



Design and Construction of a Flow Equalization Basin to Optimize Performance of Everglades Stormwater Treatment Areas



April 22, 2015

Background



- 57,000 Acres of STA Built and Operational in 2010
 - Treatment for Total Phosphorus Loading (TPL) Urban and Agricultural Areas
 - TPL Reduction – 170ppb to as low as 12ppb
- Stormwater Runoff (Pulse Flows) Reduce Water Treatment Effectiveness
 - Reduced Treatment Time
 - Soil Degradation
 - Damage to Vegetation

Restoration Strategies



- 2012 SFWMD Started Implementing Restoration Strategies Program
 - Optimize Existing Water Quality Infrastructure
 - Suite of Additional Water Quality Projects
 - Address Pulse Flow Issues and Reduce TPL to 10ppb

- Plan Included 6 Projects
 - 6,500 Acres of STA Expansion
 - 120,000 Acre-Feet of Additional Water Storage
 - Flow Equalization Basins (FEB)

Restoration Strategies



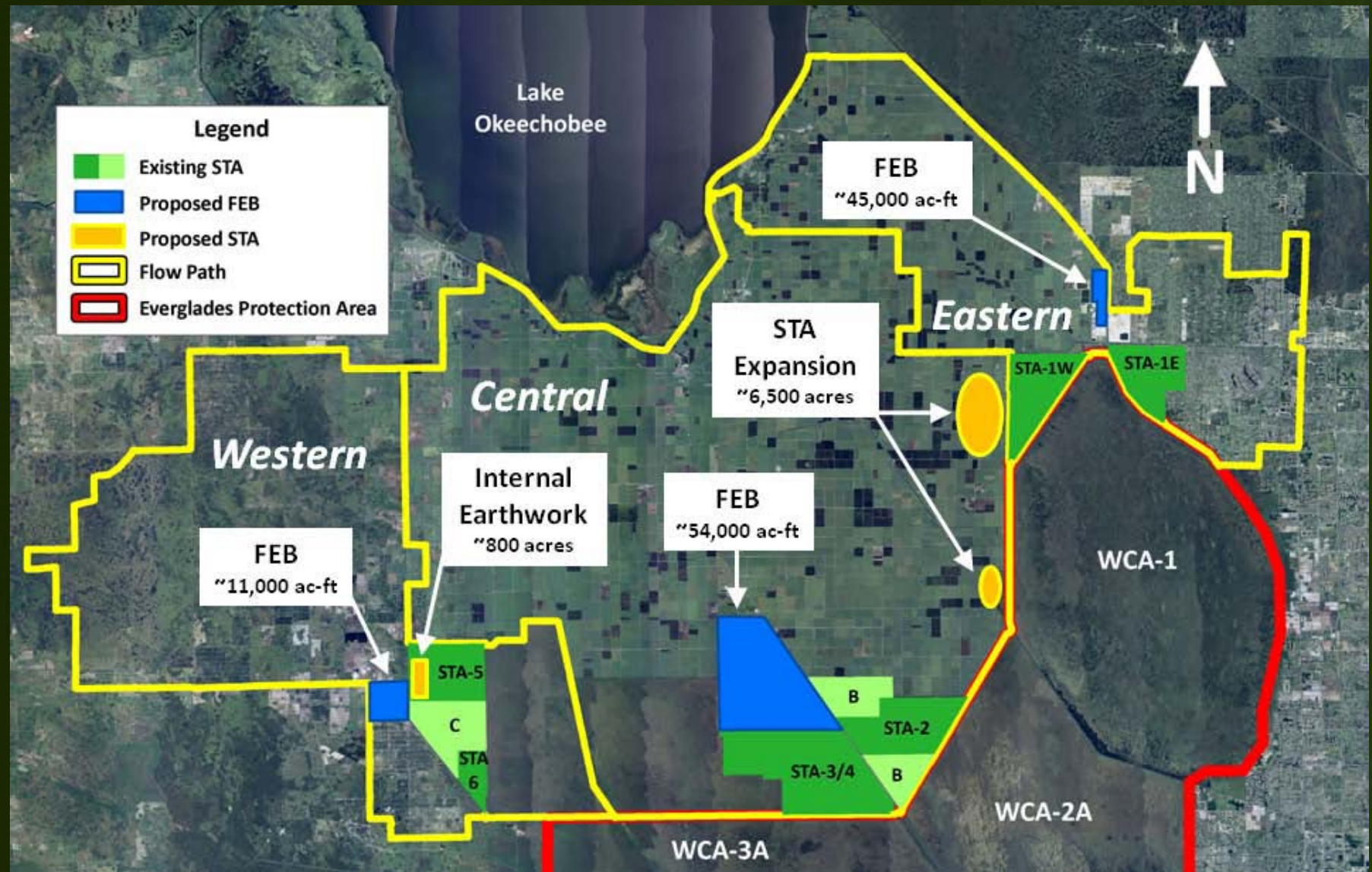
➤ FEB Attenuation of Pulse Flows

- Optimized Hydropatterns
- Reduced Flow Volumes/Velocities
- Lower Peak TP Loading Rates
- Reduced STA Expansion

➤ STA Optimization

- Cost Effective
- Environmentally Preferable
- Key Objective

System Layout



EAA A-1 FEB Objectives



- Support STA-3/4 and STA 2/Compartment B
 - Provide Flow Equalization
 - Reduce Peak Loading
 - Prevent STA Damage

- Support the Long-Term 10 ppb TPL Objective
 - Achieve Greater Periods of Treatment Time
 - Increasing the Treatment Performance

- Provide Additional Operational Flexibility

Design Considerations



➤ Historical Inflows

- Canal Flows from S-2, S-7, and S-8 Water Basins
- Stormwater Runoff from Central Flow Path
- Direct Precipitation

➤ Predicted Outflows

- Evapotranspiration
- Seepage
- STA Releases

Design Considerations



- Existing Infrastructure
 - Pump Stations G-370, G-372, G-434, G-435
 - Water Control Structure G-373
 - Power Supply
 - Hwy 27
 - Adjacent Farmland and Holey Land
- Negative Impacts to WQ
- Future Vegetative Conditions

Value Engineering



- Utilization of Previous Construction
 - Existing Scraped Area
 - Existing Seepage Canal
 - Existing Agricultural Canals
- Utilization of Existing Materials
 - Seepage Canal Excavation Stockpiles
 - Sorted/Processed Material Stockpiles
- Solar Powered Gates
- Future Vegetative Conditions



FEB Overview

- 13,500 Acres of Storage
- 54,000 Acre-Feet Temporary Storage
- Uniform North-South Flow
- 2 Inflow Structures
- 11 Outflow Structures
- 2 Bypass Structures
- 13 Miles of New Perimeter Levee
- 7 Miles of New Above Ground Inflow Channels





INFLOW OPERATIONS

Inflow from G-372

- 2,775 cfs to G-720
- 925 cfs to STA-3/4

Inflow from G-370

- 1,850 cfs to G-721
- 925 cfs to STA-3/4

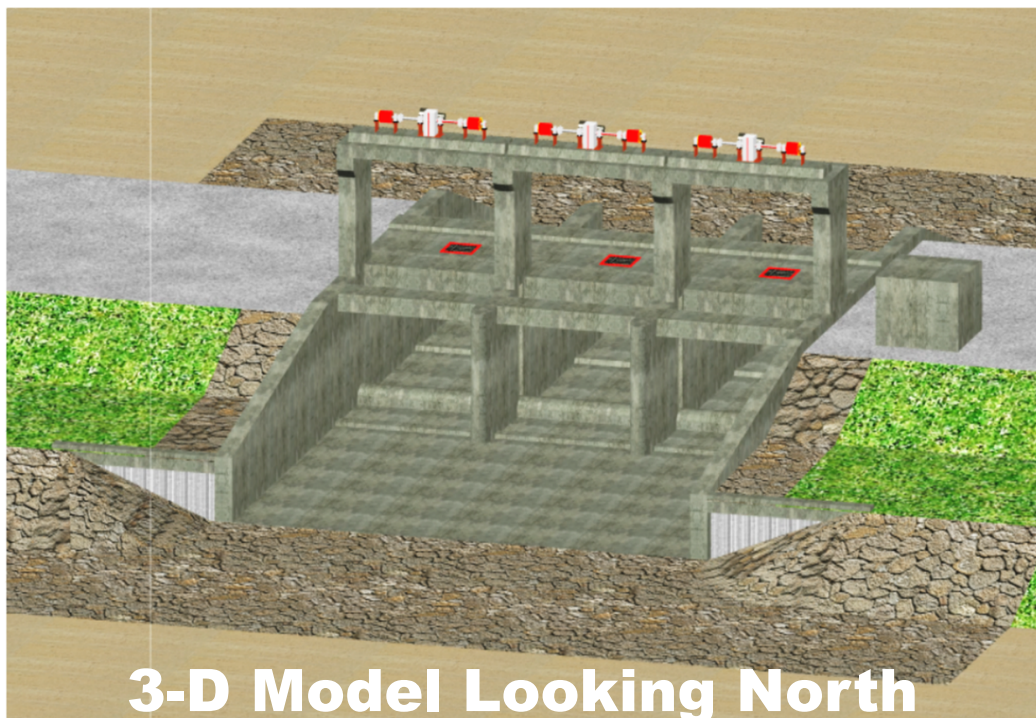


TuFlow Model

WATER CONTROL STRUCTURE G-720



- 3-Bay Reinforced Concrete Gated Spillway
- 11' x 20' Vertical Lift Roller Gates



- Remote Telemetry SCADA Control
- Commercial Electric Power
- Portable Backup Generator

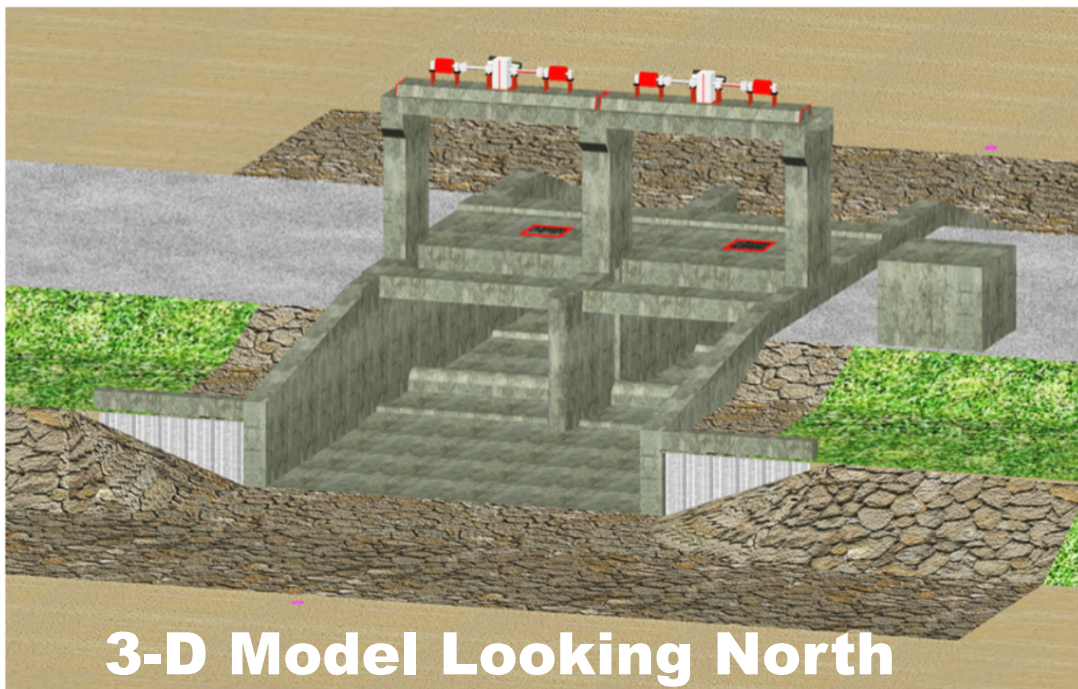
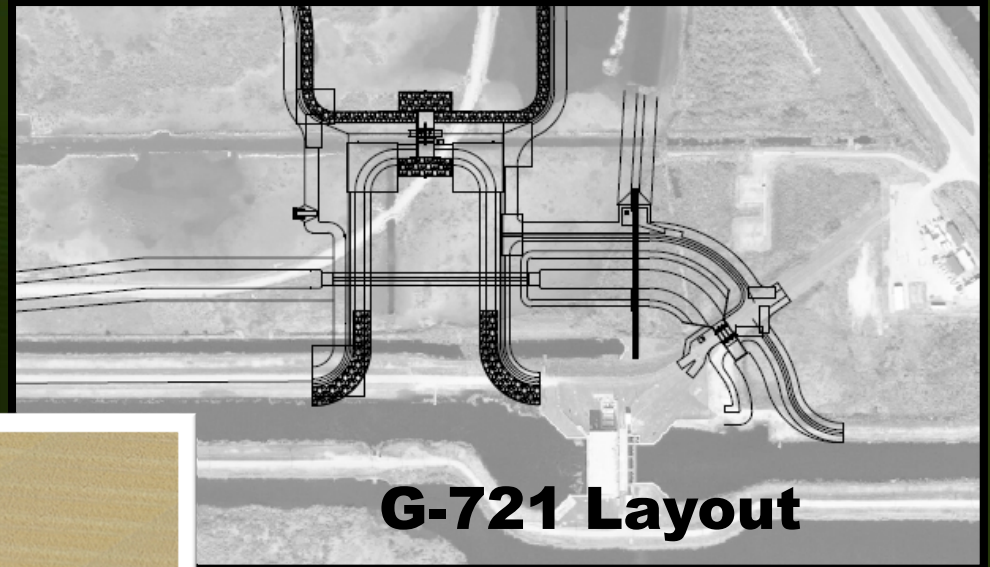
WATER CONTROL STRUCTURE G-720



WATER CONTROL STRUCTURE G-721



- 2 - Bay Reinforced Concrete Gate Spillway
- 10' x 20' Vertical Lift Roller Gate



- Remote Telemetry SCADA Control
- Commercial Electric Power
- Backup Power Supplied from G-370

WATER CONTROL STRUCTURE G-721





OUTFLOW OPERATIONS

G-722W and G-722

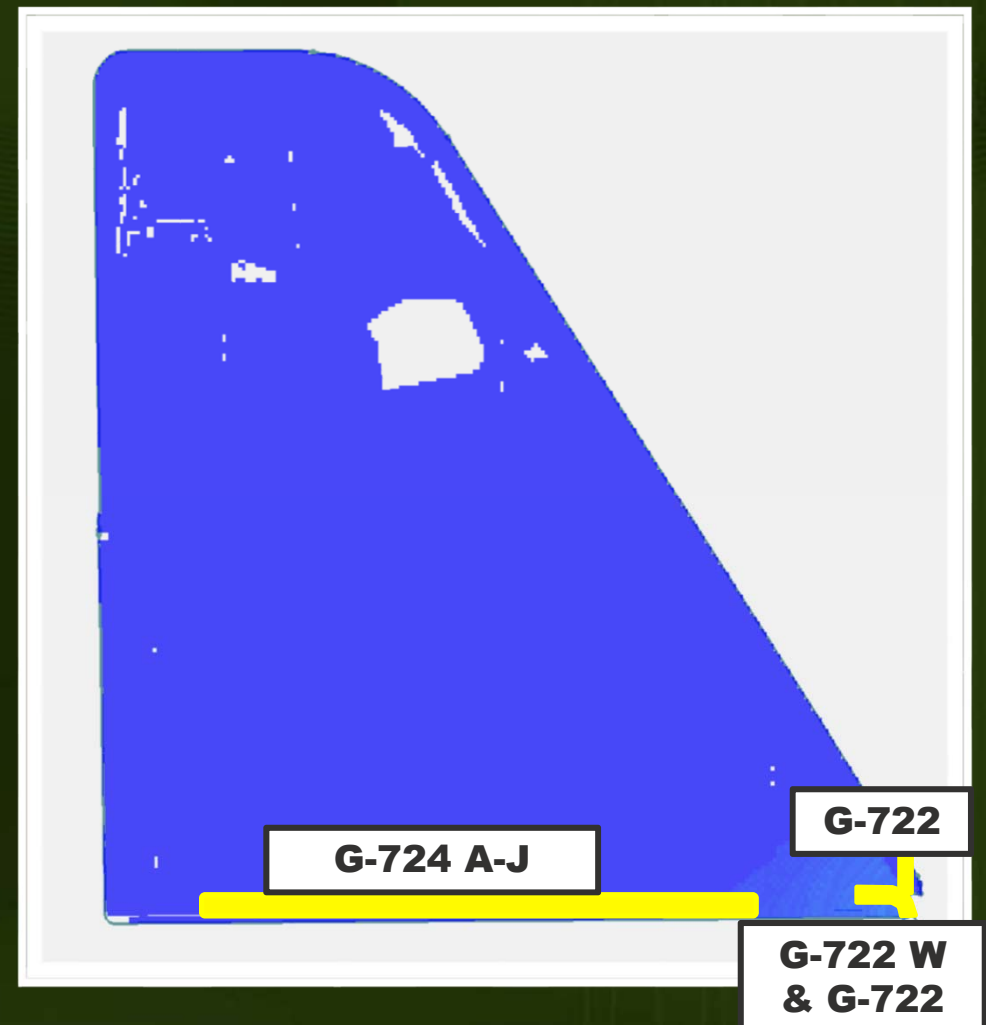
- G-722W – Bypass G-721 Inflow Channel
- G-722 – Release to NNRC.
- Max Outflow = 2,000 cfs

G-723

- Outflow Canal Bypass Seepage Collection
- Outflow Canal Low Flows
- Max Outflow = 225 cfs

G-724 (A-J)

- Gravity Flow Discharge to STA-3/4 Inflow Canal
- Max Outflow = 2,000 cfs



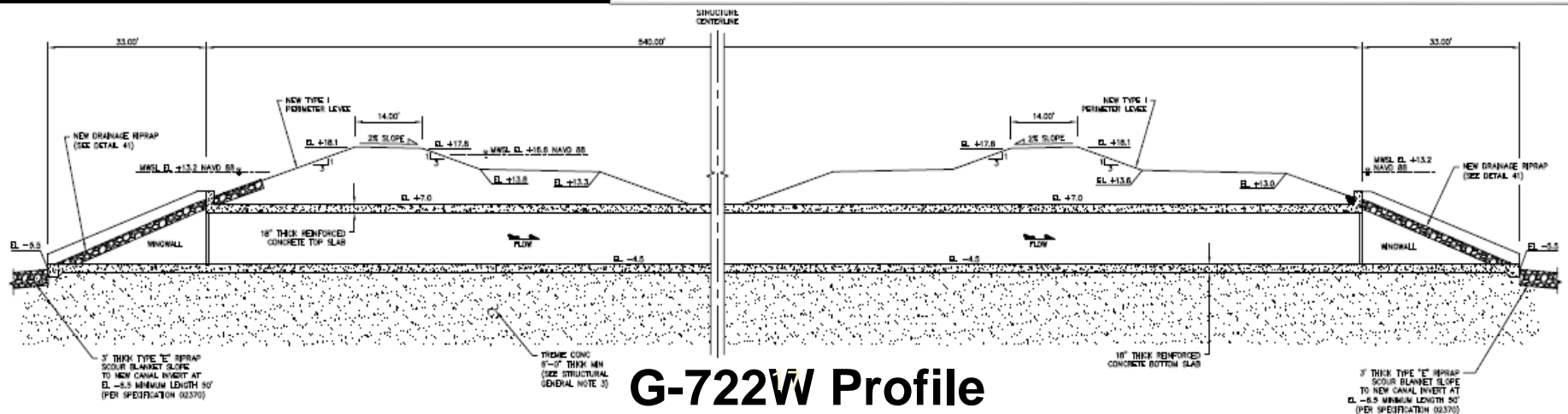
TuFlow Model

WATER CONTROL STRUCTURE – G-722W



- 3 - Barrel Reinforced Concrete Box Culvert
- 10' x 10' x 600'
- Non-gated Culvert Structure

3-D Model Looking Northwest



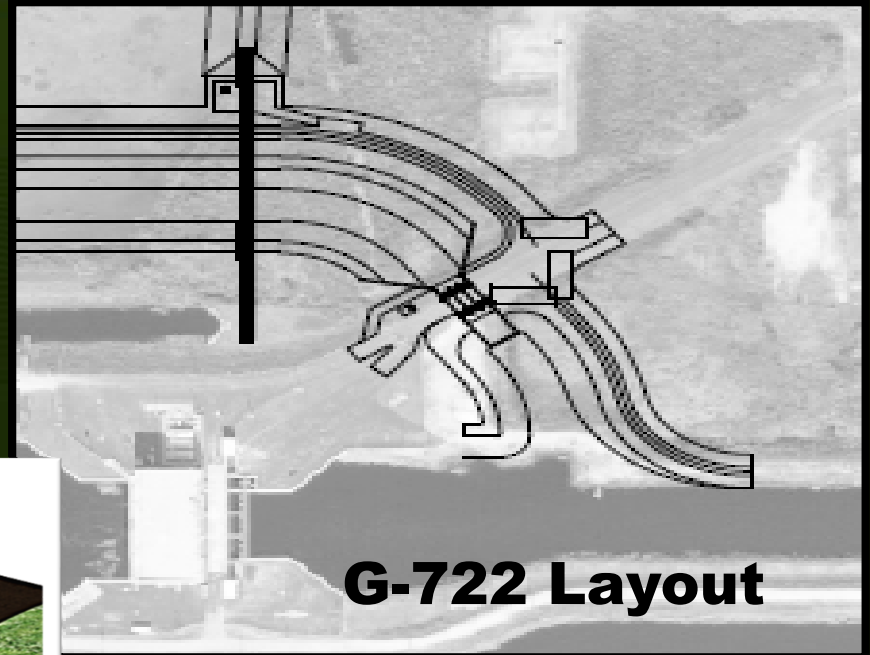
WATER CONTROL STRUCTURE G-722W



WATER CONTROL STRUCTURE G-722

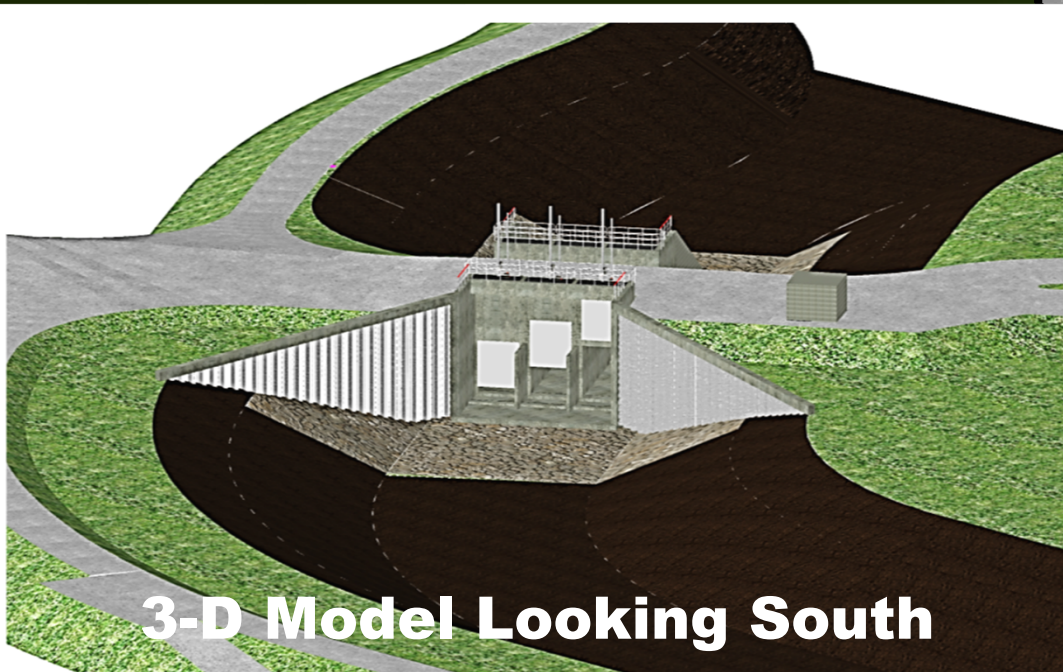


- 3 - Barrel Reinforced Concrete Gate Culvert
- 10 Feet Tall; 10 Feet Wide; 31 Feet Long
- Stem Operated Vertical Lift Slide Gates



G-722 Layout

- Remote Telemetry SCADA Control
- Commercial Electric Power
- Backup Power Supplied from G-370



3-D Model Looking South

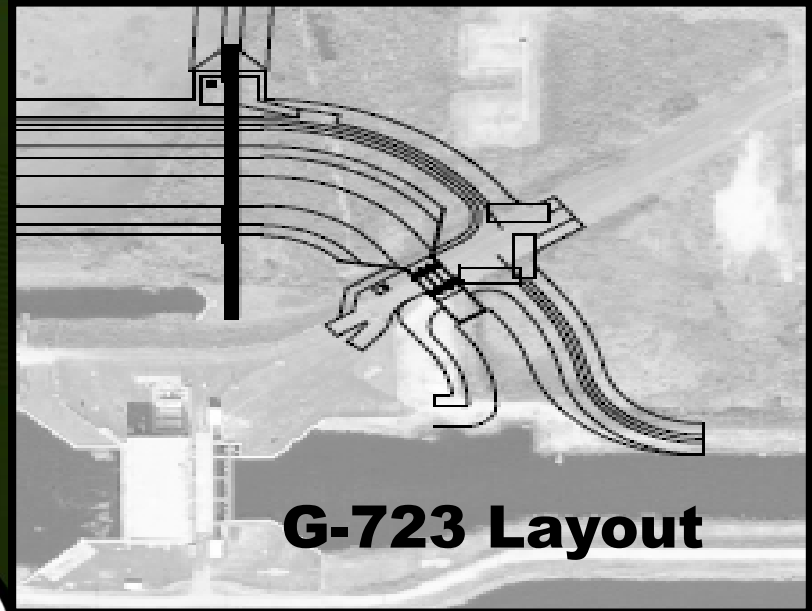
WATER CONTROL STRUCTURE G-722



WATER CONTROL STRUCTURE G-723 N & S

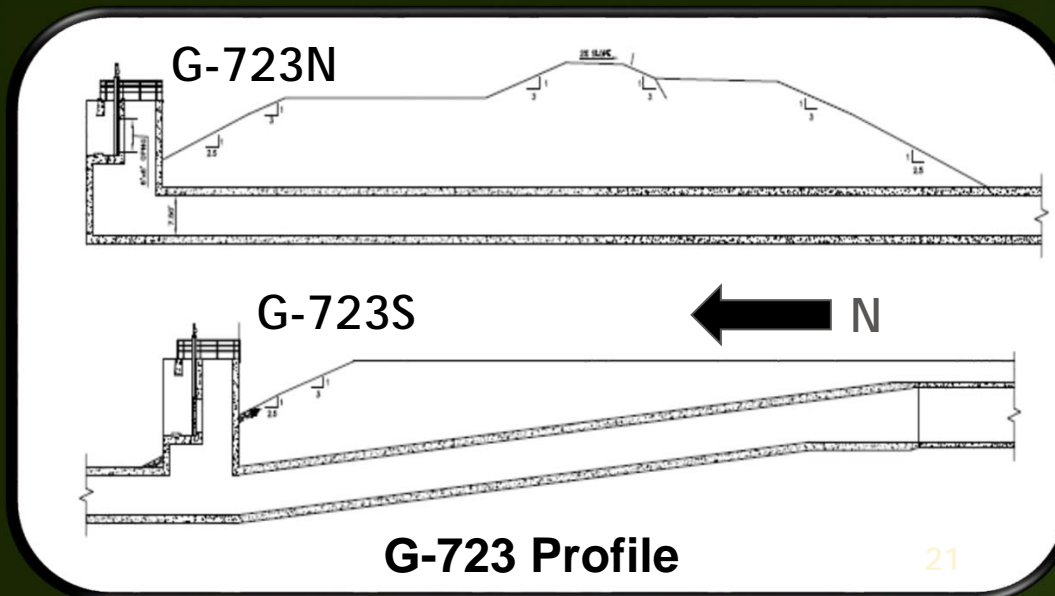


- Single Barrel Reinforced Concrete Gate Culvert
- 7.5' x 7.5' x 460'
- 2 - Stem Operated Vertical Lift Slide Gates



G-723 Layout

- Remote Telemetry SCADA Control
- Commercial Electric Power
- Backup Power Supplied from G-370



G-723 Profile

WATER CONTROL STRUCTURE G-723 N & S



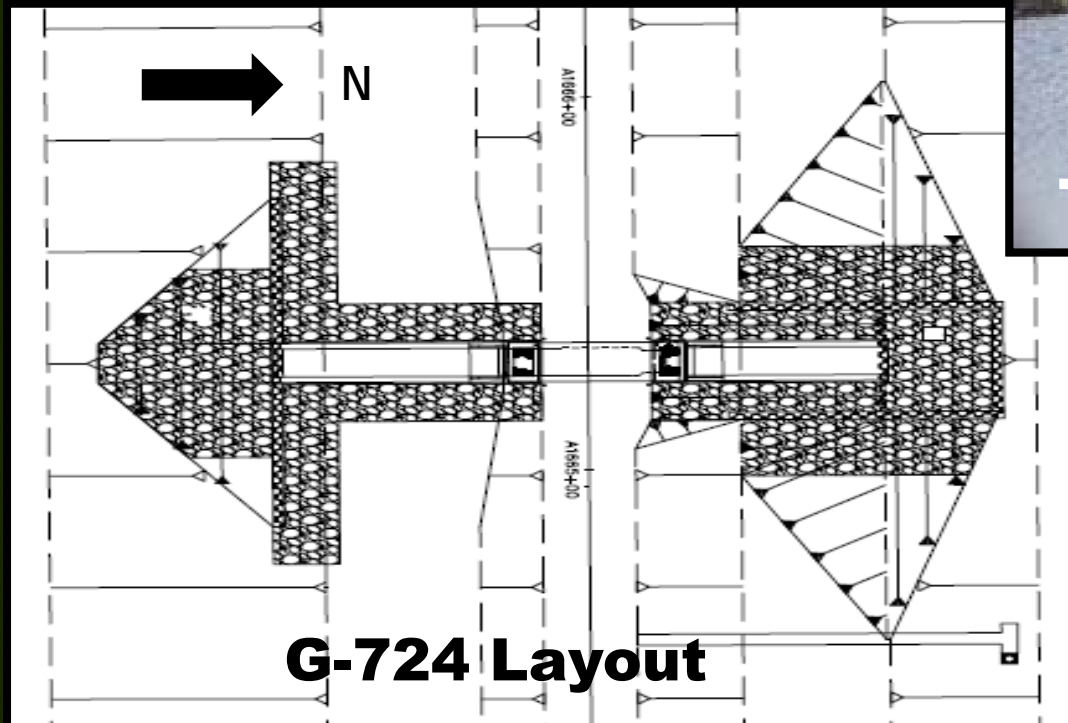
WATER CONTROL STRUCTURE 724A-J



- 1 - Barrel Reinforced Concrete Gate Culvert
- 6' x 6' Rubicon Vertical Lift Aluminum Slide Gates



Typical Stem Slide Gate



- Remote Telemetry SCADA Control
- Solar Charged Battery Power
- Manual or Portable Generator Backup

WATER CONTROL STRUCTURE - 724 (A-J)



Anticipated Impact



	<u>DRY YEAR -</u> <u>2007</u>	<u>WET YEAR -</u> <u>2008</u>
UNITS	Acre-ft	Acre-ft
Total Volume Captured by FEB/STA-3/4 System	158,075	472,577
Total Volume of Diversions	0	33,848
Net Inflow to FEB (G-720 and G-721)	38,000	133,204
Total Outflow through G-722	24,606	90,767
Total outflows through G-724 (A-J)	0	20,275

Note: -Modeling based on inflows to STA-3/4 at 1,000cfs below and 2,000cfs above a NFSL of 1 feet NAVD 88.
 -Results provided by NOVA Consulting.

Anticipated Impact



DRY YEAR – 2007

- Modeled FEB Attenuated 24% of all Miami and NNR Canal Inflows.
- 100% of Inflows Handled by FEB/STA-3/4 System

WET YEAR – 2008

- Modeled FEB Attenuated 26% of all Miami and NNR Canal Inflows.
- 93% of Inflows Handled by FEB/STA-3/4 System
- G-724 A-J Utilized to Convey 18% of FEB Releases to STA-3/4.

PROJECT TEAM



Owner/Operator



LEAD DESIGN



SUBCONSULTANTS



Outside References



- ***Restoration Strategies Regional Water Quality Plan***, South Florida Water Management District, April 2012.
- ***Science Plan for the Everglades Stormwater Treatment Areas***, South Florida Water Management District, June 2013.

QUESTIONS...

