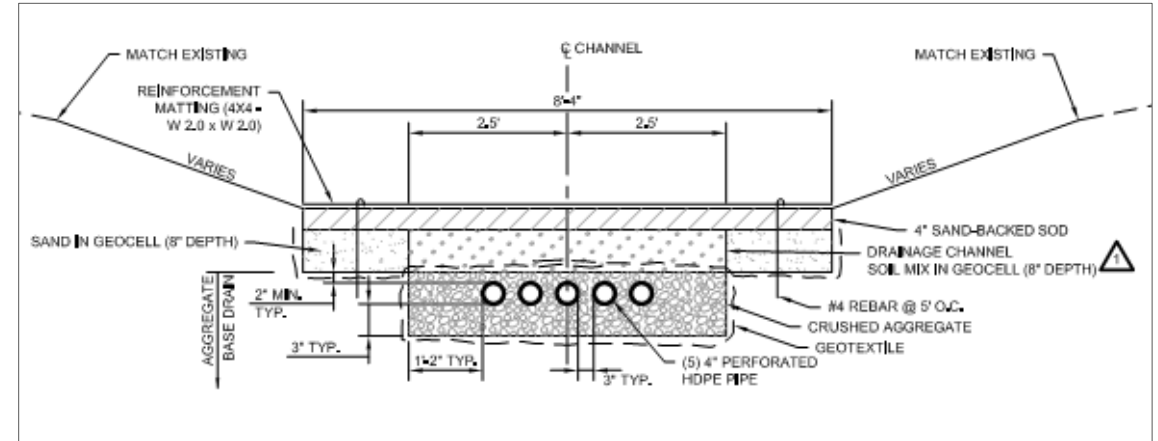
PASSPORT AVENUE (2017)



- Bioswale that includes native plants and trees
- Collects runoff from Passport Avenue (4 lane road with median)
- Cleans outs and overflow included in the design for the underdrains

4-LID/GSI at DFW

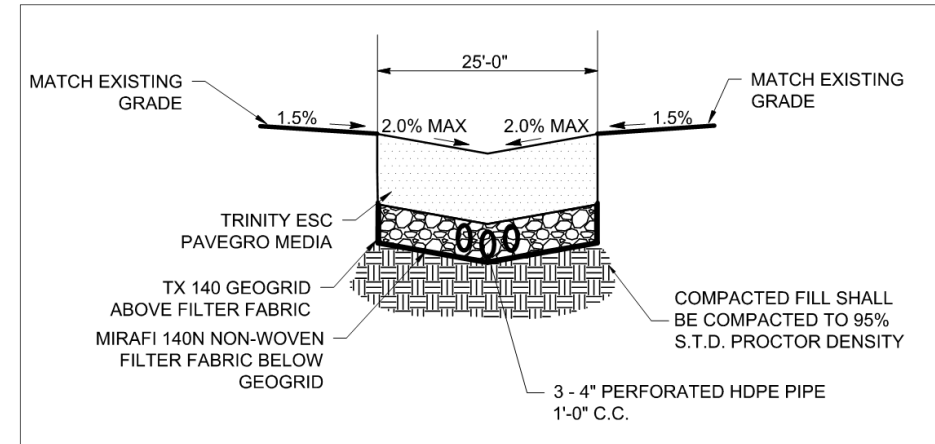
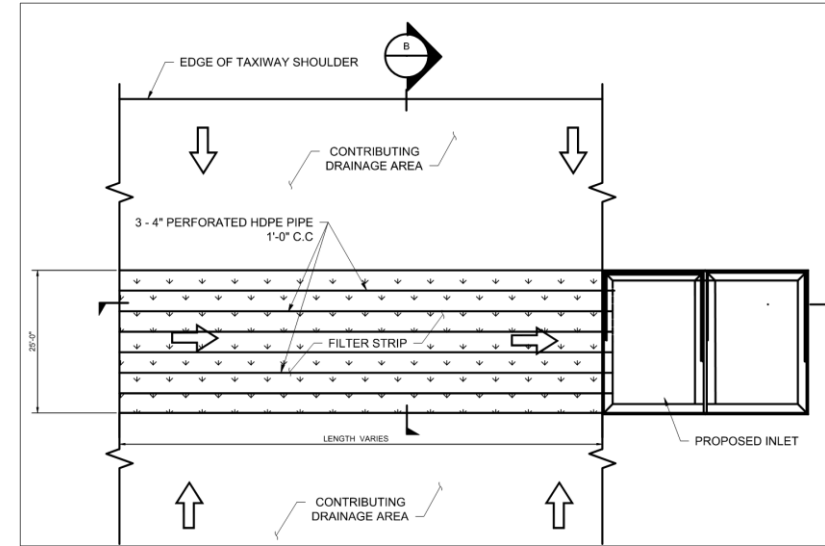
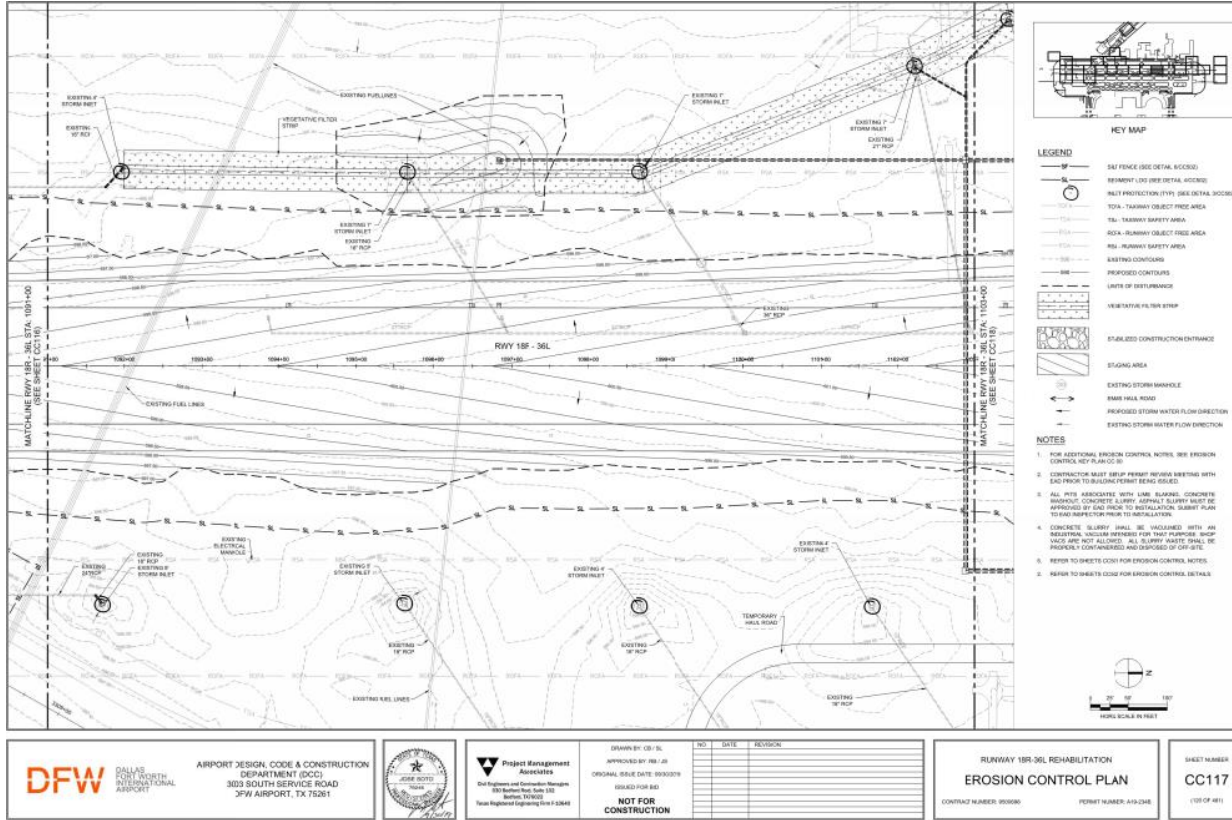
EAST CARGO CHANNEL (2019)



- 2000-foot Infiltration trench that includes porous layers for water quality
- Located inside the Airfield (East Cargo Ramp) upstream from Hackberry Creek
- Cleans outs included in the design for the underdrains

4-LID/GSI at DFW

FILTER STRIPS NEAR TAXIWAYS (2019)



- Infiltration strip that includes porous layers for water quality
- Located inside the Airfield and next to the Taxiways
- Cleans outs included in the design for the underdrains connected to storm drain inlets.



5. Water Quality, LID/GSI Performance and Flood Control

5-Water Quality, LID/GSI Performance and Flood Control

Research Project with UTA (2020-2025)

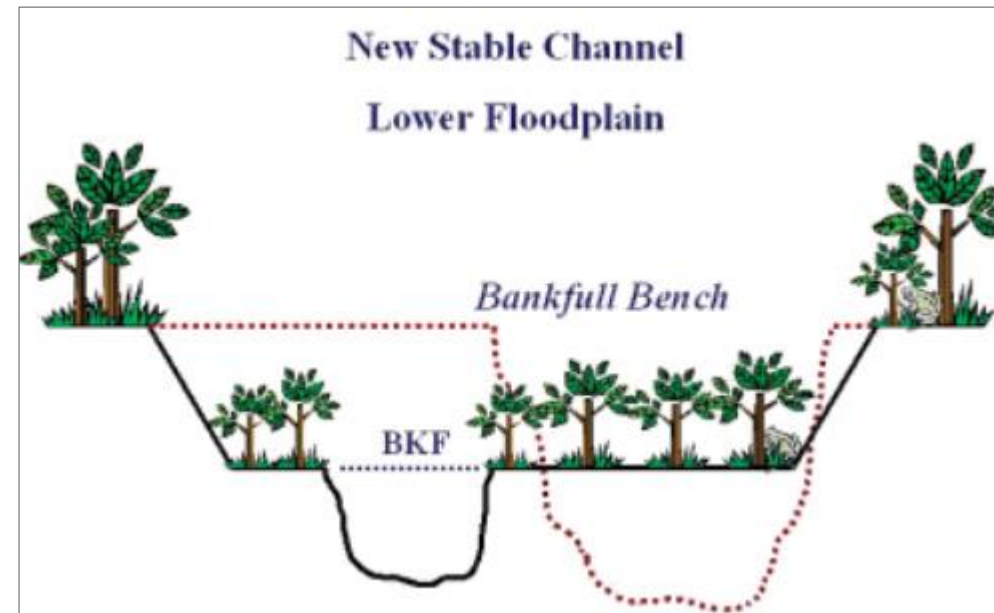
- Monitor, analyze and evaluate the First Flush Stormwater System
- Develop Nowcasting Toolkit to schedule anti-icing for runways and taxiways
- Monitor quality and quantity of stormwater BMPs
- Perform downstream assessment
- Evaluate erosion areas and develop conceptual restoration designs
- Develop an Advance Flood Warning System

5-Water Quality, LID/GSI Performance and Flood Control



Channel Restoration

- 1) Identify and document open channel deficiencies
- 2) Develop conceptual design for restoration

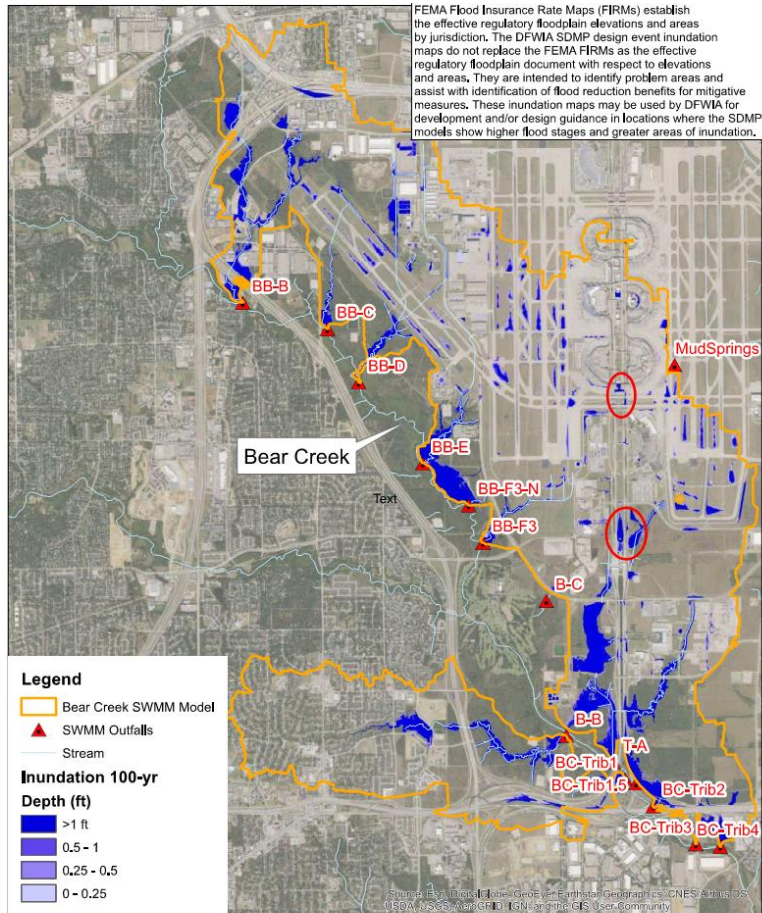


Source: Exhibit from "Stream Restoration – A Natural Channel Design Handbook" NC State University

5-Water Quality, LID/GSI Performance and Flood Control

MS4 BMP No. 11 Commitment

- 1) Identify, document and address drainage deficiencies
- 2) Implement Low Impact Development (LID)/Green Stormwater Infrastructure (GSI) Strategies on all new developments:
 - a. Mimic pre-development hydrologic regime
 - b. Detain to manage runoff to existing drainage conditions
- 3) Design and develop a centralized web-based Flood Warning System to monitor select critical locations in the Airside and Landside



Thank You