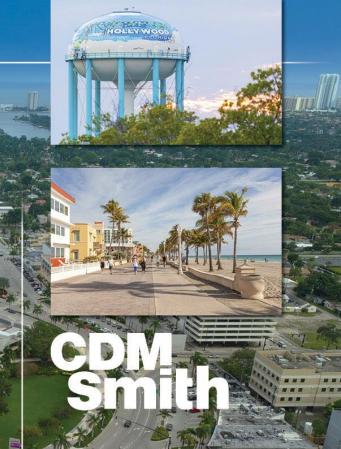


Stormwater Master Plan Results Presentation

Project No. 20-11053 April 19, 2023





### **SWMP Presentation Agenda**







- 2. LOS Goals
- 3. SWMP Results and Citywide CIP to Meet LOS
- 4. Next Steps for the City
- 5. Questions and Discussion

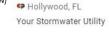






King tides flood streets in Hollywood ...

[PHOTO CREDIT WSVN]



FLOOD



WPLG Local 10

HOLLYWOOD

[PHOTO CREDIT WPLG]

flooded water in Hollywood Beach

## SWMP Goals Are Consistent with SFWMD ERP Requirements and Establish the Metrics for Success

- **✓** Flood Control
- ✓ Water Quality Protection
- ✓ Aquifer Recharge and Water Supply
- ✓ Conservation and Reuse
- **✓** Operation and Maintenance
- ✓ Stormwater Utility Sufficiency
- ✓ Long Term Financing
- **✓ Community Acceptance**





## What Did the Citywide SWMP Accomplish?

- 1. Established comprehensive program goals
- Created an updated stormwater asset database and problem area database from community workshops
- Developed dynamic stormwater models and determined existing level of service (LOS) and the root causes of flooding
- 4. Evaluated two alternatives, budget costs, benefit/cost ratio, and sea level rise effects
- 5. Developed a citywide CIP for the desired LOS
- 6. Provide guidance with future policies
- 7. Provided information to updated stormwater design standards, building code, vulnerability

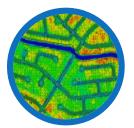
#### YEAR 1 ACTIVITIES



Identify
Opportunities
and Constraints

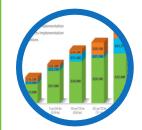


Data Collection and Evaluation Community Workshops



Modeling
Phase Existing
Conditions LOS

#### YEAR 2 ACTIVITIES



Alternatives Analysis, SLR, and Master Plan



Capital Improvement Program



Prioritization
Public Input
Funding Support





## Hollywood Stormwater Issues and Constraints

- Low, flat terrain with natural ridges trapping stormwater
- High groundwater table
- Near build-out with high impervious area
- Aging stormwater system and increased maintenance requirements
- Runoff into the City from other areas
- Older homes built in natural historic low-lying areas
- Saltwater intrusion and aquifer protection classification
- Regulations to maintain historic flows and stages in canals
- Increasing high tides, rising sea levels and tidal surge, tidal flooding

- Discharge limits to west
- Water quality regulations
- Little available area for new dedicated stormwater management
- Recharge wells limited to:
  - East of 10,000 TDS line
- Exfiltration and wells limited to areas of:
  - Higher elevation (> 6 ft-NAVD)
  - No known contamination
  - No potable wellfield cones





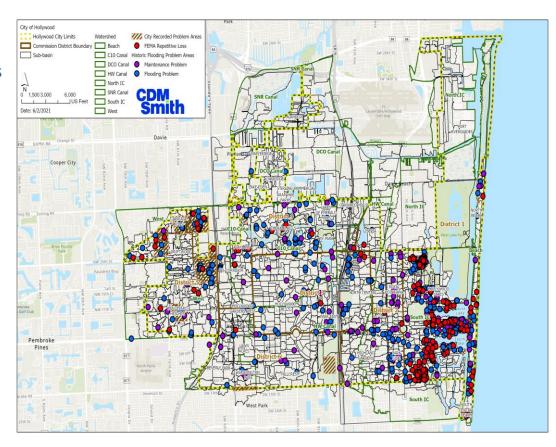




#### Stormwater Problem Areas Identification

#### Flood Complaint Data Sources:

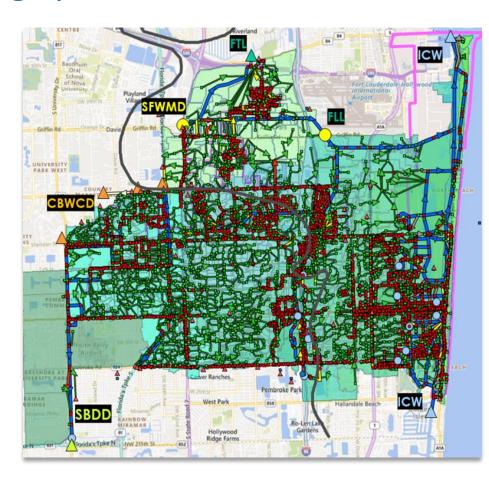
- Resident Flooding Problem Area Workshops
- Commission Flooding Problem Area Workshops
- Department of Public Utilities
- O&M Workshops Roadway Closures Map
- FEMA Floodplains and Repetitive Loss Data
- City Flood Complaint Database and County Complaint Data
- First Responder / Media Coverage





### SWMM Model Build of Existing System

- Total Study Area 45 sq mi
- Four major basins
- Offsite basin system contributions considered
  - SFWMD
  - FDOT
  - Broward County
  - CBWCD
  - SBDD
  - FLL, FTL, Dania, Hallandale
  - ICW/Tides
- Neighborhood level of detail
- Considers both groundwater and tidal effects for present and future conditions and seawalls



## **Existing Conditions Model Validation**

Comparison of Model Predictions to Actual Conditions

Accuracy of results is High - model results verified to match recorded conditions of two large past storms around the City





S 7th Ave & Tyler St Dec 2019





Polk & Ng 14th Ave TS Eta



[Photo credit Sun Sentinel]



14th Ave & Fletcher Dec 2019

#### **Established City Desired Level of Service Goals**

#### Two LOS goals for CIP provides wider range of implementation affordability

#### Alternative 1 – (Primary LOS Goal)

- Flooding up to 3-inches over road crowns in the 10-year, 24-hour recurrence interval design storm for major roadways and identified evacuation routes
- Flooding up to 3-inches above road crown for secondary and arterial residential streets for a 5-year 24-hour storm
- Flooding maintained below building finished-floor elevations in the 100-year recurrence interval design storm wherever practicable

#### 2. <u>Alternative 2</u> – (*Secondary LOS Goal*)

- Short duration, up to 6-inches of flooding allowable the over road crowns in the 10-year, 24-hour recurrence interval design storm for major evacuation routes
- Short duration, up to 6-inches of flooding above residential streets for a 5 year, 24-hour storm event
- Flooding maintained below building finished-floor elevations in the 100-year recurrence interval design storm wherever practicable



[Photo credit Sun Sentinel]

#### Not Meeting LOS



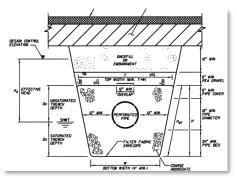
Allowable for Short Duration

## Citywide Capital Improvements to Meet LOS

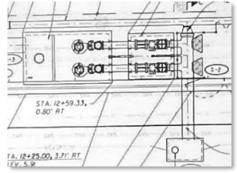
#### Stormwater Infrastructure CIP Types:

- Exfiltration Systems
- Gravity Pipe Collection Systems and Inlets
- Stormwater Pump Stations
- Outfalls
- Stormwater Gravity and Injection Wells
- Storage and Detention
- Swales
- Backflow Prevention Devices
- Raise Seawalls / Shoreline Armoring
- Road Raising in conjunction with new collection systems









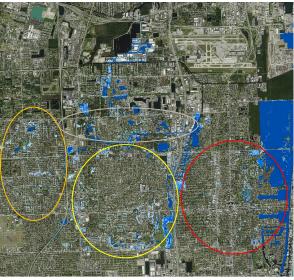
### Pre-Post CIP Flooded Structures Reduction Citywide

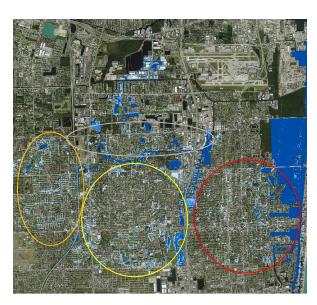
- 100-yr Storm Structures Inundation Analysis
  - LiDAR perimeter average plus 1-ft
  - FFEL sample for ground survey for truth check
  - Used for future NFIP-CRS score FEMA FIRM Flood Insurance Discount
    - Currently Approx 1,600 structures estimated inundated Citywide
    - ALT 1 reduction of Approx 83%
    - ALT 2 reduction of Approx 52%



## Pre-Post CIP Citywide Flood Inundation Maps







EXISTING CONDITIONS ALT 1 CIP ALT 2 CIP



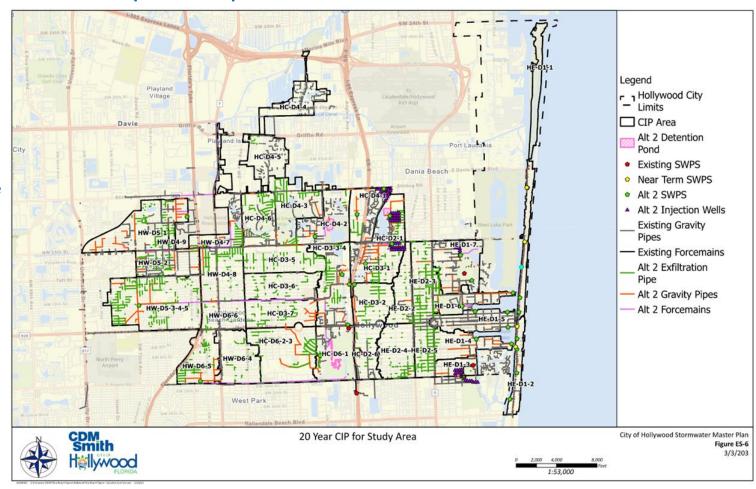
## **CIP Program Alternatives Comparison**

	PROPOSED CIP ELEMENT								
ALTERNATIVE	EXFILTRATION (MI)	GRAVITY RECHARGE WELLS	STORMWATER GRAVITY COLLECTION PIPE (MI)	NEW STORMWATER PUMP STATIONS	FORCEMAIN (MI)		AQUIFER RECHARGE / INJECTION WELLS	NEW DETENTION AREA (AC-FT)	BACKFLOW PREVENTERS
1	112	109	63	37	27	45	135	51.5	26
2	61	55	46	32	19	43	56	18.7	27



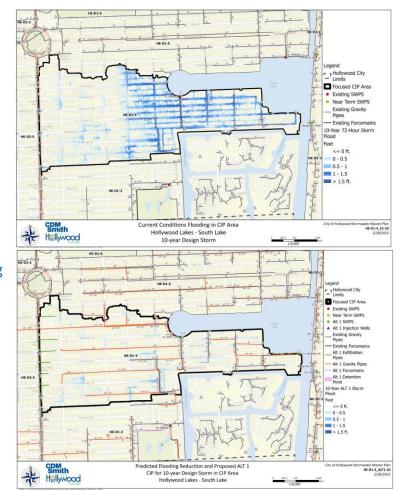
#### Citywide Stormwater Capital Improvement Areas

- 40 delineated CIP Areas
- Each represents an area of contiguous flooding
- Proposed CIP was developed to meet the LOS for each Alternative

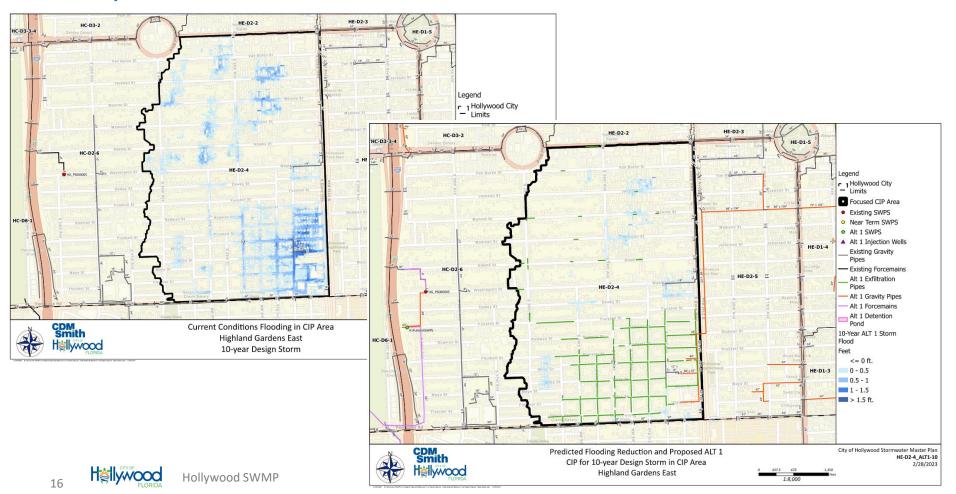


#### **Example CIP Areas and Post-CIP Flood Reduction**

- Preliminary design concepts developed for each CIP Area
- Used by designers as a guide for the stormwater infrastructure improvements
- Can be further phased into smaller projects as funding allows
  - Exfiltration systems where hydraulically feasible to "capture water uphill"
  - Gravity collection systems and inlets in the roadways
  - Recharge wells (gravity and pumped) east of salinity line and avoiding contamination areas and well fields
  - Swales and detention areas
  - Stormwater pump stations
  - Raised seawalls and tidal outfall backflow preventers



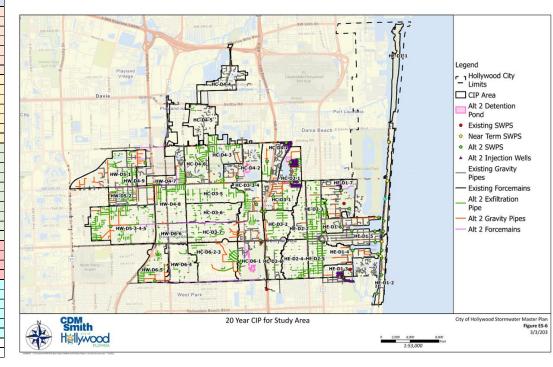
#### **Example CIP Area and Post-CIP Flood Reduction**



#### CIP Program Budgetary Planning Estimates by District

DISTRICT   OP AREA NAME				ALT 1 PLANNING-LEVEL	ALT 2 PLANNING-LEVEL
1	DISTRICT	CIP AREA NAME	NEIGHBORHOOD		
1 HE-D1-3 Hollywood Lakes South \$48.80 \$16.89  1 HE-D1-5 Hollywood Lakes - South Lake \$64.30 \$31.06  1 HE-D1-5 Hollywood Lakes - Central \$65.35 \$30.04  1 HE-D1-6 Hollywood Lakes - Central \$65.35 \$30.04  1 HE-D1-7 Hollywood Lakes - North Lake \$68.53 \$38.33  1 HE-D1-7 Hollywood Lakes - North Lake \$68.53 \$38.33  1 HE-D1-7 Hollywood Lakes - North Lake \$68.53 \$38.33  2 HE-D2-6 Highland Gardens \$30.00 \$3.69  2 HC-D2-1 Liberia \$42.04 \$27.05  2 HC-D2-1 Liberia \$42.04 \$27.05  2 HE-D2-2 North Central - East \$11.61 \$4.31  2 HE-D2-3 Royal Poinciana \$80.27 \$34.98  2 HE-D2-3 Royal Poinciana \$80.27 \$34.98  2 HE-D2-4 Highland Gardens East \$41.81 \$9.35  2 HE-D2-5 Parkside \$45.57 \$48.32  3 HC-D3-5 Hollywood Hills North \$92.77 \$18.32  3 HC-D3-5 Hollywood Hills North \$92.77 \$18.32  3 HC-D3-6 Hollywood Hills North \$92.77 \$19.89  3 HC-D3-7 Hollywood Hills North \$93.27 \$15.65  3 HC-D3-7 Hollywood Hills North Central \$33.27 \$15.65  3 HC-D3-1 North Central South \$46.28 \$18.36  3 HC-D3-1 North Central North / Parkeast North \$973.75 \$48.96  4 HW-D4-9 Driftwood \$100.50 \$324.88  4 HW-D4-9 Driftwood \$100.50 \$38.63  4 HW-D4-7 Playland / 441 Corridor Central / Hollywood Hills \$30.17 \$18.41  4 HC-D4-1 Driftwood \$100.50 \$38.63  4 HC-D4-2 Emerald Hills / Playland / Hollywood Hills \$30.15 \$31.35  5 HW-D5-1 Driftwood / Central / Hollywood Hills \$30.50 \$38.85  5 HW-D5-2 Driftwood \$33.40 \$33.89 \$33.89 \$33.89  5 HB-D3-3 Brearld Hills / Playland / 441 Corridor Central / Hollywood Hills \$30.15 \$33.89 \$33.89 \$33.89  5 HB-D3-3 Brearld Hills / Playland / 441 Corridor Central / Hollywood Hills \$30.15 \$33.89 \$33.89 \$33.89  5 HB-D3-1 Driftwood / Central / Hollywood Hills \$30.15 \$33.89 \$33.89  5 HB-D3-3 Brearld Hills / Playland / 441 Corridor Central / Hollywood Hills \$30.15 \$33.89 \$33.89  5 HB-D3-3 Brearld Hills / Playland / 441 Corridor Central / Hollywood Hills \$41.94 \$30.50  5 H	1	HE-D1-1	North Beach and South Central Beach		
1 HE-D1-4 Hollywood Lakes - South Lake	1	HE-D1-2	South Central Beach	\$38.06	\$25.29
1 HE-D1-5 Hollywood Lakes - Central S65.35 \$30.43  1 HE-D1-6 Hollywood Lakes - Central S65.35 \$30.43  1 HE-D1-7 Hollywood Lakes North Lake \$568.53 \$38.33 \$38.33  1 HE-D1-7 Hollywood Lakes North \$50.13 \$26.84	1	HE-D1-3	Hollywood Lakes South	\$48.80	\$16.89
1 HE-D1-6 Hollywood Lakes - North Lake 568.53 \$38.33   1 HE-D1-7 Hollywood Lakes North 550.13 \$26.84	1	HE-D1-4	Hollywood Lakes - South Lake	\$64.30	\$31.06
The Description of the Descrip	1	HE-D1-5	Hollywood Lakes - Central	\$65.35	\$30.43
Subtotal DI   \$37L04   \$195.72	1	HE-D1-6	Hollywood Lakes - North Lake	\$68.53	\$38.33
2 HC-D2-6 Highland Gardens \$30.00 \$3.69 2 HC-D2-1 Liberia \$42.04 \$27.05 2 HE-D2-1 North Central - East \$511.61 \$4.31 2 HE-D2-2 North Central - East \$511.61 \$4.31 2 HE-D2-3 Royal Poinclana \$80.27 \$34.98 2 HE-D2-4 Highland Gardens East \$41.81 \$9.35 2 HE-D2-5 Parkside \$35.75 \$18.32 3 HC-D3-5 Hollywood Hills North \$92.77 \$19.89 3 HC-D3-5 Hollywood Hills North \$92.77 \$19.89 3 HC-D3-6 Hollywood Hills North Central \$49.31 \$7.35 3 HC-D3-6 Hollywood Hills North Central \$49.31 \$7.35 3 HC-D3-7 Hollywood Hills South Central \$33.27 \$15.65 3 HC-D3-3, 4 Parkeast North \$73.75 \$48.96 3 HC-D3-3, 4 Parkeast North \$73.75 \$48.96 3 HC-D3-1 North Central North / Parkeast \$79.52 \$42.35 4 HW-D4-9 North Central North / Parkeast \$79.52 \$42.35 4 HW-D4-9 Driftwood \$100.50 \$58.63 4 HW-D4-8 441 Cooridor Central / Hollywood Gardens West \$43.89 \$28.54 4 HW-D4-7 Playland / 441 Corridor North \$19.62 \$12.73 4 HC-D4-4 Alandco \$0.00 \$0.00 4 HC-D4-5 Darkend Hills / Playland / 441 Corridor North \$19.62 \$12.73 4 HC-D4-6 Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills \$33.59 \$18.89 4 HC-D4-1 Darkend Hills / Parkend Hills \$33.59 \$18.89 5 HW-D5-1 Driftwood \$540.00 \$	1	HE-D1-7	Hollywood Lakes North	\$50.13	\$26.84
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3 HC-D3-6 Hollywood Hills North Central \$49.31 \$7.35 3 HC-D3-7 Hollywood Hills South Central \$33.27 \$15.65 3 HC-D3-3, 4 Parkeast North \$73.75 \$48.96 3 HC-D3-2 North Cental South \$46.28 \$18.36 3 HC-D3-1 North Cental South \$46.28 \$18.36 3 HC-D3-1 North Cental North / Parkeast \$79.52 \$42.35			Subtotal D2	\$241.48	\$97.71
3 HC-D3-7 Hollywood Hills South Central \$33.27 \$15.65  3 HC-D3-3, 4 Parkeast North \$73.75 \$48.96  3 HC-D3-2 North Cental South \$46.28 \$18.36  3 HC-D3-1 North Cental North / Parkeast \$775.2 \$42.35  4 HW-D4-9 Driftwood \$347.90 \$152.55  4 HW-D4-9 Driftwood \$540.05 \$374.90 \$152.55  4 HW-D4-7 Playland / 441 Corridor North \$19.62 \$12.73  4 HC-D4-4 Alandco \$0.00 \$0.00 \$0.00  4 HC-D4-4 Alandco \$0.00 \$0.00 \$0.00  4 HC-D4-5 Oakridge Mapleridge \$1.76 \$1.33  4 HC-D4-5 Claringle Mapleridge \$1.76 \$1.33  4 HC-D4-3 Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills \$30.17 \$18.41  4 HC-D4-2 Emerald Hills / TY Park \$25.11 \$15.56  4 HC-D4-1 Oakwood Hills \$45.02 \$32.92  5 HW-D5-1 Driftwood / Carriage Hills \$45.02 \$32.92  5 HW-D5-2 Driftwood \$53.40 \$16.82  5 HW-D5-1 Boulevard Heights \$257.97 \$111.25  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Corridor South \$8.55.00 \$44.67  6 HC-D6-1 Parkeast South \$56.60 \$44.67  6 HC-D6-1 Farkeast South \$56.60 \$44.67	3	HC-D3-5	Hollywood Hills North	\$92.77	\$19.89
3 HC-D3-3, 4 Parkeast North \$73.75 \$48.96  3 HC-D3-1 North Cental South \$46.28 \$138.36  3 HC-D3-1 North Cental North / Parkeast \$79.52 \$42.35  4 HW-D4-9 Driftwood \$100.50 \$588.63  4 HW-D4-8 441 Cooridor Central / Hollywood Gardens West \$43.89 \$28.54  4 HW-D4-7 Playland / 441 Corridor North \$19.62 \$12.73  4 HC-D4-4 Alandco \$0.00 \$0.00 \$0.00  4 HC-D4-5 Oakridge / Mapleridge \$1.76 \$1.33  4 HC-D4-6 Emerald Hills / Playland / Atd Corridor Central / Hollywood Hills \$30.17 \$18.41  4 HC-D4-3 Emerald Hills / Stirling Commercial District \$33.58 \$138.98  4 HC-D4-1 Oakwood Hills \$45.02 \$32.92  5 HW-D5-1 Driftwood / Carriage Hills \$45.02 \$32.92  5 HW-D5-1 Driftwood / Carriage Hills \$41.94 \$20.85  5 HW-D5-2 Driftwood / Carriage Hills \$25.797 \$11.125  5 HW-D5-3, 4, 5 Boulevard Heights \$25.797 \$11.125  5 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Hills South \$66.66 \$44.67  6 HC-D6-1 Parkeast South \$50.00 \$41.10  Subtotal D6 \$259.35 \$106.60  ALT1 ALT2	3	HC-D3-6	Hollywood Hills North Central	\$49.31	\$7.35
3 HC-D3-3, 4 Parkeast North \$73.75 \$48.96  3 HC-D3-2 North Cental South \$46.28 \$138.36  3 HC-D3-1 North Cental North / Parkeast \$79.52 \$42.35  4 HC-D3-1 North Cental North / Parkeast \$59.52 \$42.35  4 HW-D4-9 Driftwood \$100.50 \$58.63  4 HW-D4-8 441 Cooridor Central / Hollywood Gardens West \$43.89 \$28.54  4 HW-D4-7 Playland / 441 Corridor North \$19.62 \$12.73  4 HC-D4-4 Alandco \$0.00 \$0.00 \$0.00  4 HC-D4-5 Darkinge / Mapleridge \$1.76 \$1.33  4 HC-D4-5 Emerald Hills / Playland / A41 Corridor Central / Hollywood Hills \$30.77 \$18.41  4 HC-D4-3 Emerald Hills / Stirling Commercial District \$33.58 \$18.98  4 HC-D4-1 Oakwood Hills \$45.02 \$32.92  4 HC-D4-1 Oakwood Hills \$45.02 \$32.92  5 HW-D5-1 Driftwood / Carriage Hills \$41.94 \$20.85  5 HW-D5-2 Driftwood \$53.40 \$51.62  5 HW-D5-3, 4, 5 Boulevard Heights \$257.97 \$111.25  5 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Lawn Accept / Park \$157.03 \$48.83  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.15 \$5.72  6 HC-D6-2, 3 Hillicrest / Hollywood Hills South \$65.66 \$44.67  6 HC-D6-1 Parkeast South \$50000 \$41.00  Subtotal D6 \$259.35 \$106.60  ALT1 ALT2	3	HC-D3-7	Hollywood Hills South Central	\$33.27	\$15.65
Subtotal D3   S374.90   S125.25	3	HC-D3-3, 4	,		\$48.96
Subtotal D3   S79.52   \$42.35	3	HC-D3-2	North Cental South	\$46.28	\$18.36
4         HW-D4-9         Driftwood         \$100.50         \$58.63           4         HW-D4-8         441 Cooridor Central / Hollywood Gardens West         \$43.89         \$28.54           4         HW-D4-7         Playland / 441 Corridor North         \$19.62         \$12.73           4         HC-D4-4         Alandco         \$0.00         \$0.00           4         HC-D4-5         Oakridge / Mapleridge         \$1.76         \$1.33           4         HC-D4-6         Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills         \$30.17         \$18.41           4         HC-D4-3         Emerald Hills / Stirling Commercial District         \$33.58         \$18.89           4         HC-D4-2         Emerald Hills / TY Park         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$39.66         \$187.11           5         HW-D5-1         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-3, 4, 5         Boulevard Heights         \$25.79         \$111.25           5         HW-D6-6         Hollywood Gardens West / 41 Cooridor South         \$8.13         \$3.3.22     <	3				
4         HW-D4-8         441 Cooridor Central / Hollywood Gardens West         \$43.89         \$28.54           4         HW-D4-7         Playland / 441 Corridor North         \$19.62         \$12.73           4         HC-D4-4         Alandco         \$0.00         \$0.00           4         HC-D4-5         Oakridge / Mapleridge         \$1.76         \$1.33           4         HC-D4-6         Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills         \$30.17         \$18.41           4         HC-D4-3         Emerald Hills / Tills / Ty Park         \$25.11         \$15.56           4         HC-D4-2         Emerald Hills / Ty Park         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$45.02         \$32.92           Subtotal D4         \$299.66         \$187.11         \$15.56           5         HW-D5-1         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood         \$33.40         \$16.82           5         HW-D5-3, 4, 5         Boulevard Heights         \$257.97         \$111.25           \$\$\text{MW-D5-6}\$         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-6			Subtotal D3	\$374.90	\$152.55
4         HW-D4-7         Playland / 441 Corridor North         \$19.62         \$12.73           4         HC-D4-4         Alandco         \$0.00         \$0.00           4         HC-D4-4         \$0.00         \$0.00         \$0.00           4         HC-D4-5         \$0.00         \$0.00         \$0.00           4         HC-D4-6         Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills         \$30.17         \$18.41           4         HC-D4-3         Emerald Hills / Stirling Commercial District         \$33.58         \$18.98           4         HC-D4-2         Emerald Hills / TY Park         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$45.02         \$32.92           5         HW-D5-1         Oakwood Hills         \$45.02         \$32.92           5         HW-D5-1         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood         \$53.40         \$16.82           5         HW-D5-3         \$5         Boulevard Heights         \$257.97         \$111.25           5         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-6	4	HW-D4-9	Driftwood	\$100.50	\$58.63
4         HC-D4-4         Alandco         \$0.00         \$0.00           4         HC-D4-5         Oakridge / Mapleridge         \$1.76         \$1.33           4         HC-D4-5         Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills         \$30.17         \$18.41           4         HC-D4-3         Emerald Hills / Stirling Commercial District         \$33.58         \$18.88           4         HC-D4-2         Emerald Hills / TV Park         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$45.02         \$32.92           5         HW-D5-1         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-3, 4, 5         Boulevard Heights         \$25.79         \$111.25           5         HW-D5-3, 4, 5         Boulevard Heights         \$25.79         \$111.25           6         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-6         Hollywood Alardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-6         Lawn Acres / Washington Park         \$157.03         \$48.83 </td <td>4</td> <td>HW-D4-8</td> <td>441 Cooridor Central / Hollywood Gardens West</td> <td>\$43.89</td> <td>\$28.54</td>	4	HW-D4-8	441 Cooridor Central / Hollywood Gardens West	\$43.89	\$28.54
4         HC-D4-5         Oakridge / Mapleridge         \$1.76         \$1.33           4         HC-D4-6         Emerald Hills / Playland / Ast Corridor Central / Hollywood Hills         \$30.17         \$18.41           4         HC-D4-3         Emerald Hills / Stirling Commercial District         \$33.58         \$18.98           4         HC-D4-2         Emerald Hills / Yield Fark         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$45.02         \$32.92           5         HW-D5-1         Driftwood / Carriage Hills         \$299.66         \$187.11           5         HW-D5-2         Driftwood         \$53.40         \$16.82           5         HW-D5-2         Driftwood         \$53.40         \$16.82           5         HW-D5-3, 4, 5         Boulevard Heights         \$257.97         \$111.25           5         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-5         Beverly Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$12.51         \$5.72           6         HC-D6-1         Parkeast South         \$56.66         \$44.67           6	4	HW-D4-7	Playland / 441 Corridor North	\$19.62	\$12.73
4 HC-D4-6 Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills \$30.17 \$18.41  4 HC-D4-3 Emerald Hills / Stirling Commercial District \$33.58 \$18.98  4 HC-D4-2 Emerald Hills / TY Park \$25.11 \$15.56  4 HC-D4-1 Oakwood Hills \$45.02 \$32.92  Subtotal D4 \$299.66 \$187.11  5 HW-D5-1 Driftwood / Carriage Hills \$41.94 \$20.85  5 HW-D5-2 Driftwood \$53.40 \$16.82  5 HW-D5-2 Driftwood \$53.40 \$16.82  5 HW-D5-3 4, 5 Boulevard Heights \$257.97 \$111.25  Subtotal D5 \$353.32 \$148.92  6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22  6 HW-D6-6 Beeverly Park \$157.03 \$48.83  6 HW-D6-4 Lawn Acres / Washington Park \$157.03 \$48.83  6 HW-D6-4 Hollywood Hills South \$65.66 \$44.67  6 HC-D6-1 Parkeast South \$16.02 \$41.6  Subtotal D6 \$259.35 \$106.60  ALT1 ALT2	4	HC-D4-4	Alandco	\$0.00	\$0.00
4         HC-D4-3         Emerald Hills / Stirling Commercial District         \$33.58         \$18.98           4         HC-D4-2         Emerald Hills / YP Park         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$45.02         \$32.92           5         HC-D4-1         Difftwood Hills         \$45.02         \$32.92           5         HW-D5-1         Difftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood         \$53.40         \$16.82           5         HW-D5-3         \$5 Boulevard Heights         \$257.97         \$111.25           6         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-5         Beverty Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$125.03         \$48.83           6         HC-D6-2         Hillcrest / Hollywood Hills South         \$65.66         \$44.67           6         HC-D6-1         Parkeast South         \$16.02         \$41.16           Subtotal D6         \$259.35         \$106.60         \$41.16	4	HC-D4-5	Oakridge / Mapleridge	\$1.76	\$1.33
4         HC-D4-2         Emerald Hills / TY Park         \$25.11         \$15.56           4         HC-D4-1         Oakwood Hills         \$45.02         \$32.92           5         HW-D5-1         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood         \$53.40         \$16.82           5         HW-D5-3, 4, 5         Boulevard Heights         \$257.97         \$111.25           6         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$32.22           6         HW-D6-5         Beverly Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$12.51         \$5.72           6         HC-D6-2, 3         Hillicrest / Hollywood Hills South         \$65.66         \$44.67           6         HC-D6-1         Parkeast South         \$16.02         \$4.16           Subtotal D6         \$259.35         \$106.60           ALT1         ALT2	4	LIC DA C			
4 HC-D4-1 Oakwood Hills \$45.02 \$32.92    Subtotal D4 \$299.66 \$1387.11		HC-D4-6	Emerald Hills / Playland / 441 Corridor Central / Hollywood Hills	\$30.17	
Subtotal D4   \$299.66   \$187.11	4				\$18.41
5         HW-D5-1         Driftwood / Carriage Hills         \$41.94         \$20.85           5         HW-D5-2         Driftwood         \$33.40         \$16.82           5         HW-D5-3, 4, 5         Boulevard Heights         \$257.97         \$111.25           6         HW-D6-6         Hollywood Gardens West / 41 Cooridor South         \$8.13         \$3.22           6         HW-D6-5         Beverly Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$12.51         \$5.72           6         HC-D6-2, 3         Hillcrest / Hollywood Hills South         \$65.66         \$44.67           6         HC-D6-1         Parkeast South         \$16.02         \$4.16           Subtotal D6           ALT1         ALT2		HC-D4-3	Emerald Hills / Stirling Commercial District	\$33.58	\$18.41 \$18.98
5         HW-D5-2         Driftwood         \$53.40         \$16.82           5         HW-D5-3, 4, 5         Boulevard Heights         \$257.97         \$111.25           Subtotal D5         \$333.32         \$148.92           6         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-5         Beverly Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$12.51         \$5.72           6         HC-D6-2, 3         Hillicrest / Hollywood Hills South         \$65.66         \$44.67           6         HC-D6-1         Parkeast South         \$16.02         \$4.16           Subtotal D6         \$259.35         \$106.60           ALT1         ALT2         ALT2	4	HC-D4-3 HC-D4-2	Emerald Hills / Stirling Commercial District Emerald Hills / TY Park	\$33.58 \$25.11	\$18.41 \$18.98 \$15.56
5         HW-D5-3, 4, 5         Boulevard Heights         \$257.97         \$111.25           6         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$33.22           6         HW-D6-5         Beverly Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$12.51         \$5.72           6         HC-D6-2, 3         Hillcrest / Hollywood Hills South         \$65.66         \$44.67           6         HC-D6-1         Parkeast South         \$16.02         \$4.16           Subtotal D6         \$259.35         \$106.60           ALT1         ALT2	4	HC-D4-3 HC-D4-2	Emerald Hills / Stirling Commercial District Emerald Hills / TY Park Oakwood Hills	\$33.58 \$25.11 \$45.02	\$18.41 \$18.98 \$15.56 \$32.92
6         HW-D6-6         Hollywood Gardens West / 441 Cooridor South         \$8.13         \$3.22           6         HW-D6-5         Beverly Park         \$157.03         \$48.83           6         HW-D6-4         Lawn Acres / Washington Park         \$12.51         \$5.72           6         HC-D6-2, 3         Hillcrest / Hollywood Hills South         \$65.66         \$44.67           6         HC-D6-1         Parkeast South         \$16.02         \$4.16           Subtotal D6         \$259.35         \$106.60         ALT1         ALT2	4	HC-D4-3 HC-D4-2 HC-D4-1	Emerald Hills / Stirling Commercial District Emerald Hills / TY Park Oakwood Hills Subtotal D4	\$33.58 \$25.11 \$45.02 \$299.66	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11
6 HW-D6-6 Hollywood Gardens West / 441 Cooridor South \$8.13 \$3.22 6 HW-D6-5 Beverly Park \$157.03 \$48.83 6 HW-D6-4 Lawn Acres / Washington Park \$12.51 \$5.72 6 HC-D6-2, 3 Hillcrest / Hollywood Hills South \$65.66 \$44.67 6 HC-D6-1 Parkeast South \$16.02 \$4.16  Subtotal D6 \$259.35 \$106.60  ALT1 ALT2	4 4 5	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills Subtotal D4 Driftwood / Carriage Hills	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85
6 HW-D6-5 Beverly Park \$157.03 \$48.83 6 HW-D6-4 Lawn Acres / Washington Park \$12.51 \$5.72 6 HC-D6-2, 3 Hillcrest / Hollywood Hills South \$65.66 \$44.67 6 HC-D6-1 Parkeast South \$16.02 \$4.16  Subtotal D6 \$259.35 \$106.60  ALT1 ALT2	4 4 5 5	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1 HW-D5-2	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills Subtotal D4 Driftwood / Carriage Hills Driftwood	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82
6 HW-D6-4 Lawn Acres / Washington Park \$12.51 \$5.72 6 HC-D6-2, 3 Hillcrest / Hollywood Hills South \$65.66 \$44.67 6 HC-D6-1 Parkeast South \$16.02 \$4.16  Subtotal D6 \$259.35 \$106.60  ALT1 ALT2	4 4 5 5	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1 HW-D5-2	Emerald Hills / Stirling Commercial District Emerald Hills / TY Park Oakwood Hills Subtotal D4 Driftwood / Carriage Hills Driftwood Boulevard Heights	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82 \$111.25
6 HC-D6-2, 3 Hillcrest / Hollywood Hills South \$65,66 \$44,67 6 HC-D6-1 Parkeast South \$16,02 \$4,16  Subtotal D6 \$259,35 \$106,60  ALT 1 ALT 2	5 5 5	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills Subtotal D4 Driftwood / Carriage Hills Driftwood Boulevard Heights Subtotal D5 Subtotal D5	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82 \$111.25 \$148.92
6 HC-D6-1 Parkeast South \$16.02 \$4.16  Subtotal D6 \$259.35 \$106.60  ALT 1 ALT 2	4 4 5 5 5 5	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills  Subtotal D4  Driftwood / Carriage Hills Driftwood Boulevard Heights  Subtotal D5  Hollywood Gardens West / 441 Cooridor South	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32 \$8.13	\$18.41 \$18.98 \$15.56 \$32.92 <b>\$187.11</b> \$20.85 \$16.82 \$111.25 <b>\$148.92</b> \$3.22
Subtotal D6   \$259.35   \$106.60	4 4 5 5 5 5 6 6	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5 HW-D6-6 HW-D6-5	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills Subtotal D4 Driftwood / Carriage Hills Driftwood Boulevard Heights Subtotal D5 Hollywood Gardens West / 441 Cooridor South Beverly Park	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32 \$8.13 \$157.03	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82 \$111.25 \$148.92 \$3.22 \$48.83
ALT1 ALT2	4 4 5 5 5 5 6 6 6	HC-D4-3 HC-D4-2 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5 HW-D6-6 HW-D6-5 HW-D6-4	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills  Driftwood / Carriage Hills Driftwood Boulevard Heights Subtotal DS Hollywood Gardens West / 441 Cooridor South Beverly Park Lawn Acres / Washington Park	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32 \$8.13 \$157.03 \$12.51	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82 \$111.25 \$148.92 \$3.22 \$48.83 \$5.72
	4 4 5 5 5 5 6 6 6 6	HC-D4-3 HC-D4-1 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5 HW-D6-6 HW-D6-5 HW-D6-4 HC-D6-2, 3	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills  Subtotal D4  Driftwood / Carriage Hills Driftwood Boulevard Heights  Subtotal D5  Hollywood Gardens West / 441 Cooridor South Beverly Park Lawn Acres / Washington Park Hillcrest / Hollywood Hills South	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32 \$8.13 \$157.03 \$12.51 \$65.66	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82 \$111.25 \$148.92 \$3.22 \$48.83 \$5.72 \$44.67
CIP TOTAL CITYWIDE \$1,899.76 \$888.62	4 4 5 5 5 5 6 6 6 6	HC-D4-3 HC-D4-1 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5 HW-D6-6 HW-D6-5 HW-D6-4 HC-D6-2, 3	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills  Subtotal D4  Driftwood / Carriage Hills Driftwood Boulevard Heights  Subtotal D5  Hollywood Gardens West / 441 Cooridor South Beverly Park Lawn Acres / Washington Park Hillcrest / Hollywood Hills South Parkeast South	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32 \$8.13 \$157.03 \$12.51 \$66.66 \$16.02	\$18.41 \$18.98 \$15.56 \$32.92 \$187.11 \$20.85 \$16.82 \$111.25 \$148.92 \$3.22 \$48.83 \$5.72 \$44.67 \$4.16
	4 4 5 5 5 5 6 6 6 6	HC-D4-3 HC-D4-1 HC-D4-1 HW-D5-1 HW-D5-2 HW-D5-3, 4, 5 HW-D6-6 HW-D6-5 HW-D6-4 HC-D6-2, 3	Emerald Hills / Stirling Commercial District Emerald Hills / TV Park Oakwood Hills  Subtotal D4  Driftwood / Carriage Hills Driftwood Boulevard Heights  Subtotal D5  Hollywood Gardens West / 441 Cooridor South Beverly Park Lawn Acres / Washington Park Hillcrest / Hollywood Hills South Parkeast South	\$33.58 \$25.11 \$45.02 \$299.66 \$41.94 \$53.40 \$257.97 \$353.32 \$8.13 \$157.03 \$12.51 \$65.66 \$16.02 \$229.35	\$18.41 \$18.98 \$15.56 \$32.92 <b>5187.11</b> \$20.85 \$16.82 \$111.25 <b>5148.92</b> \$3.22 \$48.83 \$5.72 \$44.67 \$4.16

LOS	PROGRAM CIP COST	PROGRAM YRS - ANNUAL EXPENDITURE			
103	PROGRAMICIP COST	20	25	30	
ALT 1	\$1,900,000,000	\$95,000,000	\$76,000,000	\$63,333,333	
ALT 2	\$890,000,000	\$44,500,000	\$35,600,000	\$29,666,667	



#### Importance of Seawall Improvements in Coastal Neighborhoods

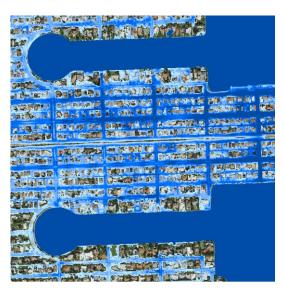


EXISTING CONDITIONS FLOODING\*

(TIDE AT EL ~2.5 NAVD)



SWMP CIP\*
WITH CITY SHORELINE MITIGATION PROJECT PH 1-3
AND PRIVATE SEAWALL IMPROVEMENTS
(FUTURE TIDES UP TO EL 5 NAVD)



SWMP CIP\*
WITHOUT ANY SEAWALL
IMPROVEMENTS
(TIDE AT EL ~2.5 NAVD)



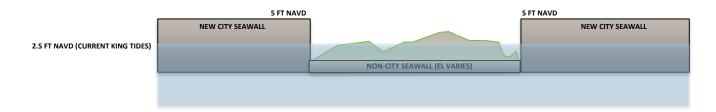
#### SWMP is Coordinated with Phases 1-3 City Shoreline Mitigation Project

#### Analysis shows:

- 1. Proposed stormwater CIP cannot pump out the ocean
- 2. Tidal flooding mitigation requires contiguous shoreline barrier:
  - Identify leaks in existing seawalls to be repaired
  - Maintain backflow preventers at outfalls so tides do not come up through the stormwater inlets into the streets
  - Potential lining of leaking pipes required (infiltration)
  - Verify shoreline for potential remaining low-lying non-City seawall areas to ensure a continuous barrier



N Southlake Dr

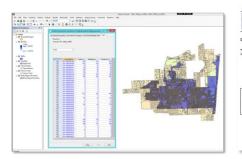


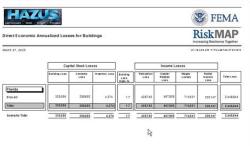
#### FEMA HAZUS Results – Citywide Analysis – Flood Damage Avoidance

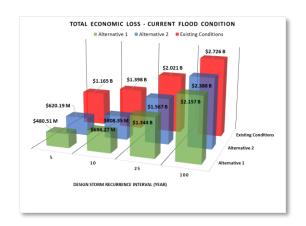
- ALT 1 BCA = 1.7
- ALT 2 BCA = 2.5

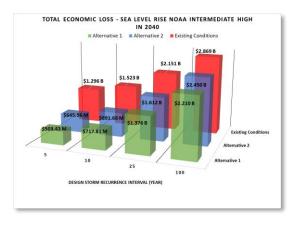
- ✓ Includes Citywide cost of seawalls in CIP (Public/Private)
- ▼ FEMA HAZUS Considers flood damages and basic economic loss
- Compare flood damages to the CIP costs and calculates a benefit- to-cost ratio (BCR)
- The benefit-cost ratio is used to determine the viability of cash flows from an asset or project.

  The higher the ratio, the more attractive the project's risk-return profile
- ✓ If a project has a BCR greater than 1.0, the project is expected to deliver a positive net present value to the owner or its investors.









## **Future Project Sequencing**

#### Factors in the sequencing of future projects:

- Funding
- Grant and Loan Availability
- Coordination with Other Utility, Drainage Districts, and Roadway Work
- Public-Private-Partnerships (PPP) and Re-development
- New Seawall Areas
- Long lead-time projects (permitting, involvement of other entities)
- Impacts to City and major storm conditions







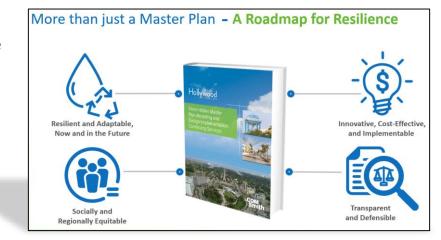




## What are the Next Steps for the City?

- Determine the near-term budget and select initial program projects within the budget
- Determine the City's long-term financing plan
- Continue grant and loan identification in parallel
- Continue to identify Joint Project Agreements with other entities (FDOT, WC Districts, P3, Neighboring Municipalities, BC)
- Select next rounds of projects to determine future budget
- Review NFIP CRS for potential additional credits
- Update design and development standards
- Remain flexible in project execution
- Update the model as CIP is installed for current snapshot of Citywide progress, important for permitting, use for review and conformance with SWMP
- Plan for future O&M budget reserve



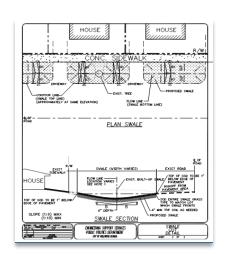




## SWMP - Recapture the Swale Grant Program

- ✓ City wide existing swales have been identified and digitized into a GIS layer
- ✓ Location, depth, area, linear feet, and volume estimates
- ✓ Modeled the water quality storm pre-post
- ✓ First 5 of 15 swale projects has completed









#### **SWMP Rollout and Presentation**

- Commission Presentation
- 2. Westside and Eastside Resident Presentations
- 3. Educational Materials
- 4. Adopt the SWMP and Funding Plan





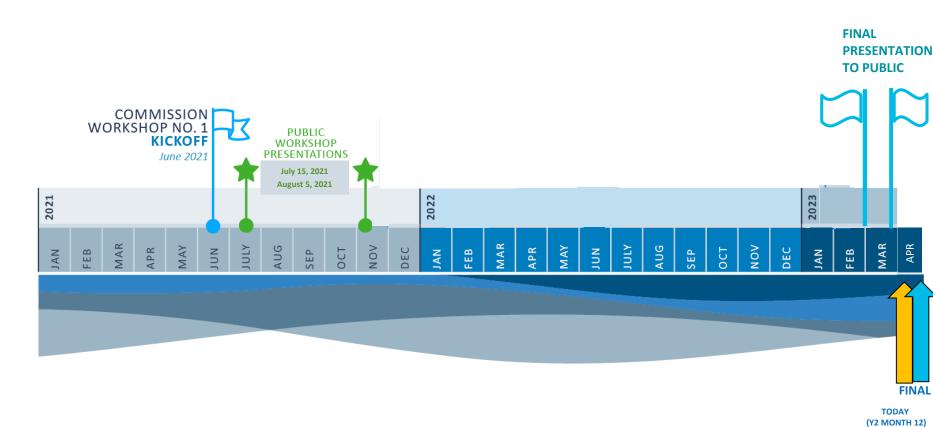








## Schedule Update



# Open Questions and Discussion

