“Filling the Gap”

TFMA Spring Conference – Houston, Texas
March 10, 2016

PROJECT TEAM:

Brown, Leal & Associates
R. Gutierrez Engineering
ERO Architects

Administered by the Texas Water Development Board
History of the Study

• Funding:
  » State of Texas Funding following Hurricanes Dolly and Ike
  » Funded by CDBG appropriations and administered by TWDB
  » “Analysis of Impediments to the Fair Housing”
  » Impediments were identified concerning Colonia Areas

• What is a Colonia
  » The term “Colonia,” in Spanish means a community or neighborhood. A Colonia is “a residential area along the Texas-Mexico border that may lack some of the most basic living necessities, such as potable water and sewer systems, electricity, paved roads, and safe and sanitary housing.”

• Project Goal:
  » To examine the drainage infrastructure needs of the Colonias and identify drainage study and infrastructure gaps that need to be filled in order to address drainage issues.
Planning Area

- 3 County Focus: Hidalgo, Cameron and Willacy
- 1,039 OAG and SOS Colonias
Flooding in the LRGV

- LRGV is flood prone
- Large Drainage Area with 6 Main Outfalls

IBWC South Drain at Highway 281 in Pharr
Flooding in LRGV

- Subject to tropical storms
- No drainage to Rio Grande River
- Very flat terrain with many roads, canal and levee embankments
- Experiencing rapid development
- Agriculture based gravity drainage system with several drains

Hurricane Buelah
September 1967

Hurricane Allen
August 1980
About the Study

• Colonia Assessment
  » Identify Colonias & Location
  » Risk
  » Need

• Finding the Gap
  » Evaluate why Colonias Flood

• Filling the Gap
  » Evaluate Solutions
Finding the Gap

• Evaluate why Colonias Flood
  » Severity of Flooding
  » Where water moves
  » Insufficient Drainage
  » Historical Studies

• Data Collection
  » Local Stakeholders
  » Advocacy Groups
  » Colonia Residents
  » Existing Studies
  » Identified Mitigation Projects
Filling the Gap

• Evaluate Solutions
  » Greatest Risk
  » Alternatives Analysis
  » Identify Projects
  » Implement Solutions \((Future)\)

• Potential Improvements
  » Drainage channels
  » Storm drain systems
  » Detention ponds
  » Retention ponds
  » Pumping systems
Phase 1 Summary

• Outreach
  » Public Meetings
  » Colonia Representatives

• Data Collection
  » List & Location of Colonias
  » Catalog existing Studies & Projects
    – Examine existing stormwater drainage studies.
    – Identify projects that reduce flood risk for colonias within the three counties.

• Colonia Assessment
  » Ultimately identify the Colonias with the greatest need (risk of flooding) for drainage study and infrastructure necessary to address drainage issues.
Phase 1: Outreach

- Public Meetings
  - Advertisement
  - Presentation
  - Comment Forms

- Advocate Group Support
  - Engagement
  - Targeted Efforts
  - Additional Comment Forms
  - Historical Information
Phase 1: Studies & Projects Catalog

- Compiled Database
  - Location
  - Study/Report Details
    - Name
    - Date
    - Associated Modeling
    - Funding Source
  - Project Details
    - Name
    - Date
    - Associated Study
    - Associated Modeling and/or Design
    - Funding Source

### Study/Report Catalog Notes:
- Report/Study Title: List report or study title.
- Report/Study Date: List report or study completion date.
- Report Available: Is the report available?
- Model Available: Is the model available?
- Model Platform: What modeling platform was used? (HMS, RAS, XP-SWMM, ICPR, etc.)
- Model Run: Does the model run?
- Geospatial model: Is the model geospatial?
- Spatial Data Available: Is the geospatial data available?
- Projects Identified: Did the report/study identify projects for flood mitigation?
- Projects Designed: Were the identified projects analyzed/designed? Ready for construction?
- Projects Funded: Is funding secured for projects?
- Funding Source: List the funding source. (FEMA, USACE, Bond, etc.)
- Projects Implemented: Has the project been constructed?

### Identified Project Catalog Notes:
- Projects Identifier: List project name or identifier.
- Project Planned: Was the identified project analyzed/designed? Ready for construction?
- Project Cost: How much does the designed project cost?
- Funding Secured: Is funding secured for project?
- Funding Source: List the funding source. (FEMA, USACE, Bond, etc.)
- Project Implemented: Has the project been constructed?
- Project Impact: Briefly explain the impact or results of project.
- Report/Study Title: List report or study title.
- Report/Study Date: List report or study completion date.
- Report Available: Is the report available?
- Model Available: Is the model available?
- Model Platform: What modeling platform was used? (HMS, RAS, XP-SWMM, ICPR, etc.)
- Model Run: Does the model run?
- Geospatial model: Is the model geospatial?
- Spatial Data Available: Is the geospatial data available?
- Design Sheets Available: Are the project design plans available?
- Design Format: What is the format of the design plans? (PDF, CADD, GIS, etc.)
- Design Status: What is the status of the design?
- Survey Available: Is survey data available?
- Survey Data Format: What is the format of the survey data? (PDF, ASCII, text, CADD, etc.)
Phase 1: Studies & Projects Catalog

- Location of Studies / Reports
  - 65 Identified Studies (including county-wide studies)
Phase 1: Studies & Projects Catalog

- Location of Identified Mitigation Projects
  - 500 Identified Projects (including county-wide solutions)
Phase 1: Colonia Database

- Obtained from OAG – Includes All Colonias (not just SOS)
  - Spatial Location of Colonia (size/location)
  - Population from TWDB Database
  - Defines if has Existing Drainage Infrastructure
  - Defines Establishment Date
  - Historic Flooding
Location Verification

- Collin Subdivision – Hidalgo County
  » Shift = 1,000 feet
  » Population = 59

- S&C – Willacy County
  » Shift = 700 feet
  » Population = 17
Phase 1: Colonia Assessment

<table>
<thead>
<tr>
<th>Score</th>
<th>Low to Moderate Income</th>
<th>Population</th>
<th>City Boundary</th>
<th>Drainage District</th>
<th>Historic Flooding¹</th>
<th>Floodplains</th>
<th>Low Terrain²</th>
<th>Hydric Soil Survey</th>
<th>Model Subdivision Community</th>
<th>Existing Drainage Infrastructure</th>
<th>Identified Mitigation Project</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>LMI (&gt;75%)</td>
<td>1000+</td>
<td>Outside City Limit</td>
<td>Outside</td>
<td>Frequent flooding of homes</td>
<td>Inside Floodway</td>
<td>&gt; 80%</td>
<td>C &amp; D</td>
<td>No</td>
<td>Red</td>
<td>No Project</td>
</tr>
<tr>
<td>4</td>
<td>500-999</td>
<td></td>
<td>Some flooding of homes</td>
<td>100-year</td>
<td>60-80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Mixed (51-75%)</td>
<td>250-499</td>
<td>Inside City ETJ</td>
<td>Standing water in lots</td>
<td>40-60%</td>
<td>A/D, B/D &amp; C/D</td>
<td>Unknown</td>
<td>Yellow or Unknown</td>
<td>Planned</td>
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<tr>
<td>2</td>
<td>100-249</td>
<td></td>
<td>Street Flooding</td>
<td>500-year</td>
<td>20-40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1</td>
<td>Non-LMI (&lt;500)</td>
<td>&lt;100</td>
<td>In City Limit (&lt;500)</td>
<td>Inside</td>
<td>Rare</td>
<td>Outside</td>
<td>1-20%</td>
<td>A &amp; B</td>
<td>Yes (&lt;500)</td>
<td>Green</td>
<td>Funded</td>
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</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>%</th>
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<tbody>
<tr>
<td>25</td>
<td>40</td>
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<tr>
<td>15</td>
<td>10</td>
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<td>7</td>
<td>10</td>
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<td>3</td>
<td>4</td>
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<td>6</td>
<td>4</td>
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<tr>
<td>11</td>
<td>4</td>
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<td>17</td>
<td>4</td>
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<td>6</td>
<td>4</td>
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<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

- People (40%)
- Community (10%)
- Risk (40%)
- Infrastructure (10%)
Phase 1: Colonia Assessment

• People
  
  » Low to Moderate Income Indexing
    - HUD 2010 LOWMOD Income Data for Texas
  
  » Population
    - OAG Database/2010 Census
Phase 1: Colonia Assessment

- People - LMI
Phase 1: Colonia Assessment

- People – Population
Phase 1: Colonia Assessment

• Community

  » City Boundaries
    - OAG Database

  » Drainage Districts
    - Political Boundaries
Phase 1: Colonia Assessment

- Community – City Boundaries
Phase 1: Colonia Assessment

- Community – Drainage Districts
Phase 1: Colonia Assessment

- **Risk**
  - Historic Flooding
    - TWDB High Water Marks
    - Public High Water Marks (Comment Forms)
    - Insurance Claims
    - OAG Database
  - Floodplains
    - FEMA
    - Cameron County DD6 Studies
    - USACE Delineations
    - Willacy Estimations

  - Low Terrain
    - LiDAR Surface
    - Filled Sinks to find ponded water locations

  - Soil Survey
    - Hydric Soils
    - Types C & D
Phase 1: Colonia Assessment

- Risk – Historic Flooding
Phase 1: Colonia Assessment

- Risk – Floodplains
Phase 1: Colonia Assessment

- Risk – Low Terrain
Phase 1: Colonia Assessment

- Risk – Hydric Soils
Phase 1: Colonia Assessment

- Infrastructure
  - Model Subdivision
    - OAG Database
  - Existing Drainage Infrastructure
    - OAG Database
  - Identified Project
    - Project Catalog
Phase 1: Colonia Assessment

- Infrastructure – Existing Drainage Infrastructure
Phase 1: Colonia Assessment Results

- People Information for all Colonias
  - 79% of Colonias are considered LMI Communities
  - 16% of Colonias have a population greater than 250

- Risk Information for all Colonias
  - 50% not in a designated floodplain
  - 70% are not in low lying terrain
  - 78% have non-hydric soils
Phase 1: Colonia Assessment Validation

- Outreach and Site Visits
  - 4 Public Workshops with Colonia Stakeholder Assistance
  - 404 Site Visits to observe site conditions and validate desktop data
  - Survey Residents

- Colonia Categorization
  - A1 – Localized Solutions with Structure Flooding
  - A2 – Localized Solutions with Nuisance (Roadway, Lot, Maintenance Flooding)
  - B1 – Regional Solutions with Structure Flooding
  - B2 – Regional Solutions with Nuisance (Roadway, Lot, Maintenance Flooding)
  - C – Colonias that may not have Possible Solution
  - D – Colonias that may not be Impacted
# Phase 1: Colonia Assessment

- Categorization Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Summary</th>
<th>Hidalgo</th>
<th>Cameron</th>
<th>Willacy</th>
<th>Hidalgo</th>
<th>Cameron</th>
<th>Willacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 (Local / Structure)</td>
<td>61</td>
<td>39</td>
<td>21</td>
<td>1</td>
<td>64%</td>
<td>34%</td>
<td>2%</td>
</tr>
<tr>
<td>A2 (Local / Nuisance)</td>
<td>215</td>
<td>164</td>
<td>45</td>
<td>6</td>
<td>76%</td>
<td>21%</td>
<td>3%</td>
</tr>
<tr>
<td>B1 (Regional / Structure)</td>
<td>17</td>
<td>16</td>
<td>1</td>
<td>0</td>
<td>94%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>B2 (Regional / Nuisance)</td>
<td>31</td>
<td>22</td>
<td>9</td>
<td>0</td>
<td>71%</td>
<td>29%</td>
<td>0%</td>
</tr>
<tr>
<td>C (No solution)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>D (No Impact)</td>
<td>79</td>
<td>66</td>
<td>13</td>
<td>0</td>
<td>84%</td>
<td>16%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>404</strong></td>
<td><strong>308</strong></td>
<td><strong>89</strong></td>
<td><strong>7</strong></td>
<td><strong>76%</strong></td>
<td><strong>22%</strong></td>
<td><strong>2%</strong></td>
</tr>
<tr>
<td>All Colonias (OAG and SOS)</td>
<td>1039</td>
<td>846</td>
<td>177</td>
<td>16</td>
<td>81%</td>
<td>17%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Phase 2: Localized Analysis

• Localized analysis of Individual Colonias
  » Consistent, Accurate, and Defendable Models
  » Drainage Standards (Establish Design Frequencies)
  » Level of Risk (Establish Depths of Flooding)
  » Localized Drainage Solutions
  » No Adverse Impact (Improvements do not negatively impact neighbors)
Phase 2: Localized Analysis

Colonia: Linda Vista Estates, Hidalgo County

Stormwater Drainage Planning for the Colonias of the Lower Rio Grande Valley
Colonia: Linda Vista Estates
County: Hidalgo County

Recommended Conceptual Plan
NOT FOR CONSTRUCTION

Legend
- PROP DRAINAGE SYSTEM
- PROP ROADSIDE SWALE
- LINDA VISTA ESTATES
- CRYSTAL CONCRETE DRAINAGE
- RETENTION POND NO/FASMEENT
- 25-yr RETENTION POND
- DRAINAGE SYSTEM FLOW

Feet

Figure 5: Existing and Proposed Conditions - 100-yr Storm Inundation Map
Questions

www.lrgvdrainage.org

“Filling the Gap”