STEERING COMMITTEE MEETING #4

GUNDA CORPORATION
Engineers, Planners & Managers

Kingwood Area Mobility Plan
Steering Committee Meeting #4

GUNDA Project No. 14004-01
Date: Sept. 23, 2014, 6:00 PM
Location: Kingwood Community Center

SIGN-IN SHEET

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NAME	FIRM/AGENCY	E-MAIL	TELEPHONE
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Kingwood Area Mobility Study

Lake Houston Redevelopment Authority (TIRZ #10)

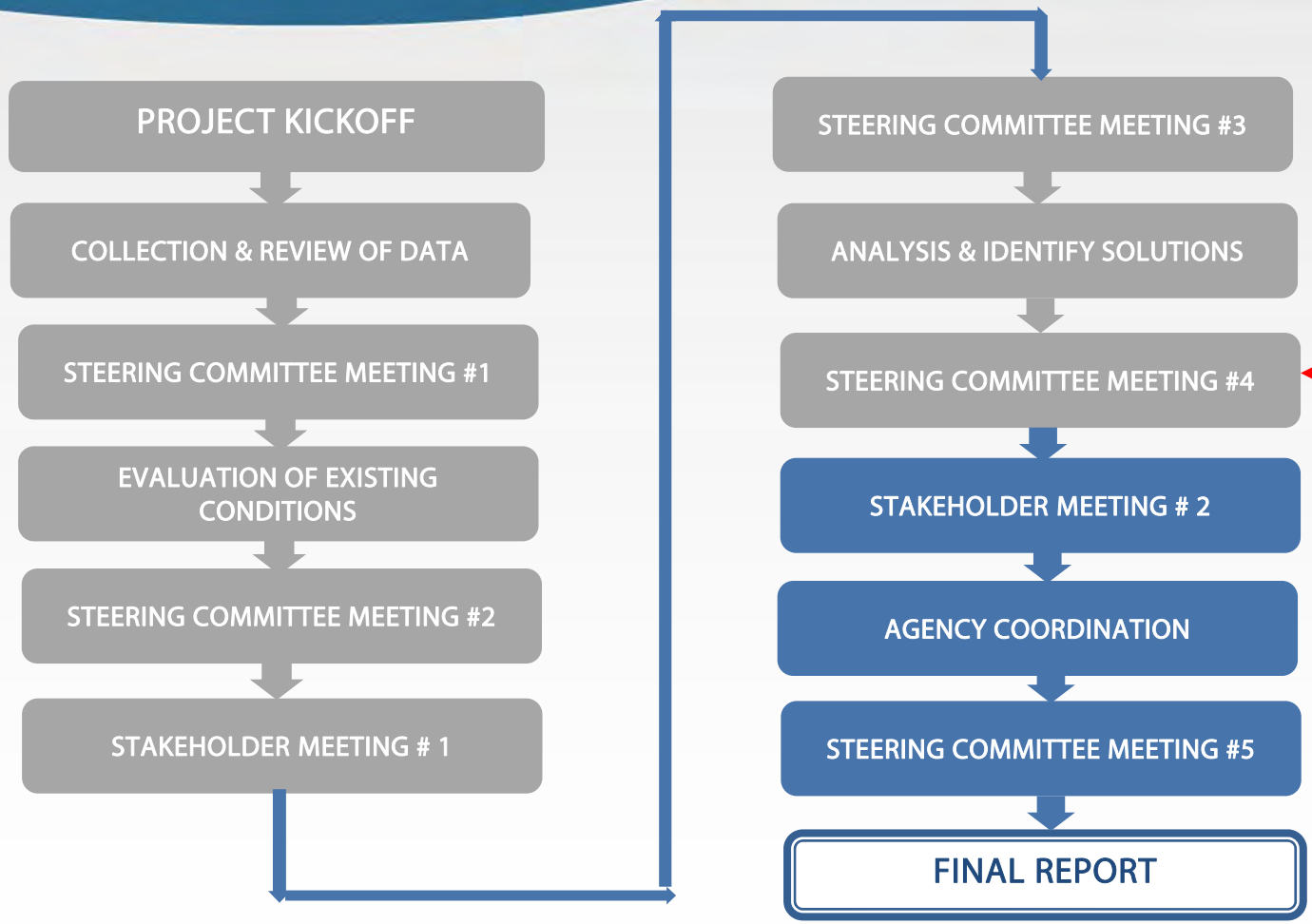
Steering Committee Meeting # 4
Date: September 23, 2014

GUNDA CORPORATION
Engineers, Planners & Managers

Introduction

- Introduction
- Remarks by Stan Sarman/Council Member Dave Martin

Recap



September 23, 2014

Update

- E-mails
- Survey
- Improvement Options and Analysis
- This information will be posted on the website

GOALS & MOE'S-Recap

GOALS

- Obtain community input
- Improve mobility – short and long term
- Maintain same or better quality of life
- Identify funding sources
  - Educate public regarding funding sources
- Plan for future
- Safety
- Possible transit for aging population
- Pedestrian facilities as part of Street Improvements
- Public transportation
- Trolley system – not typical METRO bus
- Quick fixes

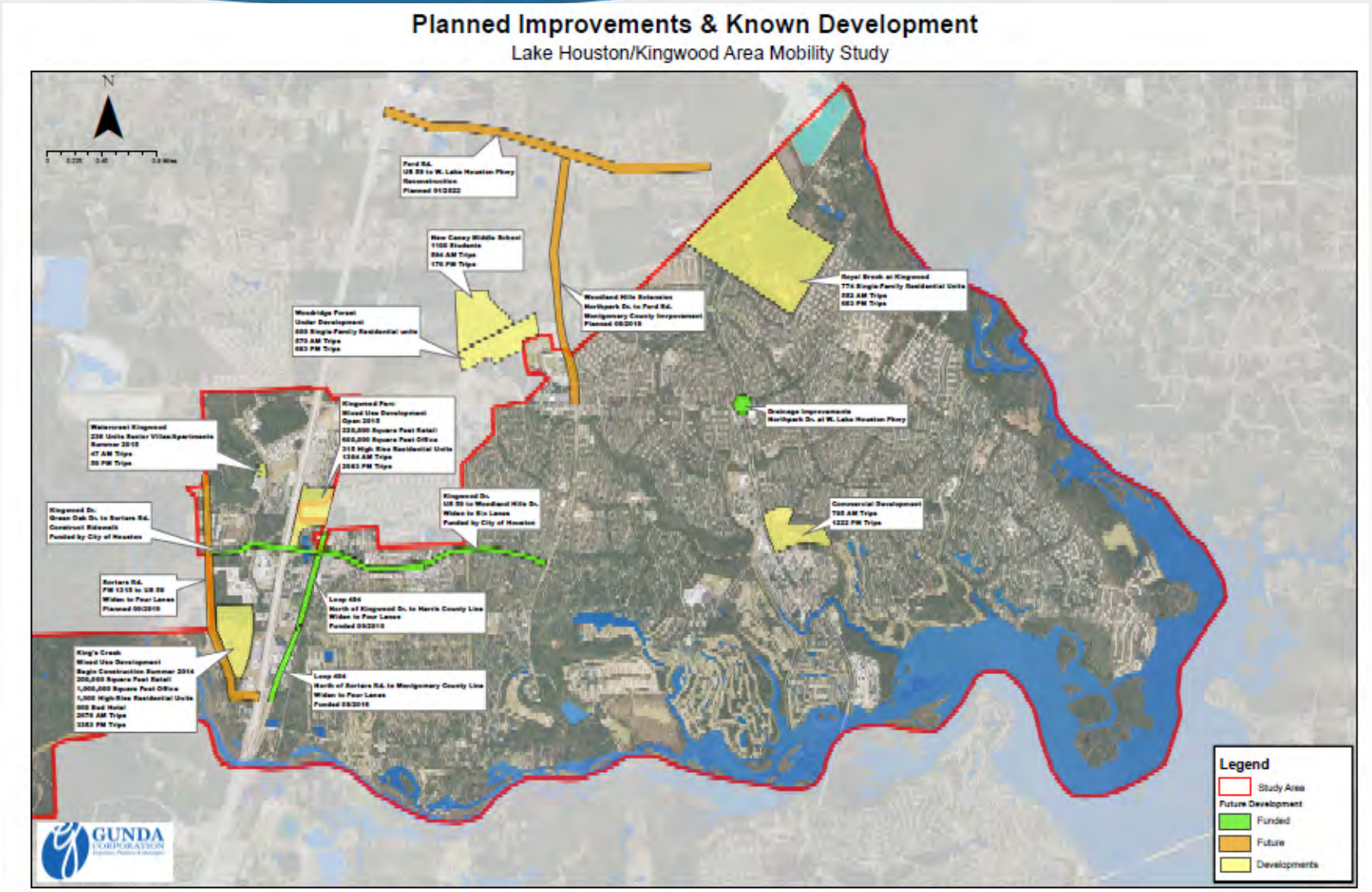
MOE'S

- Less congestion
- Decrease delay/travel time
- Pedestrian safety/bicycle safety
- Vehicular safety
- Cost effectiveness
- Schedule
- Regulatory impacts
- Environmental impacts including Tree Impacts

New Developments

- Known Developments
  - Kings Creek Mixed Use – 2014 Opening Year
  - Kingwood Parc Medical Office – 2015 Opening Year
  - Watercrest Kingwood Senior Apartments – 2015 Opening Year
  - Kings Crossings Retail – 2017 Opening Year
  - Royal Brook Residential - 2018 Opening Year
  - Woodridge Forest Development – 2018 Opening Year
  - Riverpoint Village – 2018 Opening Year
  - New Caney Middle School – 2014 Opening Year
- Background Growth Rate of 2% per year up to 2020
- Approximately 4,000 trip-ends during peak hour due to these additional developments

Planned/Funded/Scheduled Roadway and Other Infrastructure Improvements



Public Input – E-mails and Survey

- 111 E-mail Comments as of September 17, 2014
  - 30 E-mail comments since our last Steering Committee Meeting # 3
  - Still receiving e-mails
- 1,075 surveys
  - Survey closed on June 30, 2014

Suggested Improvements by Citizens and Feasibility

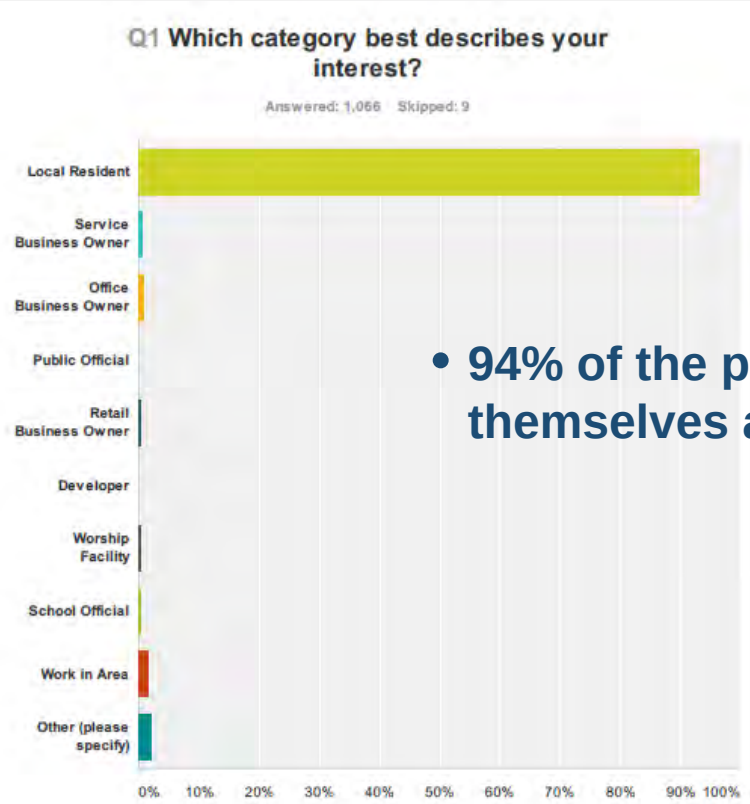
- Reversible lanes on Kingwood Drive **Not Feasible**
- Woodland Hills Connection to Hamblen **Analyzed**
- Innovative Improvements such as roundabouts, diverging diamonds, and All-way stops **Not Feasible**
- Other intersection Improvements including signal timing improvements **Analyzed**
- Maintain green band for peak directions by eliminating off-peak left-turns **Analyzed**
- Direct Connector from Kingwood Drive to US 59 **Analyzed**
- Widen both Kingwood Drive and Northpark Drive **Analyzed**

Suggested Improvements by Citizens and Feasibility

- Coordinate with Union Pacific on Rail Road timings and restrict rail timings during peak hours **Coordinated**
- Widen Hamblen Road to 4-Lanes **Analyzed**
- Connection to Huffman to the east **Not Feasible**
- Woodland Hills Connection through FM 1960 and ultimately to BW 8 **Not Feasible**

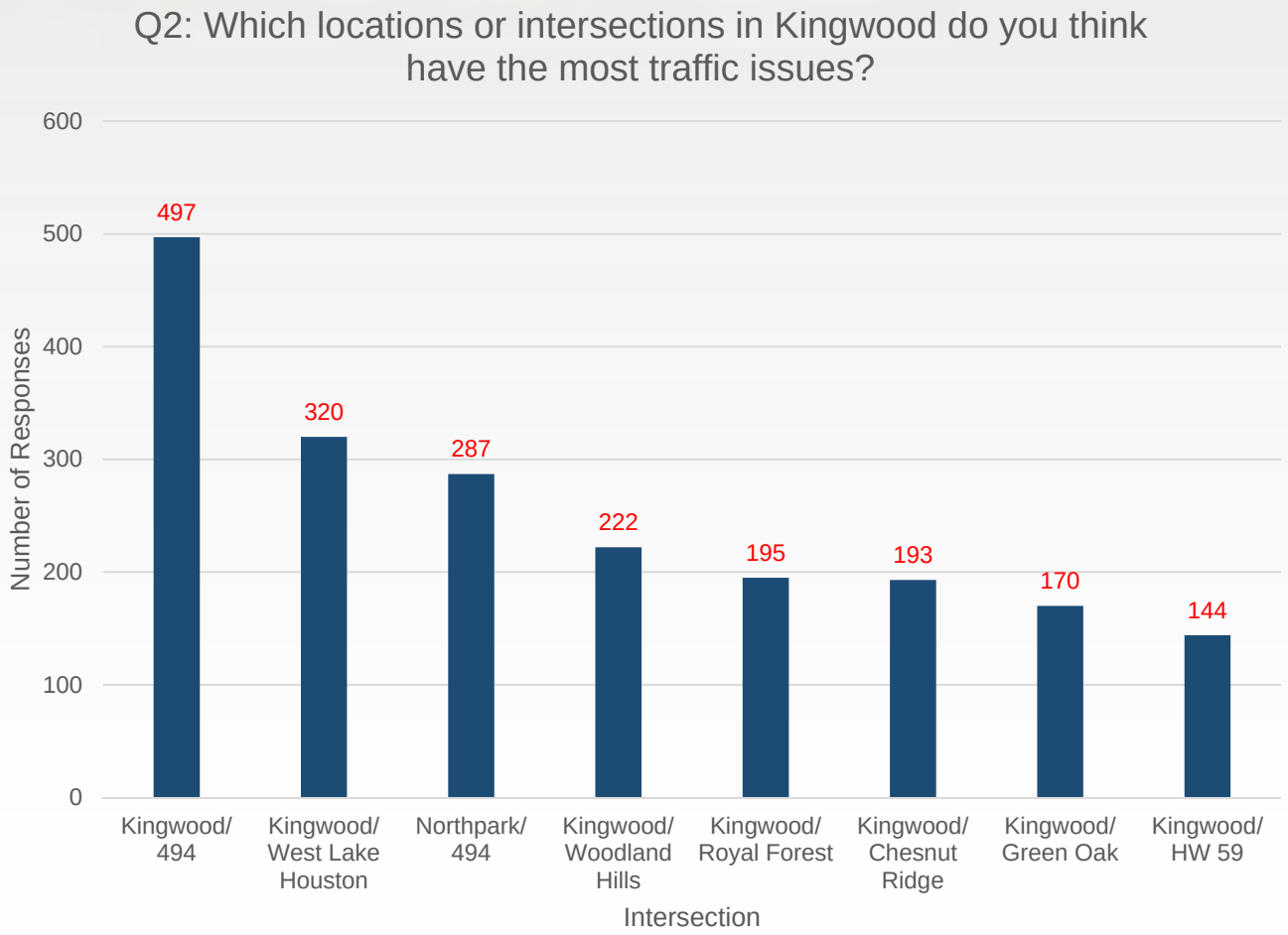
Survey Discussion

Question 1: Which Category best describes your interest?



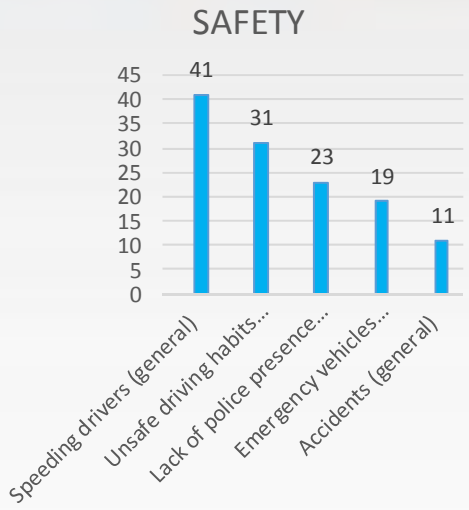
- **94% of the people identified themselves as local residents**

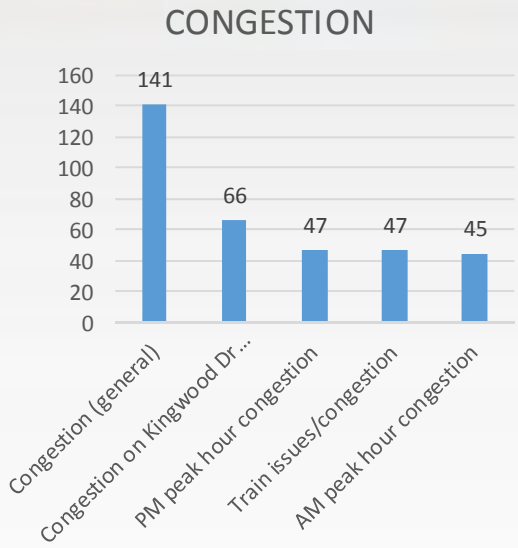
Question 2

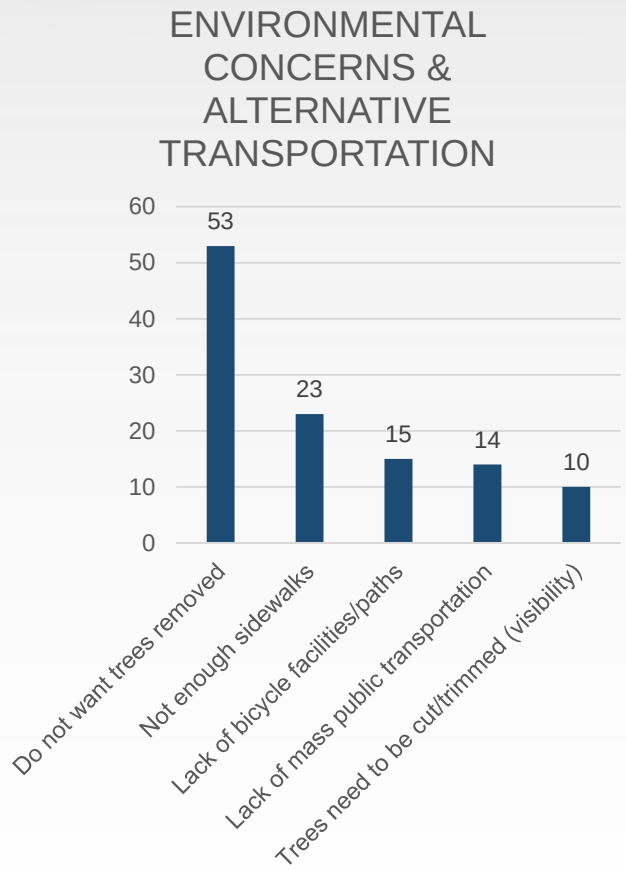

Q2: Which locations or intersections in Kingwood do you think have the most traffic issues?
Number of Responses
600
500
400
300
200
100
0
497
320
287
222
195
193
170
144
Kingwood/ 494
Kingwood/ West Lake Houston
Northpark/ 494
Kingwood/ Woodland Hills
Kingwood/ Royal Forest
Kingwood/ Chesnut Ridge
Kingwood/ Green Oak
Kingwood/ HW 59
Intersection

Question 3

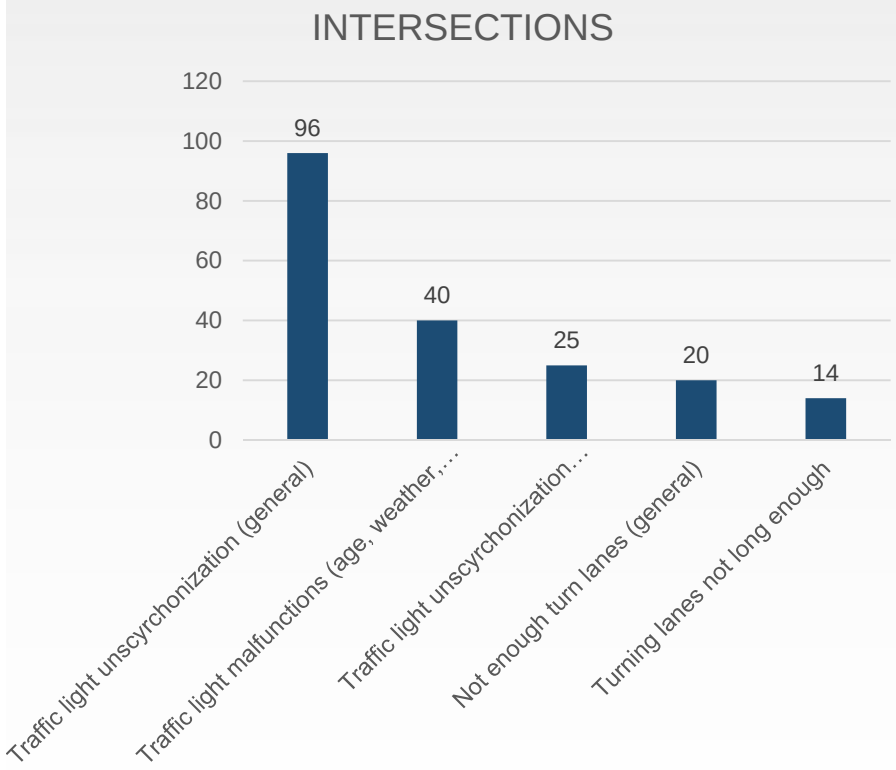
What transportation-related issues in the Kingwood area concern you the most?

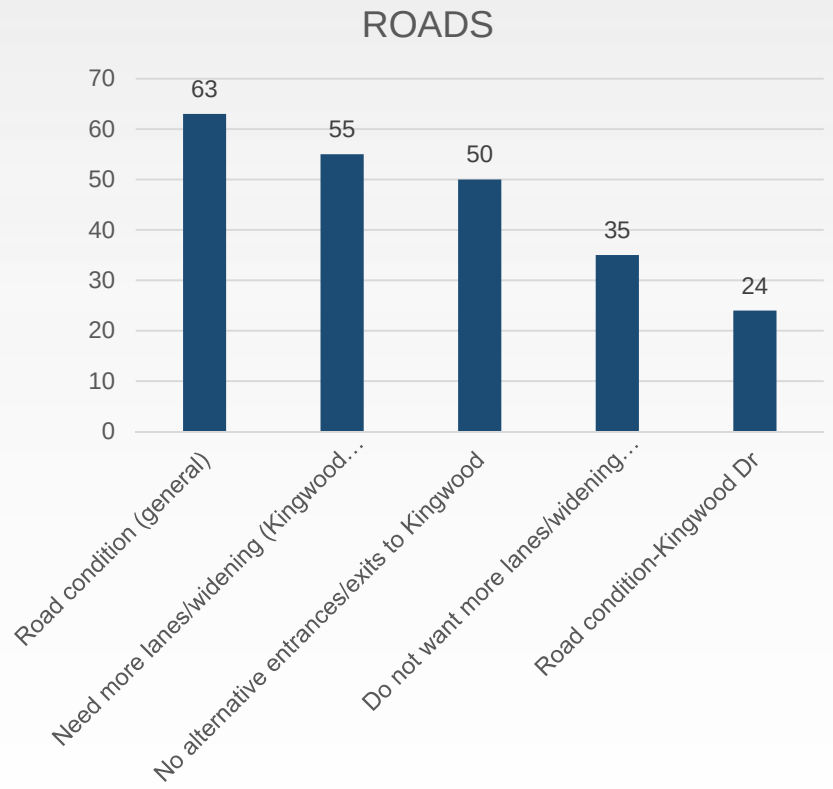






Question 3


INTERSECTIONS
120
100
80
60
40
20
0
96
40
25
20
14
Traffic light unscyrchonization (general)
Traffic light malfunctions (age, weather,…
Traffic light unscyrchonization…
Not enough turn lanes (general)
Turning lanes not long enough

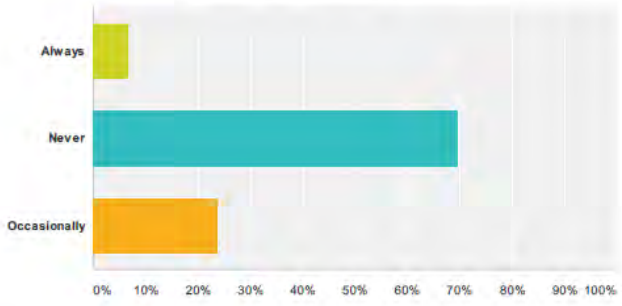

ROADS
70
60
50
40
30
20
10
0
63
55
50
35
24
Road condition (general)
Need more lanes/widening (Kingwood…
No alternative entrances/exits to Kingwood
Do not want more lanes/widening…
Road condition-Kingwood Dr

Question 4 to 9

Walking and Biking

Q4 Other than for recreation, do you or your employees/students walk to work/school in Kingwood?

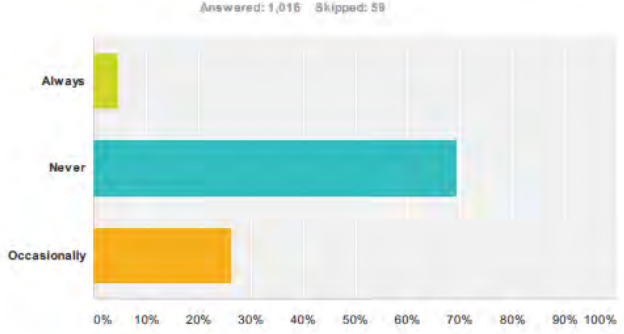
Answered: 1,020 Skipped: 55



Answer Choices	Responses	
Always	6.76%	69
Never	69.71%	711
Occasionally	23.53%	240
Total		1,020

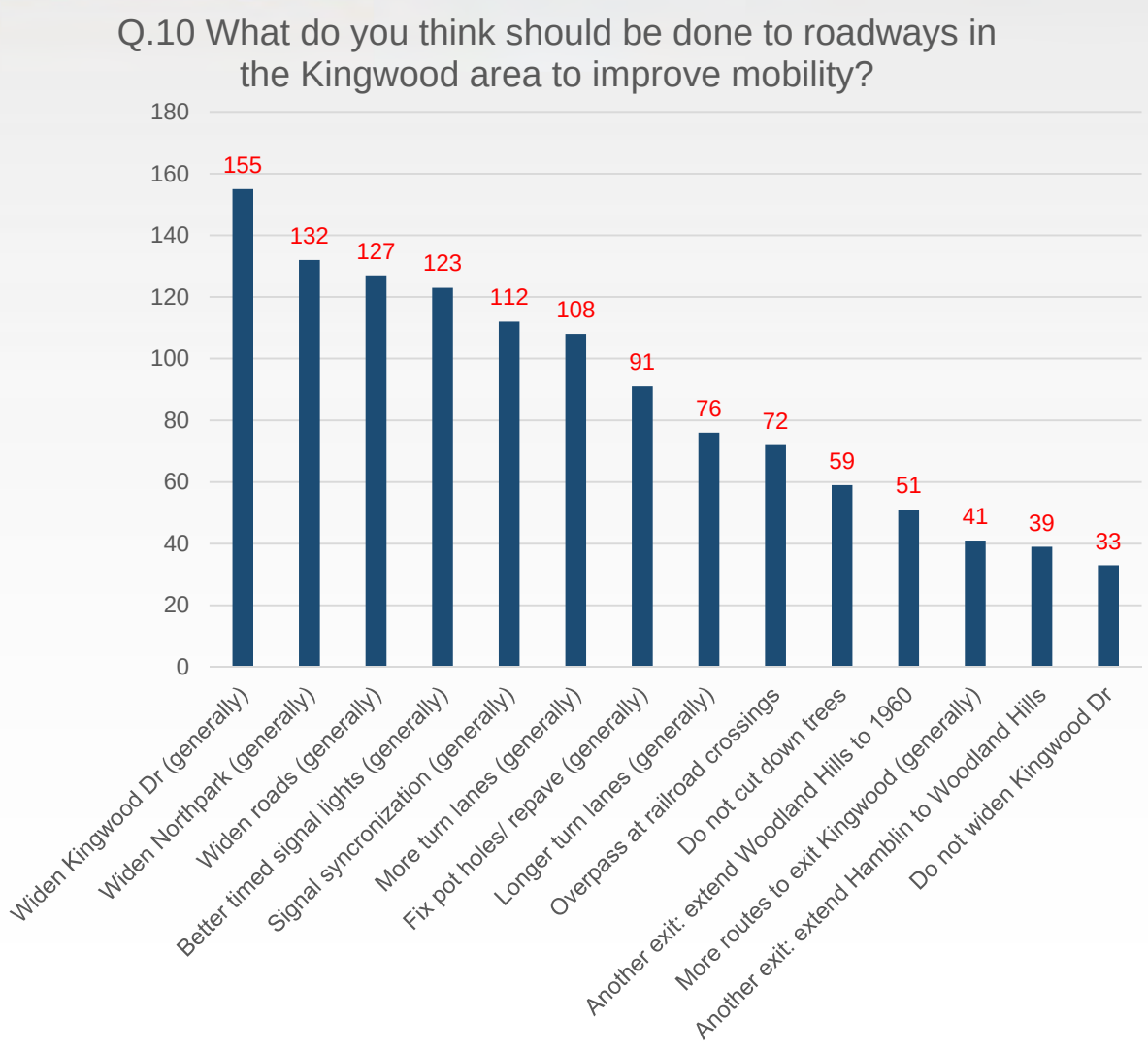
Q7 Other than for recreation, do you or your employees/students bicycle to work/school in Kingwood?

Answered: 1,016 Skipped: 59



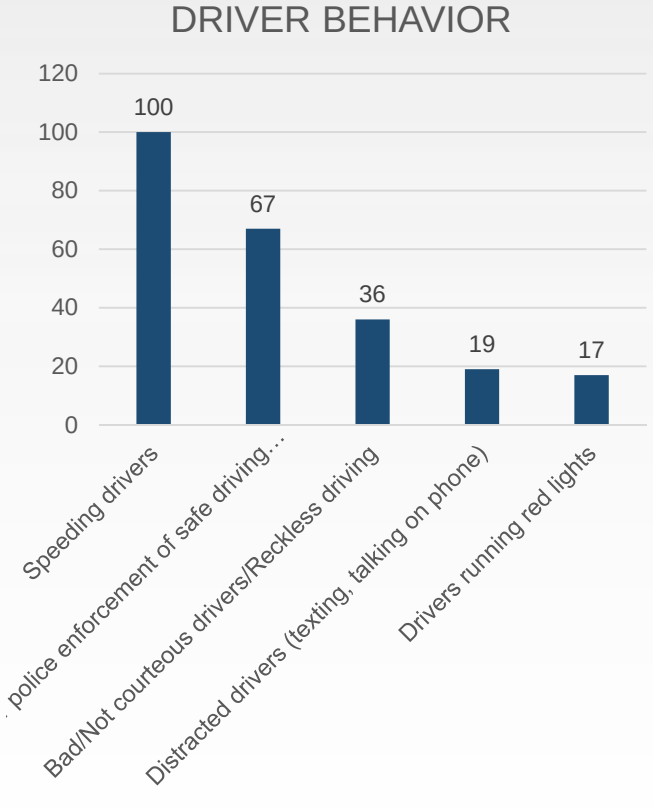
Answer Choices	Responses	
Always	4.53%	46
Never	69.29%	704
Occasionally	26.18%	266
Total		1,016

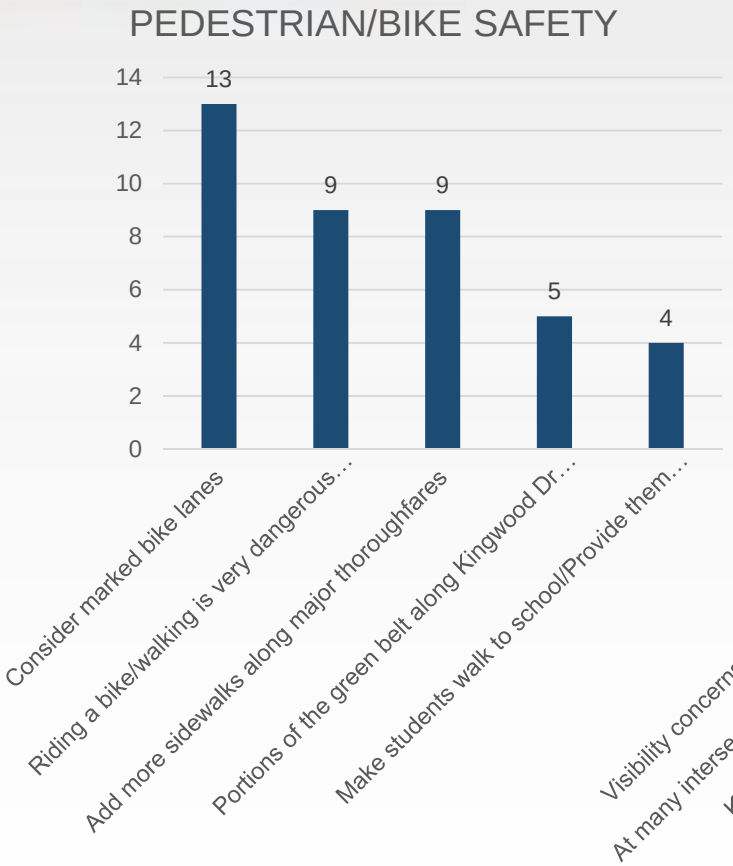
Question 10

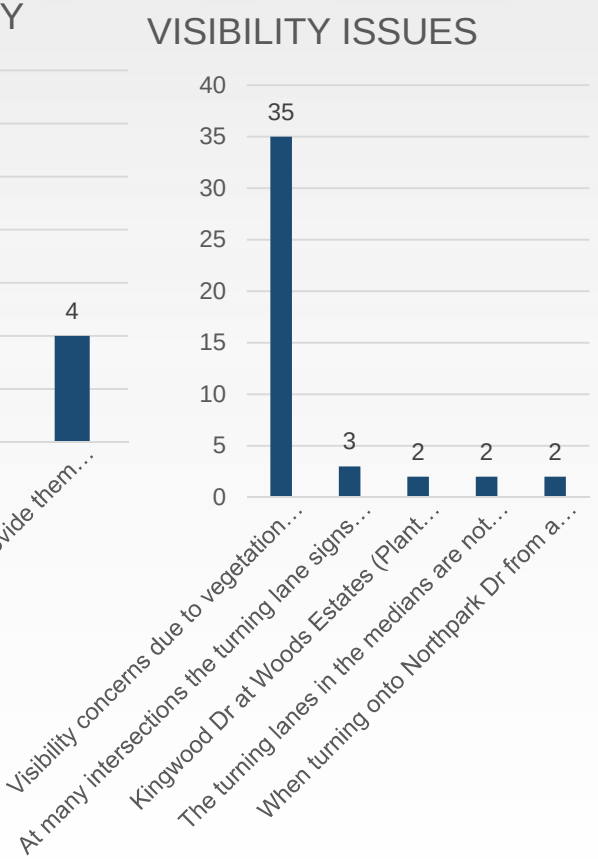

Q.10 What do you think should be done to roadways in the Kingwood area to improve mobility?
180
160
140
120
100
80
60
40
20
0
155
132
127
123
112
108
91
76
72
59
51
41
39
33
Widen Kingwood Dr (generally)
Widen Northpark (generally)
Widen roads (generally)
Better timed signal lights (generally)
Signal syncronization (generally)
More turn lanes (generally)
Fix pot holes/ repave (generally)
Longer turn lanes (generally)
Overpass at railroad crossings
Do not cut down trees
Another exit: extend Woodland Hills to 1960
More routes to exit Kingwood (generally)
Another exit: extend Hamblin to Woodland Hills
Do not widen Kingwood Dr

Question 11

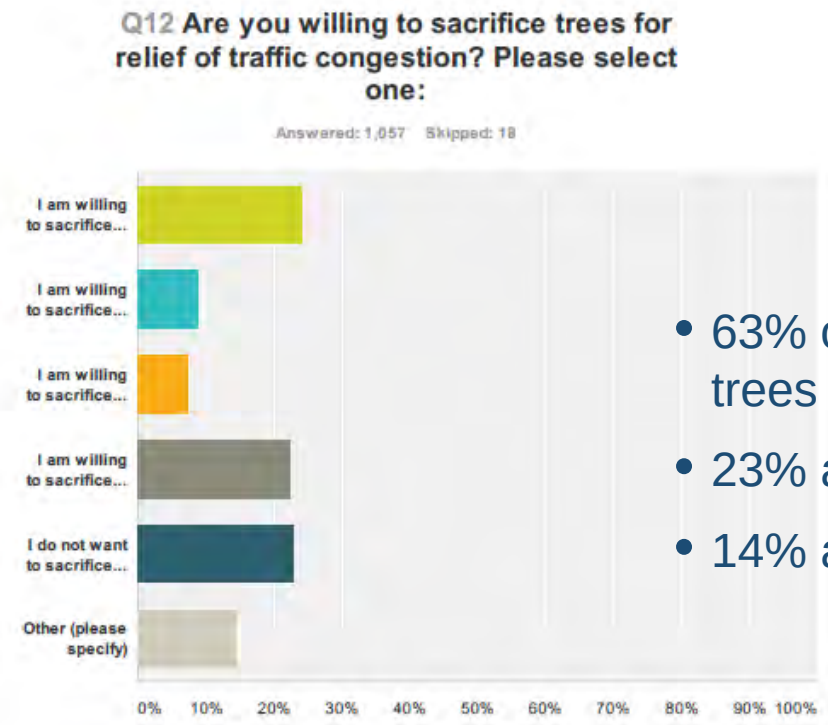
Are there any traffic-related safety concerns in Kingwood? Do you have any suggestions for these issues?







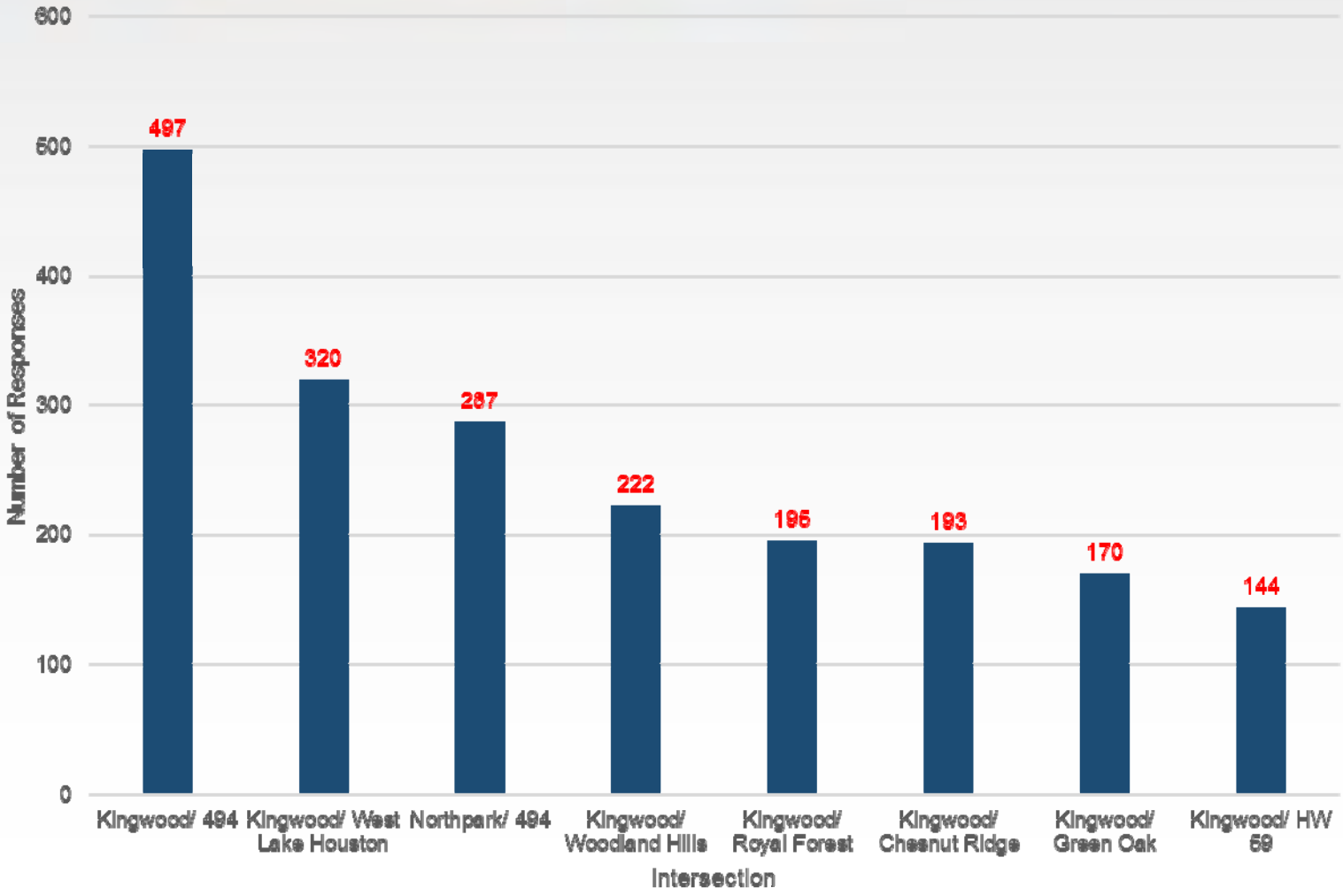
Question 12



- 63% of the people are willing to sacrifice trees for savings of at least 10 minutes
- 23% are not willing to sacrifice any trees
- 14% are undecided

Answer Choices	Responses
I am willing to sacrifice trees along major thoroughfares for travel time savings.	24.12% 255
I am willing to sacrifice 25% of trees along major thoroughfares for a travel time savings of 20 minutes every day.	8.80% 93
I am willing to sacrifice 10% of trees along major thoroughfares for a travel time savings of 10 minutes every day.	7.38% 78
I am willing to sacrifice some trees as long as an equal number of trees are planted elsewhere (reforestation) while achieving travel time savings of 10 minutes every day.	22.33% 236
I do not want to sacrifice a single tree, even if it means travel times continue to increase.	22.99% 243
Other (please specify)	14.38% 152
Total	1,057

Concerns by Location/Intersection



Travel Time Data

Field Collected Travel Times

AM Peak (Westbound)

- On Kingwood Drive from High Valley to US 59 SB Frontage Road = 16.8 Min

PM Peak (Eastbound)

- On Kingwood Drive from US 59 SB Frontage Road to High Valley = 18.4 Min

Synchro Model

AM Peak (Westbound)

- On Kingwood Drive from High Valley to US 59 SB Frontage Road = 17.7 Min

PM Peak (Eastbound)

- On Kingwood Drive from US 59 SB Frontage Road to High Valley = 20.3 Min

Speed Data

Kingwood High School (Westbound)					
Peak Period	Total	<25 mph	26-35 mph	36 to 45 mph	>45 mph
6:30 AM to 7:45 AM	1,739	446	433	583	277
2:30 PM to 3:15 PM	1,503	242	406	572	283
School Zone Flasher Timings	6:40 AM to 7:40 AM and 2:30 PM to 3:15 PM				
Posted Speed	40 mph; School Zone Speed = 25 mph				
85th Percentile Speed	49.2 mph (DAILY BASIS)				

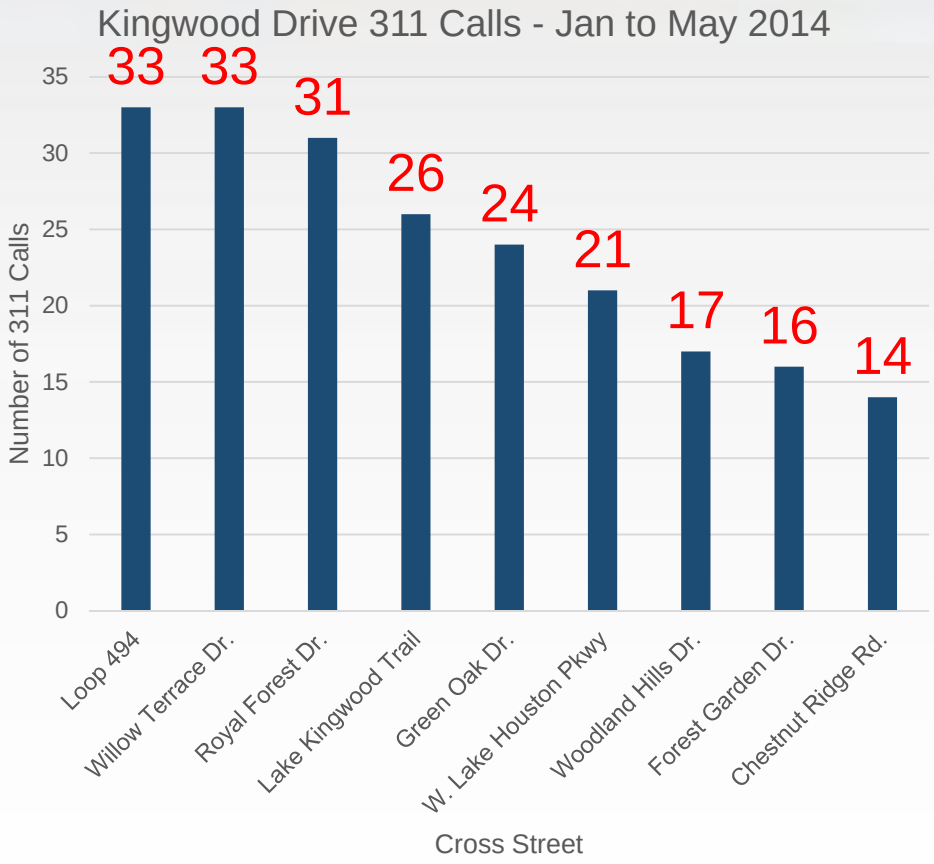
Kingwood High School (Eastbound)					
Peak Period	Total	<25 mph	26-35 mph	36 to 45 mph	>45 mph
6:30 AM to 7:45 AM	973	348	532	91	2
2:30 PM to 3:15 PM	893	379	466	47	1
School Zone Flasher Timings	6:40 AM to 7:40 AM and 2:30 PM to 3:15 PM				
Posted Speed	45 mph; School Zone Speed = 25 mph				
85th Percentile Speed	35 mph (DAILY BASIS)				

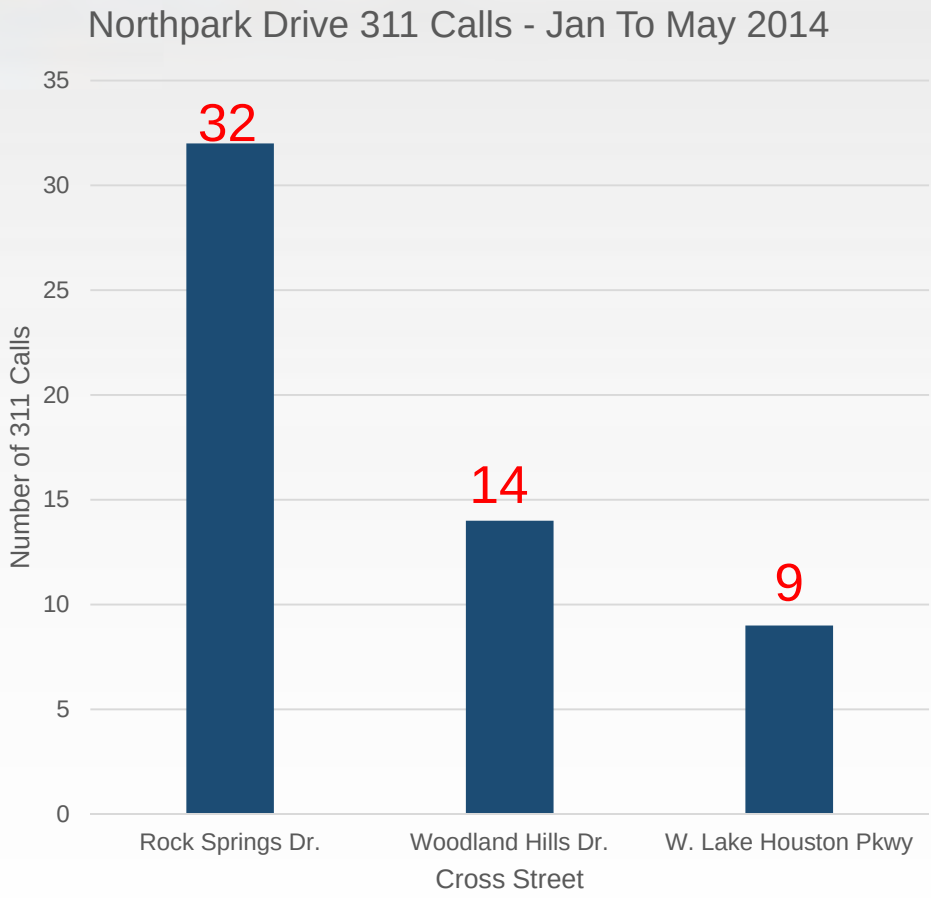
Speed Data

Creekwood Middle School (Southbound)					
Peak Period	Total	<20 mph	20-30 mph	30 to 45 mph	>45 mph
7:45 AM to 9:00 AM	1,157	205	726	211	15
3:30 PM to 4:30 PM	1,233	197	522	493	21
School Zone Flasher Timings	7:50 AM to 8:50 AM and 3:40 PM to 4:25 PM				
Posted Speed	45 mph; School Zone Speed = 20 mph				
85th Percentile Speed	44.1 mph (DAILY BASIS)				

Creekwood Middle School (Northbound)					
Peak Period	Total	<20 mph	20-30 mph	30 to 45 mph	>45 mph
7:45 AM to 9:00 AM	1,353	373	541	439	0
3:30 PM to 4:30 PM	1,277	519	353	394	11
School Zone Flasher Timings	7:50 AM to 8:50 AM and 3:40 PM to 4:25 PM				
Posted Speed	45 mph; School Zone Speed = 20 mph				
85th Percentile Speed	40.3 mph (DAILY BASIS)				

311 Calls – Signal Repair





COH MTFP Thresholds

- City of Houston MTFP volume thresholds
  - 2-Lanes = 14,000 to 16,000 vehicles/day
  - 4-Lanes = 30,000 to 33,000 vehicles/day
  - 6-Lanes = 40,000 to 45,000 vehicles/day
- Kingwood Drive from US 59 to Woodland Hills Drive- Exceeded the threshold (Current Data=37K to 41K per day)
- Northpark Drive from US 59 to Woodland Hills Drive- Exceeded the threshold (Current Data=35K per day)
- West Lake Houston Parkway from Kingwood Drive to Bridge (south) – (Current Data=31K/day)

Improvement Alternatives

1. Intersection Improvements
2. Left-Turn Prohibition in Off-Peak Direction

A. 6-Lane Kingwood Drive only

B. 6-Lane Northpark Drive only

C. Direct Connector from Kingwood Drive to US 59 only

D. Direct Connector from Northpark Drive to US 59 only

E. 6-Lane Kingwood Drive with direct connector from Kingwood Drive to US 59

F. 6-Lane Northpark Drive with direct connector from Northpark Drive to US 59

G. 6-Lane Kingwood Drive, 6-Lane Northpark Drive, Direct Connector from Kingwood Drive to US 59, and Direct Connector from Northpark Drive to US 59

H. Woodland Hills Drive Extension to Hamblen Road

I. Widening of Kingwood Drive and Northpark Drive

J. Underpass on Kingwood Drive @ Loop 494/Rail Road

K. Underpass on Northpark Drive @ Loop 494/Rail Road

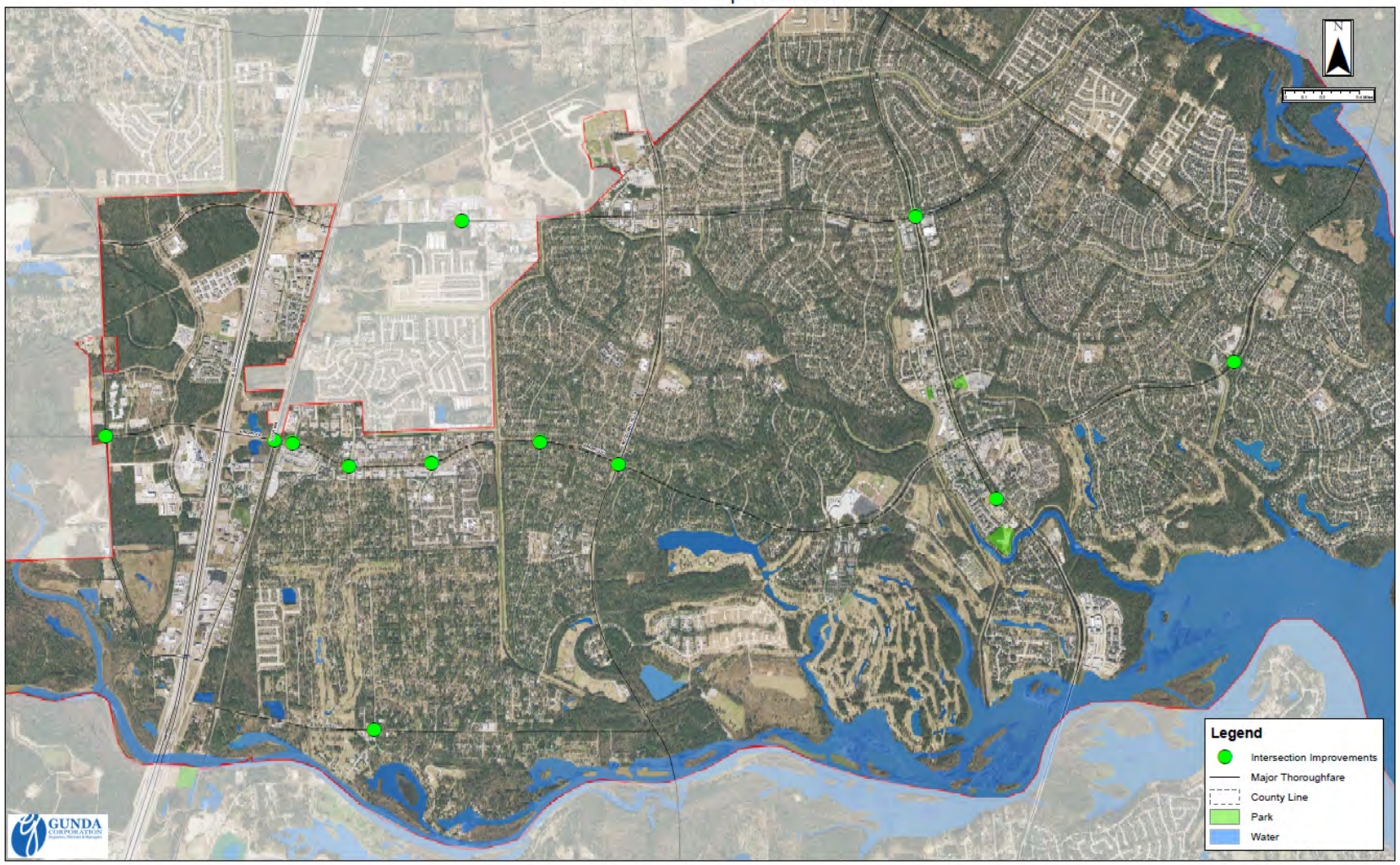
Option 1: Intersection Improvements

- Traffic Signal Timing Coordination
- New Traffic Signal at Northpark Drive & Hidden Pines/Woodridge Parkway
- EBR at Northpark Drive & Hidden Pines
- EBR at Northpark Drive & West Lake Houston Parkway
- NBR at West Lake Houston Parkway & Kings Crossings Drive
- NBR at Kingwood Drive & Sorters Road
- EBR and WBR at Kingwood Drive & Loop 494
- NBR at Kingwood Drive & Royal Forest Drive
- EBR at Kingwood Drive & Green Oak Drive

Option 1: Intersection Improvements

- EBR at Kingwood Drive & Trailwood Village Drive
- NBR & SBR at Kingwood Drive & Chestnut Ridge Road
- EBR, WBR, EBL, WBL at Kingwood Drive & Woodland Hills Drive
- EBR at Kingwood Drive & Willow Terrace
- EBL at Hamblen Road & Forest Cove Drive
- Widening of Mills Branch Road from North of Kingwood Drive to Royal Brook Residential (New Development), north of Northpark Drive

Option 1: Intersection Improvements



Option 1: Intersection Improvements

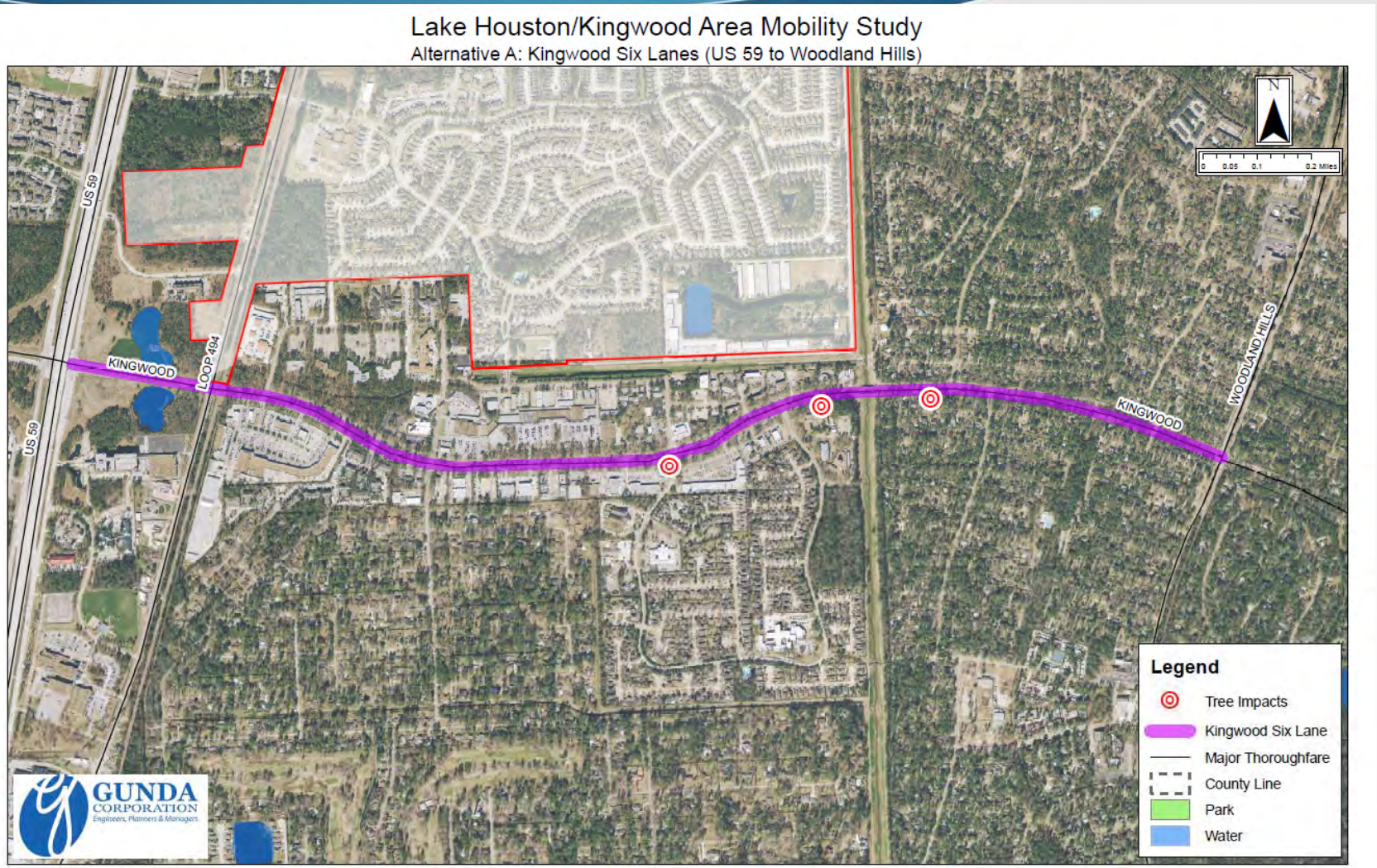
- Total Delay (in 2014):
  - Before: 1,176 Hours (AM); 1,963 Hours (PM)
  - After: 988 Hours (AM); 1,552 Hours (PM)
  - Reduction: 16% (AM); 21% (PM)
- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,302 Hours (AM); 2,131 Hours (PM)
  - Reduction: 23% (AM); 25% (PM)
- Cost of Improvements = $16.35 Million
- Crash Reduction = 52.50%
- Tree Impacts = < 10%
- Number of Intersections at LOS E/F with Improvements (2014) = 10
- Number of Intersections at LOS E/F with Improvements (2020) = 20

Option 2: Left Turn Prohibition in Off-Peak

- On Kingwood Drive Only
- At 12 locations on Kingwood Drive, additional left-turns and acceleration lanes are required for restricted left-turns to turn around.
- Total Delay (in 2014):
  - Before: 1,176 Hours (AM); 1,963 Hours (PM)
  - After: 1,032 Hours (AM); 1,700 Hours (PM)
  - Reduction: 12% (AM); 13% (PM)
- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,560 Hours (AM); 2,596 Hours (PM)
  - Reduction: 7.5% (AM); 9% (PM)
- Cost = $6.4 Million
- Tree Impacts = <10%
- Crash Reduction = 30%

- Number of Intersections at LOS E/F with Improvements (2014) = 10
- Number of Intersections at LOS E/F with Improvements (2020) = 20

Alternative A



Alternative A

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,081 Hours (AM); 1,845 Hours (PM)
  - Reduction: 36% (AM); 35% (PM)
- Cost of Improvements = $31.3 Million
- Crash Reduction = 60%
- Tree Impacts = < 10%
- Number of Intersections at LOS E/F = 9
- **Pros:** Reduces Travel Time, Congestion, Already funded
- **Cons:** Some tree impacts

Alternative B

Alternative B

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,146 Hours (AM); 1,895 Hours (PM)
  - Reduction: 32% (AM); 34% (PM)
- Cost of Improvements = $27.1 Million
- Crash Reduction = 30%
- Tree Impacts = < 10%
- Number of Intersections at LOS E/F with Improvements (2020) = 12
- **Pros:** Reduces Travel Time and Congestion
- **Cons:** Some tree impacts, multiple agency coordination, Montgomery County Roadway, Funding not readily available

Alternative C

Alternative C

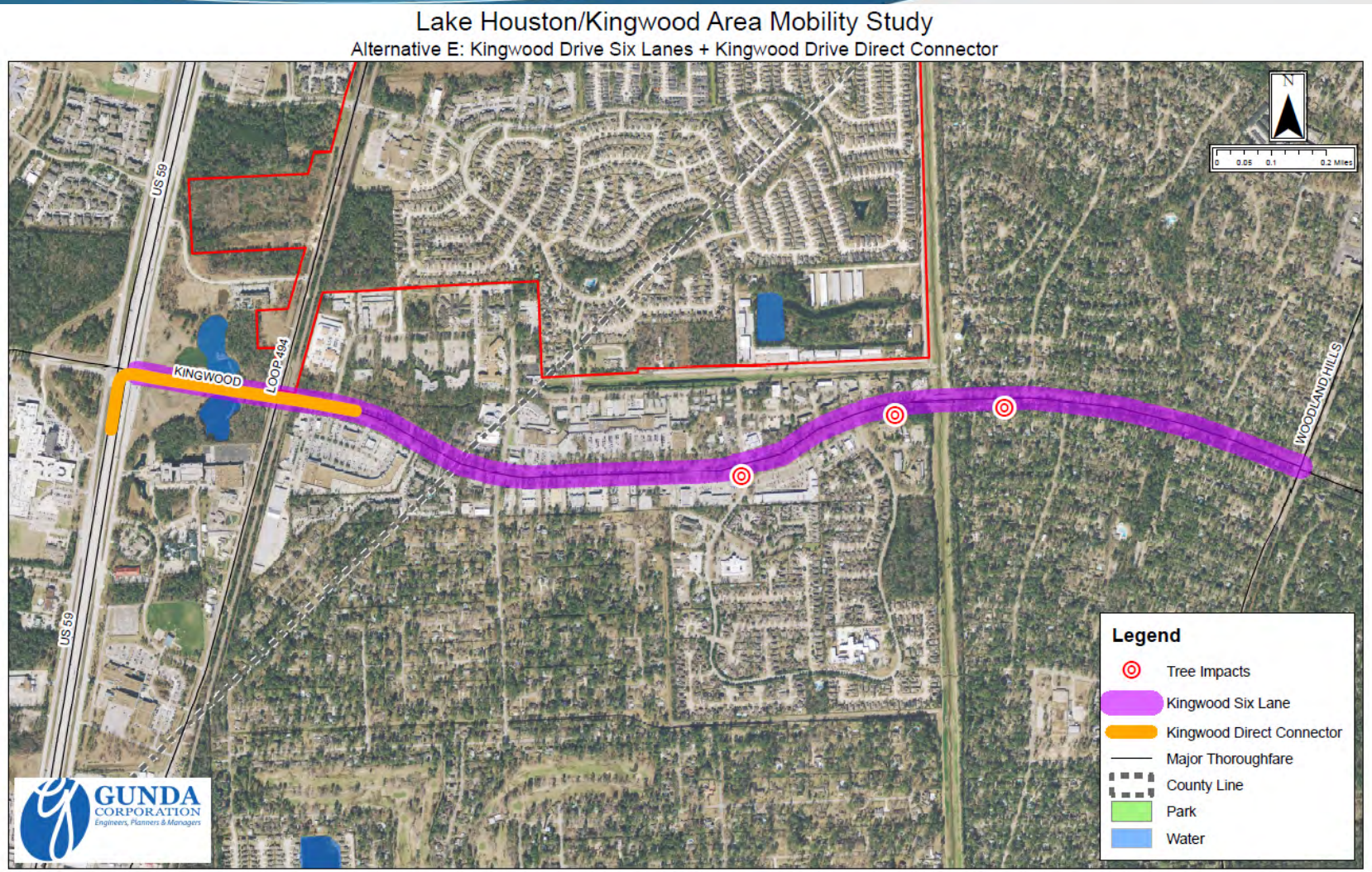
- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,432 Hours (AM); 2,265 Hours (PM)
  - Reduction: 15% (AM); 21% (PM)
- **Cost of the Improvement:** $50.72 Million
- **Tree Impacts:** <10%
- **Crash Reduction =** 15%
- Number of Intersections at LOS E/F with Improvements (2020) = 15
- **Pros:** Reduces Travel Time, Congestion, by eliminating turning movements at LP 494 and US 59
- **Cons:** Some tree impacts, High Cost, Aesthetics, Environmental Clearances

Alternative D

Alternative D

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,536 Hours (AM); 2,274 Hours (PM)
  - Reduction: 9% (AM); 20% (PM)
- **Cost of the Improvement:** $50.52 Million
- **Tree Impacts:** <10%
- **Crash Reduction:** 15%
- Number of Intersections at LOS E/F with Improvements (2020) = 12
- **Pros:** Reduces Travel Time, Congestion at Loop 494 near rail road
- **Cons:** Some tree impacts, High Cost, Aesthetics, Environmental Clearances

Alternative E



Alternative E

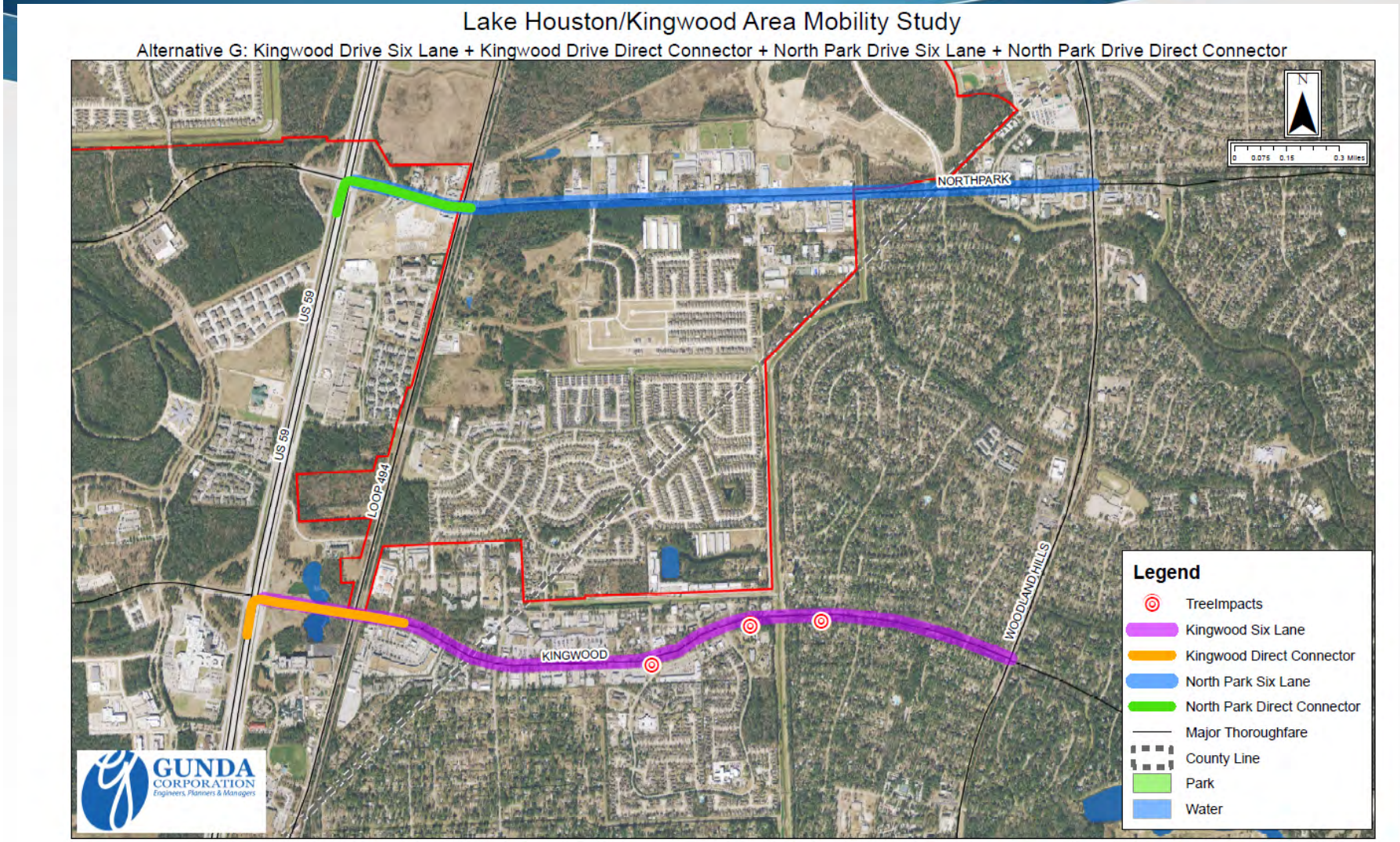
- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,043 Hours (AM); 1,816 Hours (PM)
  - Reduction: 38% (AM); 36% (PM)
- **Cost of the Improvement:** $82 Million
- **Tree Impacts:** <10%
- **Crash Reduction:** 60%
- Number of Intersections at LOS E/F with Improvements (2020) = 6
- **Pros:** Reduces Travel Time and Congestion, Already funded for widening
- **Cons:** Some tree impacts, High Cost, Aesthetics, TxDOT coordination, Environmental Clearances for over pass

Alternative F

Alternative F

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,010 Hours (AM); 1,816 Hours (PM)
  - Reduction: 40% (AM); 36% (PM)
- **Cost of the Improvement:** $77.6 Million
- **Tree Impacts:** <10%
- **Crash Reduction:** 30%
- Number of Intersections at LOS E/F with Improvements (2020) = 8
- **Pros:** Reduces Travel Time, Congestion
- **Cons:** Some tree impacts, High Cost, Aesthetics, TxDOT coordination, Environmental Clearances for over pass, multiple agency coordination, Montgomery County Road

Alternative G



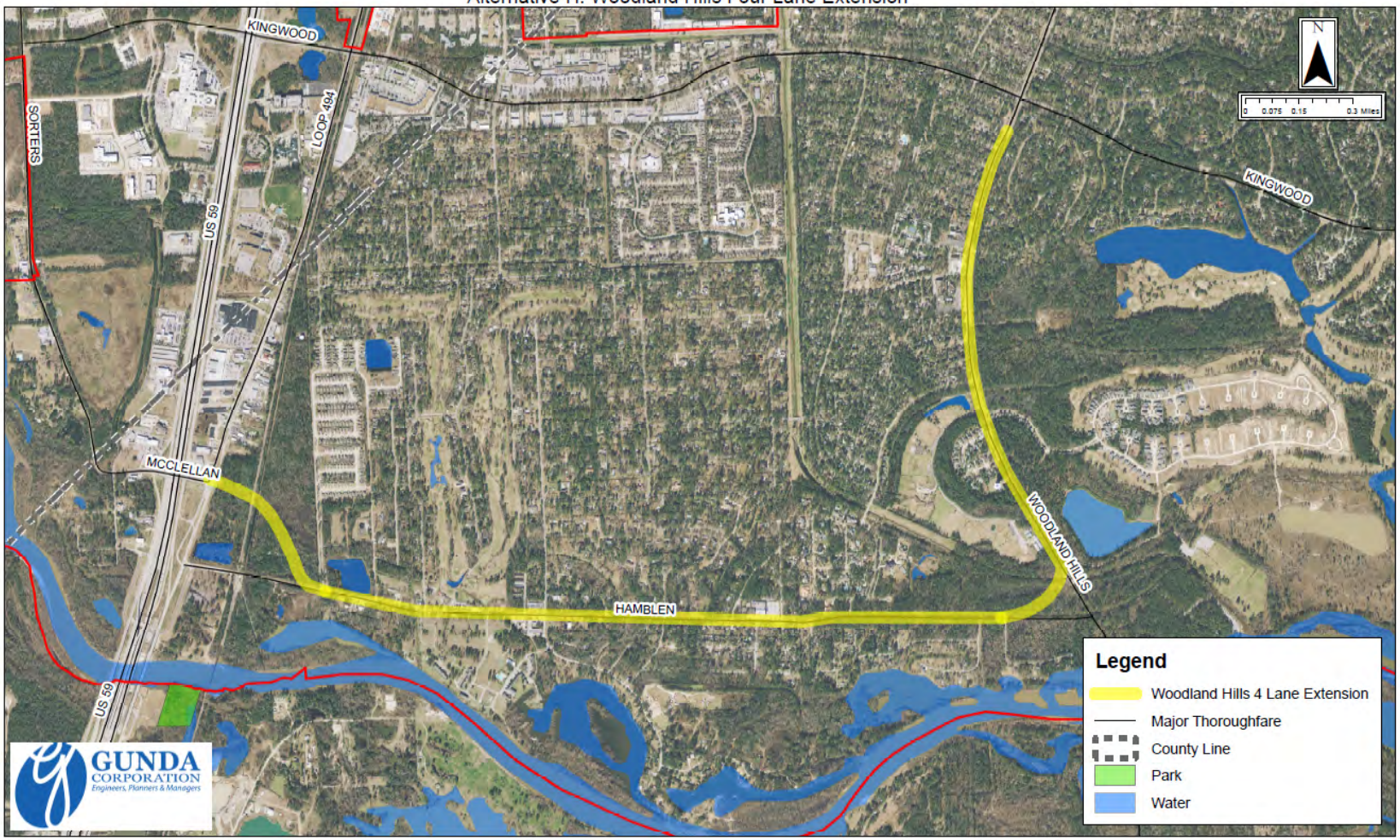
Alternative G

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 795 Hours (AM); 1,690 Hours (PM)
  - Reduction: 53% (AM); 41% (PM)
- **Cost of the Improvement:** $159.64 Million
- **Tree Impacts:** <10%
- **Crash Reduction:** 70%
- Number of Intersections at LOS E/F with Improvements (2020) = 0
- **Pros:** Reduces Travel Time, Congestion, Already funded for widening
- **Cons:** Some tree impacts, High Cost, Aesthetics, TxDOT coordination, Environmental Clearances for over pass, Cost Prohibitive, Multiple Agency Coordination

Alternative H

Lake Houston/Kingwood Area Mobility Study

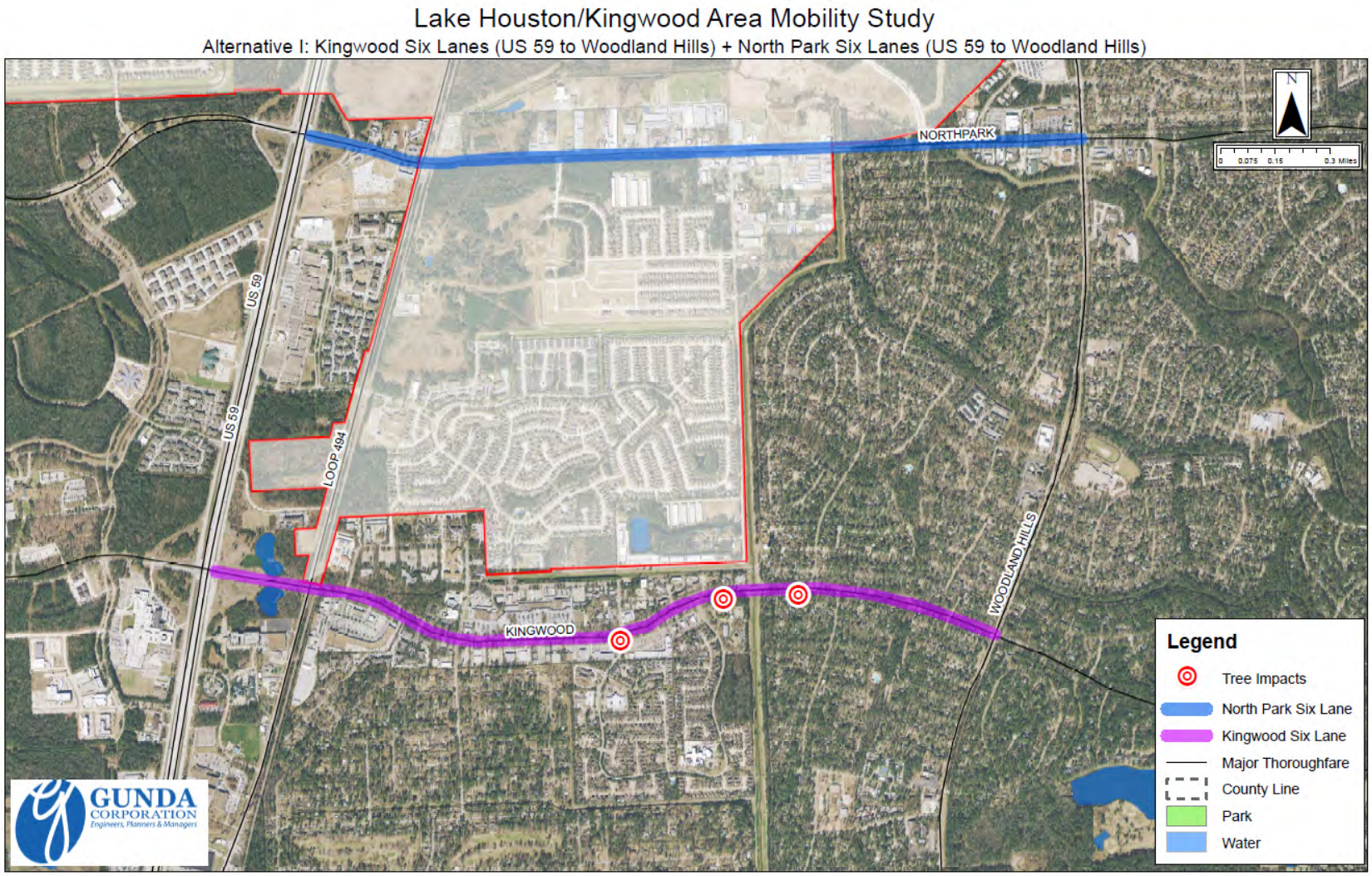
Alternative H: Woodland Hills Four Lane Extension



Alternative H

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 795 Hours (AM); 1,690 Hours (PM)
  - Reduction: 53% (AM); 41% (PM)
- **Cost of the Improvement:** $45.10 Million
- **Tree Impacts:** <30%
- **Crash Reduction:** 11%
- Number of Intersections at LOS E/F with Improvements (2020) = 9
- **Pros:** Reduces Travel Time and Congestion on Kingwood Drive, Provides a reliable alternative route for the area
- **Cons:** Significant tree impacts, not funded, ROW, environmental clearances

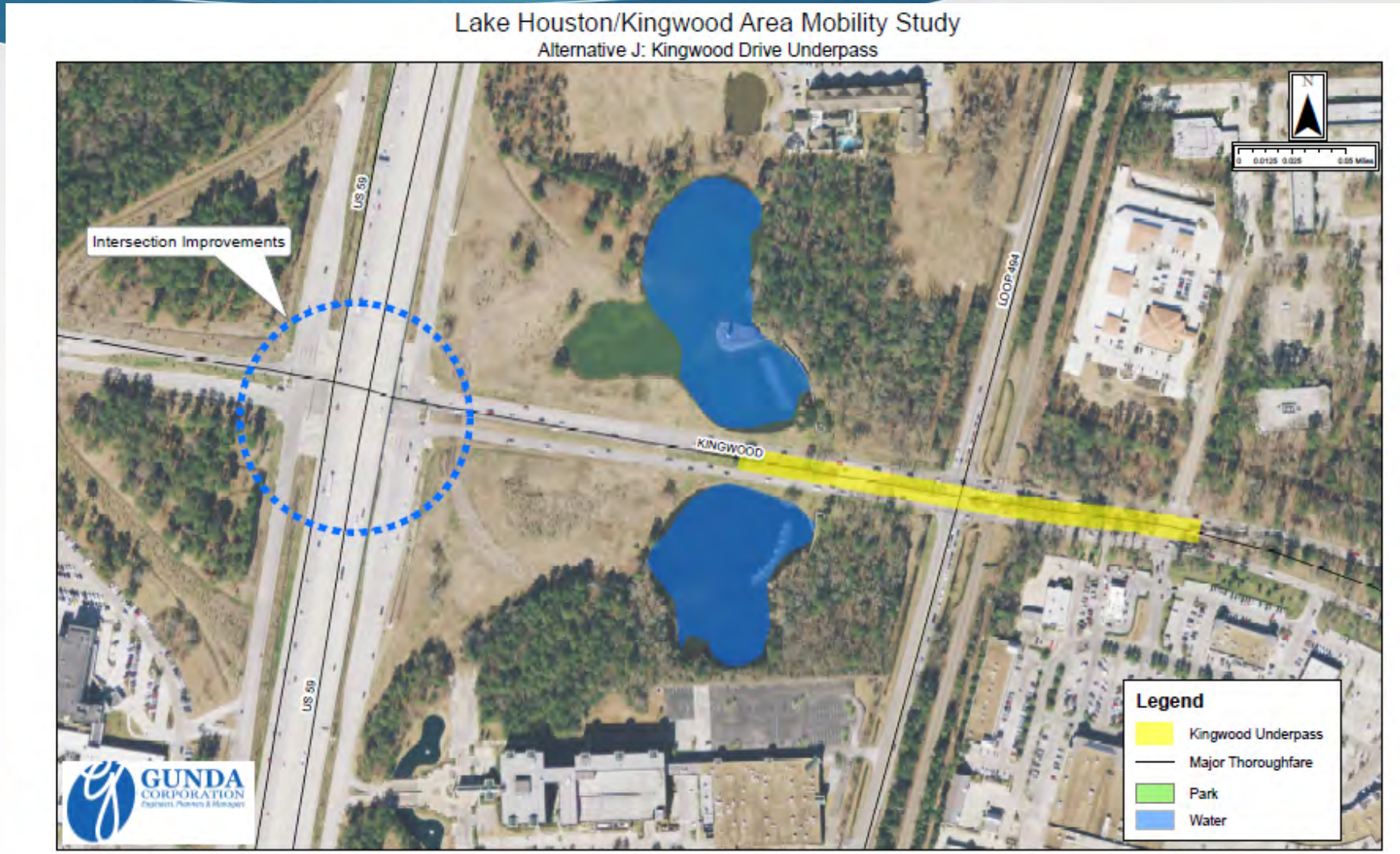
Alternative I



Alternative I

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 951 Hours (AM); 1,759 Hours (PM)
  - Reduction: 44% (AM); 38% (PM)
- **Cost of the Improvement:** $58.4 Million
- **Tree Impacts:** <10%
- **Crash Reduction:** 70%
- Number of Intersections at LOS E/F with Improvements (2020) = 3
- **Pros:** Reduces Travel Time and Congestion, Partly funded
- **Cons:** More tree impacts, multiple agency coordination, need to identify funding for Northpark Road

Alternative J



Alternative J

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,467 Hours (AM); 2,282 Hours (PM)
  - Reduction: 13% (AM); 20% (PM)
- **Cost of the Improvement:** TBD
- **Tree Impacts:** <10%
- **Crash Reduction:** 7.5%
- Number of Intersections at LOS E/F with Improvements (2020) = 8
- **Pros:** Reduces Travel Time and congestion at Loop 494 near Railroad
- **Cons:** Some tree impacts, all trees between US 59 & Loop 494, TXDOT and UP Rail Road Coordination, Impact to Retail Driveway at Royal Forest Drive

Alternative K

Alternative K

- Total Delay (in 2020):
  - Before: 1,689 Hours (AM); 2,849 Hours (PM)
  - After: 1,554 Hours (AM); 2,288 Hours (PM)
  - Reduction: 8% (AM); 20% (PM)
- **Cost of the Improvement:** TBD
- **Tree Impacts:** <10%
- **Crash Reduction:** 7.5%
- Number of Intersections at LOS E/F with Improvements (2020) = 12
- **Pros:** Reduces Travel Time and congestion at Loop 494 near Railroad
- **Cons:** Some tree impacts, all trees between US 59 & Loop 494, TXDOT and UP Rail Road Coordination.

Scoring Criteria

- Scoring MOE's
- Scoring Goals
- Weighting Factors

Improvements/Goals	Community Input	Improve Mobility (Short-Term & Long-Term)	Maintain Same or Better Quality of Life	Identify Funding Sources	Safety	Transit	Pedestrian Facilities	Total Score
		Plan for Future				Public Transportation		
		Quick Fixes				Trolley System		
Category Code	A	B	C	D	E	F	G	A to G
Weighting Factor	0	30	25	5	30	5	5	100

Hands on Exercise

- Review each improvement Option and assign score for each option
- Based on the weighting factors, the score will be calculated
- Higher the score, better the option

Next Steps

- Stakeholder Meeting #2 – October 14, 2014 @ 5:30 PM
- Open House Format with Exhibits at Stations
- Next Steering Committee Meeting Date: November 18, 2014 @ 6:00 PM
- Survey Summary and data will be posted on the website http://gundacorp.com/kingwood-mobility/

Questions?