Upper East Fork Cave Creek Area Drainage Master Plan Update

Prepared by
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HELM
Member of the SNC-Lavalin Group

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RIADA ENGINEERING
Acknowledge
“Good, Better, Best
-Dallin H. Oaks
Presentation Overview

- Project Location
- Model Development
- Project Outcomes
Project Location
Upper East Fork Cave Creek Master Plan Update
27 Square Miles
Model Development
Upper East Fork Cave Creek Master Plan Update
Greenway Channel
Grid Development

- 2 ft contours from LiDAR
- 20 ft grid (1.9 million cells)
- Detailed Surface Features
  - Manning’s Roughness
  - Individual Buildings
  - Infiltration
- Python Scripts
Hydraulic Structures

- 150 bridges/ culverts
- HY-8
  - Script for models
- Debris
Storm Drains

- 26 Trunk Lines
- Over 2,700 different pipes
- Roughly 60 miles of pipe
- Over 2,700 inlets, junctions and outlets
Grovers Basin (Cave Creek Rd/Grovers Ave)
August 8, 2014
Channels

- Moon Valley Wash
- East Fork Cave Creek Channel
- Greenway Channel
Walls

- All property walls modeled
- Over 700,000 wall features
- Assumed 6 ft tall
- Wall Sensitivity
  - 2 and 3 ft depth failure
  - No walls
Impacts of walls
Model Verification

- August 2014 Storm

Legend
- Ground Elevation Point

12th St Driveway Near Wescott Dr
Wescott Dr Mailbox Near 12th St
12th St Channel Near Union Hills Dr
Grovers Basin A Near Dog Park Entrance
Empty Lot on Paradise Ln Near 18th St
7th Ave and Greenway Channel
Waltann Ln Near Northtown Community Center
22nd St Near Waltann Ln

Legend
- Ground Elevation Point

N
0 30 60 Feet

Legend
FLD 2D Max. Flow Depths [ft]

0.1 - 0.5
0.6 - 1
1 - 2
2 - 5
5 - 10

Legend

WSE = 1424.14 ft

Legend

WSE = 1424.19
WSE = 1424.17
WSE = 1424.22
WSE = 1424.27
WSE = 1424.32
WSE = 1424.35
WSE = 1424.50
WSE = 1424.55
WSE = 1424.75
WSE = 1424.85
WSE = 1425.05
Sensitivity Analysis

- Manning's n-values and Limiting Froude Numbers (+20% and -20%)
- No property walls and wall failure for flow depths of 2 feet and 3 feet
- Courant Number (0.3, 0.5, 0.7)
- Hydraulic structure (culvert) conveyance (+25% and -25%)
- Storm drain clogging (+25% and +50%)
Project Outcomes
Upper East Fork Cave Creek Master Plan Update
Mitigation Alternative Analysis

- 3 locations identified with stakeholders
- 17 alternatives identified
- Discharge reduction calculated
- Cost Estimate
- 3 criteria for selection
  - Flood reduction of area
  - No adverse impact downstream
  - “Biggest bang for the buck”
Public Outreach

- Multiple Public Meetings
- Provide Update on Area
- Discuss Mitigation Options
## Hazus Analysis

- **UDF Method (40K points)**
- **Results of 7 types**
- **# Buildings**
- **% Building Damage**
- **$ Building Losses**
- **$ Content Losses**

### # Buildings Impacted

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Agriculture</td>
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<tr>
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<tr>
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<td></td>
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<tr>
<td>Government</td>
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</tbody>
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Impacted Buildings
Losses Avoided

- Quantify losses avoided due to drainage facilities
- Remove drainage facilities from Model
  - No storm drains, channel improvements, basins
- Compare results to existing conditions model
- Perform Hazus analysis
Project Team

- Cameron Jenkins, Atkins
- Justin Beeler, Atkins
- Eric Coughlin, Atkins
- Brian Schalk, HELM
- Hari Raghaven, HELM
- Ed Kem, HELM
- Jim O’Brien, Riada
- Karen O’Brien, Riada
- Noemi Gonzalez, Riada
- Alex Albert, GUNN Communications
- Tim Murphy, FCDMC
- Doug Williams, FCDMC
- Valerie Swick, FCDMC
- Kathryn Gross, FCDMC
- Spencer Bolen, FCDMC
- Hasan Mushtaq, City of Phoenix
- Tina Jensen, City of Phoenix
Questions

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