

# Mill River District Shoreline Analysis

Community Meeting  
June 14, 2016

City of New Haven



*presented by...*  
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*Mr. Gregory Roebuck, P.E.*



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**Whitecap Engineering, LLC**

*on behalf of...*



**The City of New Haven**



City of New Haven



# Background

- Mill River District Planning Study
  - Framework for Development
    - Retain Current Job Base
    - Expand Industrial/Commercial Base
    - Connect Adjacent Neighborhoods
  - Flood Management
  - Mill River District Shoreline Analysis



# 1. Intent of Presentation

- To provide the community and other parties interested in the Mill River District with insight into the following:
  - The Existing Condition of the Shoreline;
  - The Flood Climate;
  - Potential Flood Protection Measures; and
  - An opportunity to pose questions regarding the District and the impacts of the Potential Flood Protection Measures.





## 2. Existing Conditions



- District/Study Limits
- Several Companies
- Electrical Substation
- Key Infrastructure
- Undeveloped/Underutilized Properties



## 2. Existing Conditions (cont.)

March 8, 2015

**Data Request Questionnaire**  
**Mill River District Shoreline Analysis**

1. What type of facility is located at the Subject Property, what is the subject property's primary function, and how many people does it employ?

Manufacturing  
Light production of machine parts

2. What structures currently exist at the Subject Property and what are their approximate ages?

Self standing 8000 sq ft. Brick/Block 1 story  
Original building 1917


3. Has the Subject Property ever been flooded during past storm events? If yes, please identify the subject storm(s) and the flood impact (i.e., horizontal and vertical extent of flooding).

Only up to parking lot, (During Sandy)  
never into the building

4. What type of waterfront currently exists at the Subject Property (e.g., stone revetment, sheet pile bulkhead, natural shoreline, etc.)?

Natural Shoreline

Page 1 of 3



### Community Input

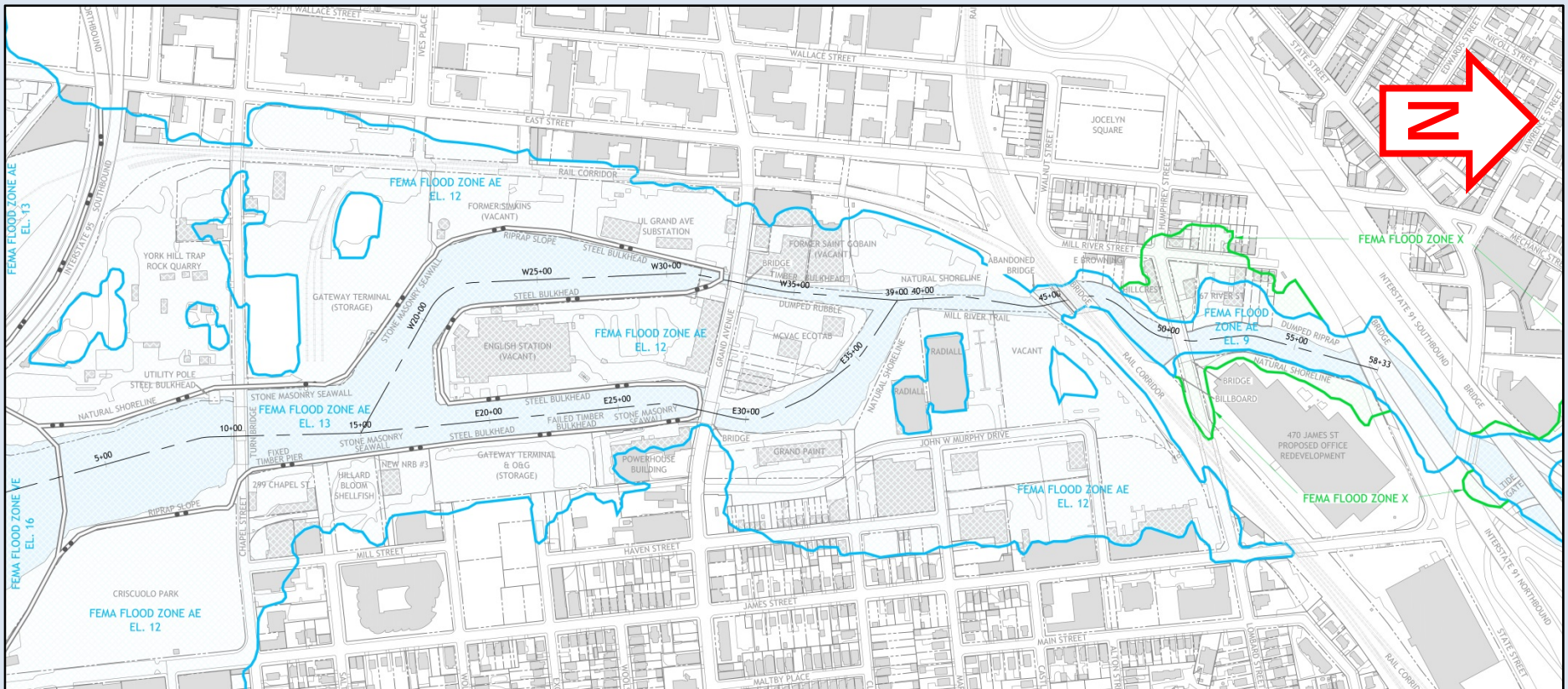
- Site Information
- Accounts of Flooding





# 2. Existing Conditions (cont.)

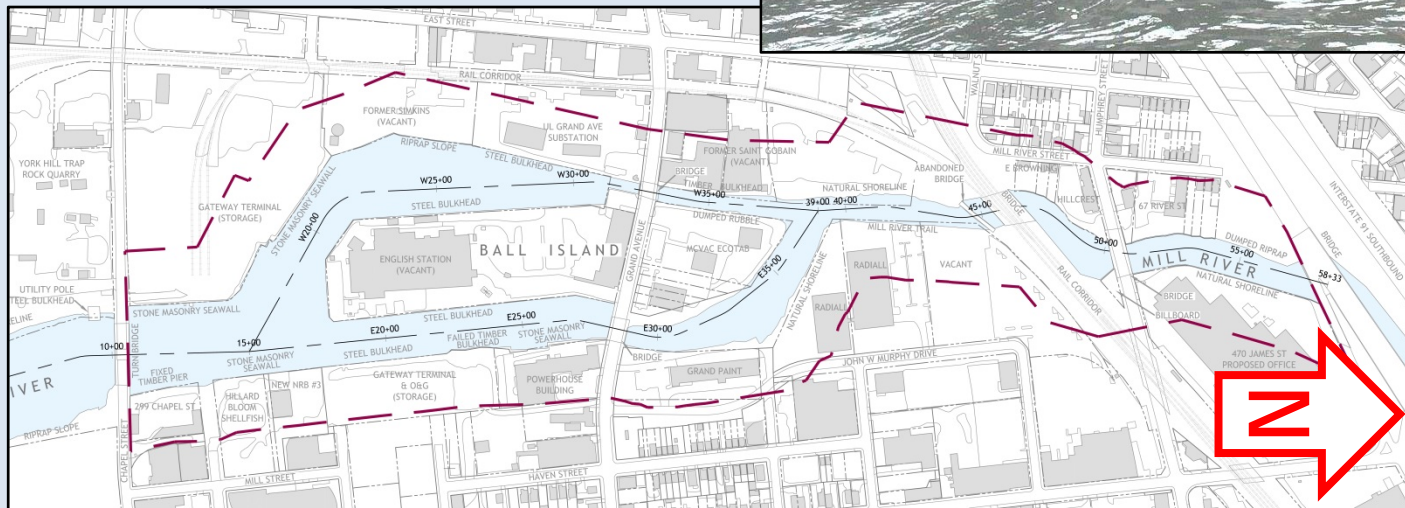
## FEMA Flood Boundaries



# 3. Shoreline Inspection

## Inspection

- Understand Shoreline
- Study Area Limits
- Numeric Grading System



# 3. Shoreline Inspection (cont.)

## Chapel to Grand

- Steel/Timber Bulkheads
- Stone Masonry Seawall
- Remnants of historic structures
- Varying Condition





# 3. Shoreline Inspection (cont.)



# 3. Shoreline Inspection (cont.)

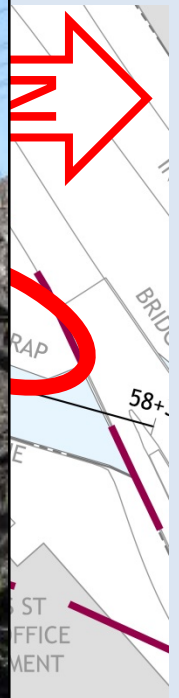
## Grand to I-91

- Timber Bulkheads
- Dumped Riprap/Rubble
- Remnants of Historic Structures
- Natural Shoreline
- Varying Condition



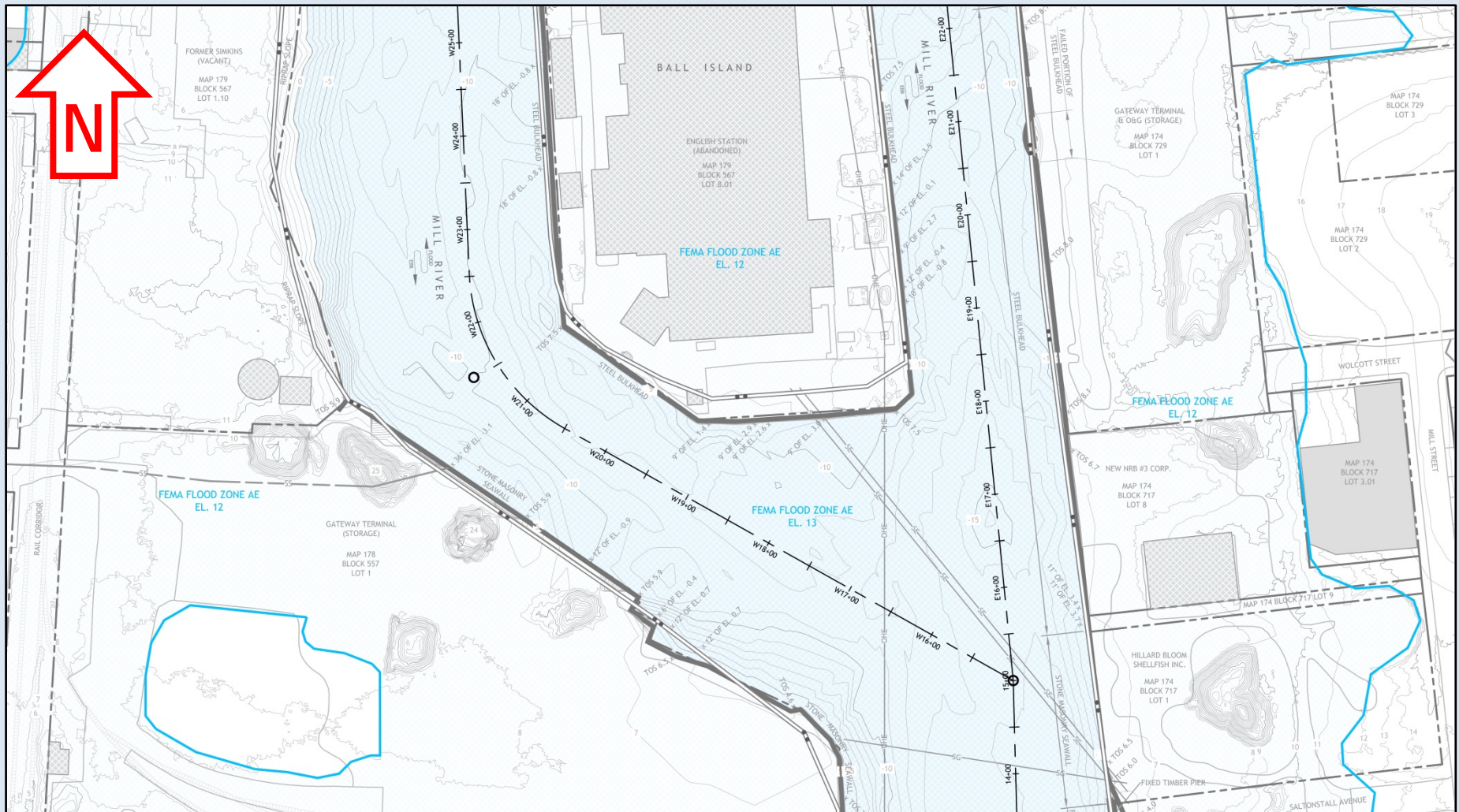


# 3. Shoreline Inspection (cont.)





# 4. Topographic & Bathymetric Surveys



# 5. Flood Evaluation

## Coastal Flooding Analysis

- Review of Past Storm Data
- Review of Community Input
- FEMA CHAMP Model



# 5. Flood Evaluation (cont.)

## Storm Surge Data

NOAA Station 8465705

New Haven, CT



Flood Elevations (NAVD 88)



City of New Haven





# 5. Flood Evaluation (cont.)

## Long Island Sound Wave Data

NOAA Station 44039

### 2012 Christmas Storm

- Wave Height: 10.2 ft, Period: 8 Sec
- Winds: East @ 44-56 MPH

### Hurricane Sandy

- Wave Height: 7.2 ft, Period: 7 Sec
- Winds: Northeast @ 41-53 MPH

### Hurricane Irene

- Wave Height: 9.2 ft, Period: 7 Sec
- Winds: West @ 38-52 MPH



Select Basemap ▾



Large icon indicates selected station. [Disclaimer](#)

- ◆ Stations with recent data
- ◆ Stations with no data in last 8 hours (24 hours for tsunami stations)



# 5. Flood Evaluation (cont.)

## Design Wave Calculations

### ACES & Fetch Analysis

#### Duration Limited Wave (100 yr storm)

- Wind Duration: 1 Hour

#### Fetch Limited Wave (Largest Wave)

- Wind Duration: 3 Hour

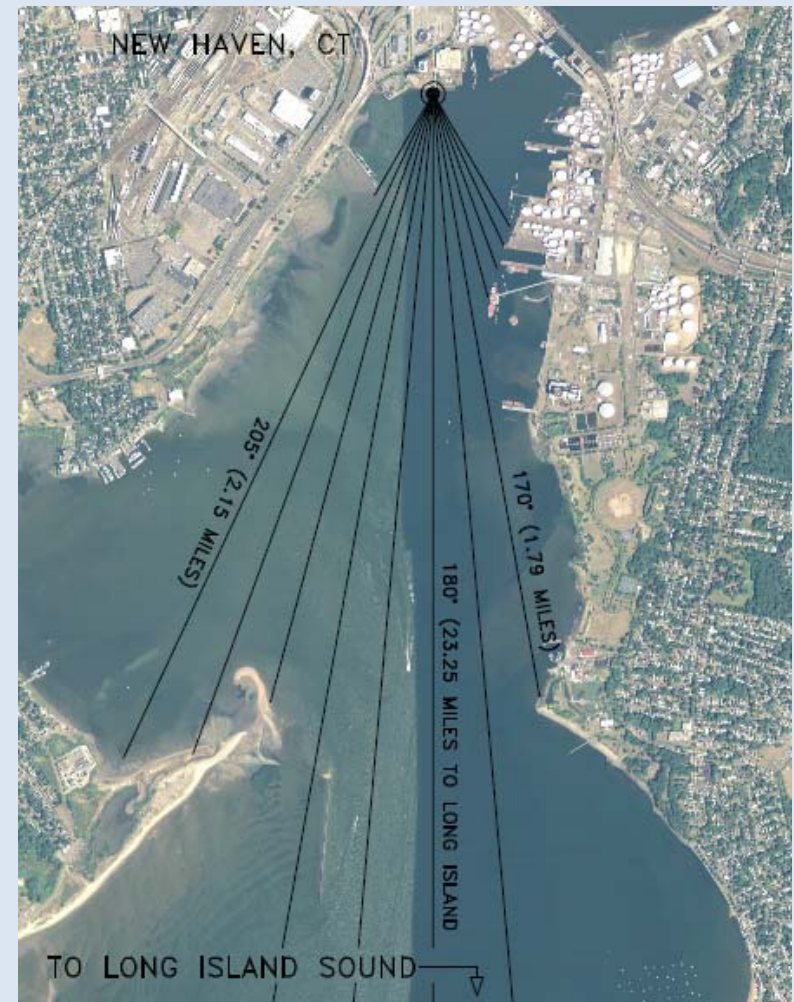
#### Geostrophic Winds

- 105 MPH

#### Deep Water Design Wave Results

Duration Limited Wave: 6.2 ft, 4.8 seconds

Fetch Limited Wave: 12.5 ft, 7.0 seconds



# 5. Flood Evaluation (cont.)

## Coastal Hazard Analysis Modeling Program

- FEMA CHAMP Model v2.0
- WHAFIS v4.0
- RUNUP v2.0

### Required Inputs:

- Storm Surge Elevations
- Design Wave Heights
- Site Specific Bathymetry and Topography
- Representative Transect Locations

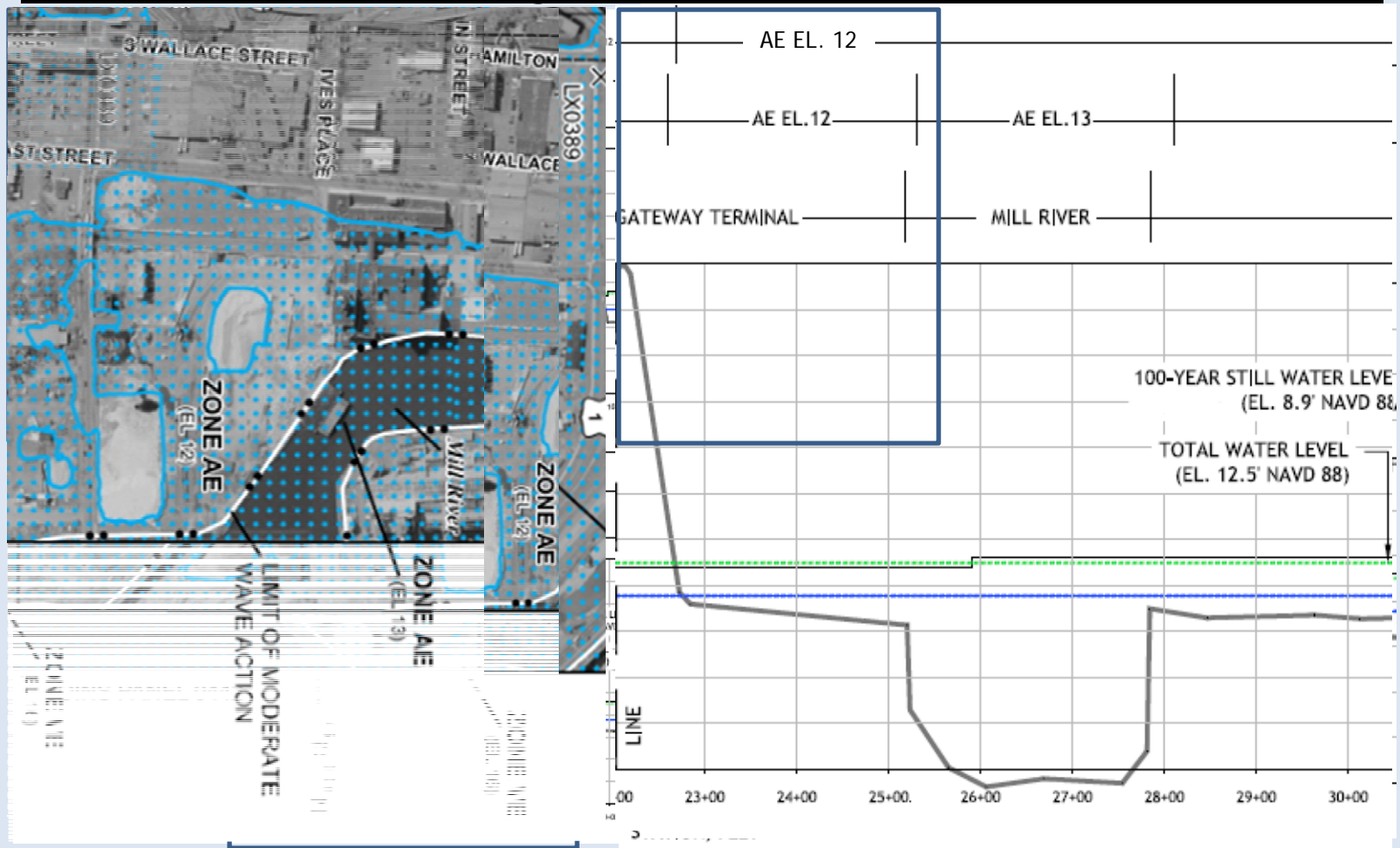






# 5. Flood Evaluation (cont.)

## CHAMP Modeling Results - Middle Transect

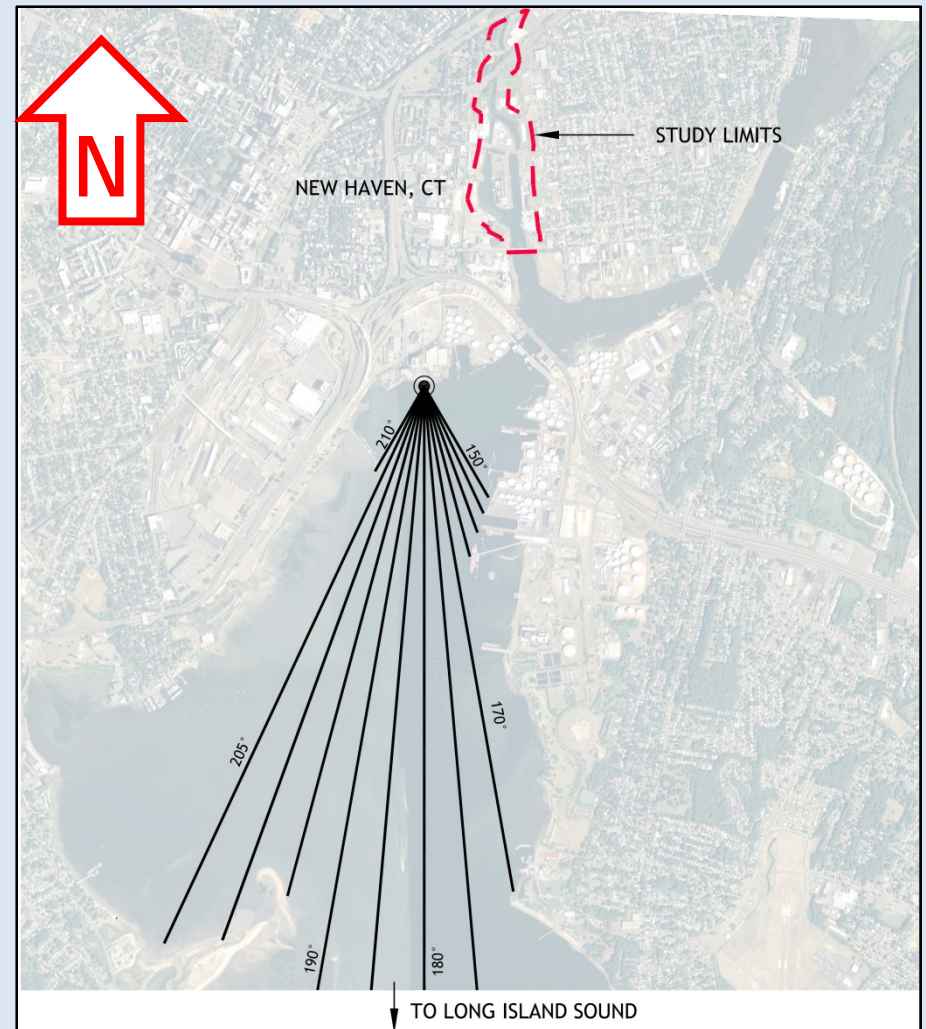




# 5. Flood Evaluation (cont.)

## Analysis Results

- FEMA Flood Panels Confirmed
- Protected from Wave Action
- Subject to Storm Surge
- Use of FEMA FIRM Maps and CHAMP Model to Evaluate Site Specific Flood Control Alternatives



# 6. Flood Management Approaches

## Flood Criteria

- Flood Protection Design El.

FEMA 100-Year Flood El.

Future Potential Sea-Level Rise

+ Freeboard as Req'd (1 foot)

Design Elevation (DE)



# 6. Flood Management Appr. (cont.)



## Future Potential Sea-Level Rise

- Historic Rates
  - 2 to 3 mm/year (1/16" to 1/8")
- Predicted Future Rates
  - Boothroyd 1 to 1.5 cm/year (3/8" to 5/8")
  - IPCC AR5 0.6 to 1.1 cm/year (1/4" to 7/16")
- Flood Protection Measures
  - Agree on a Rate
  - Select a Design Life



# 6. Flood Management Appr. (cont.)

## “Natural Attenuation” <sup>1</sup>

- Minimum Intervention
- Flooding and Associated Financial Burdens
- Affected Businesses Relocate Over Time
- Ecological Succession

1. Mill River District Planning Study



# 6. Flood Management Appr. (cont.)

## “Paired Capacity Investment”<sup>1</sup>

- Target Specific Properties
- Implement Flood Protection Measures

1. Mill River District Planning Study





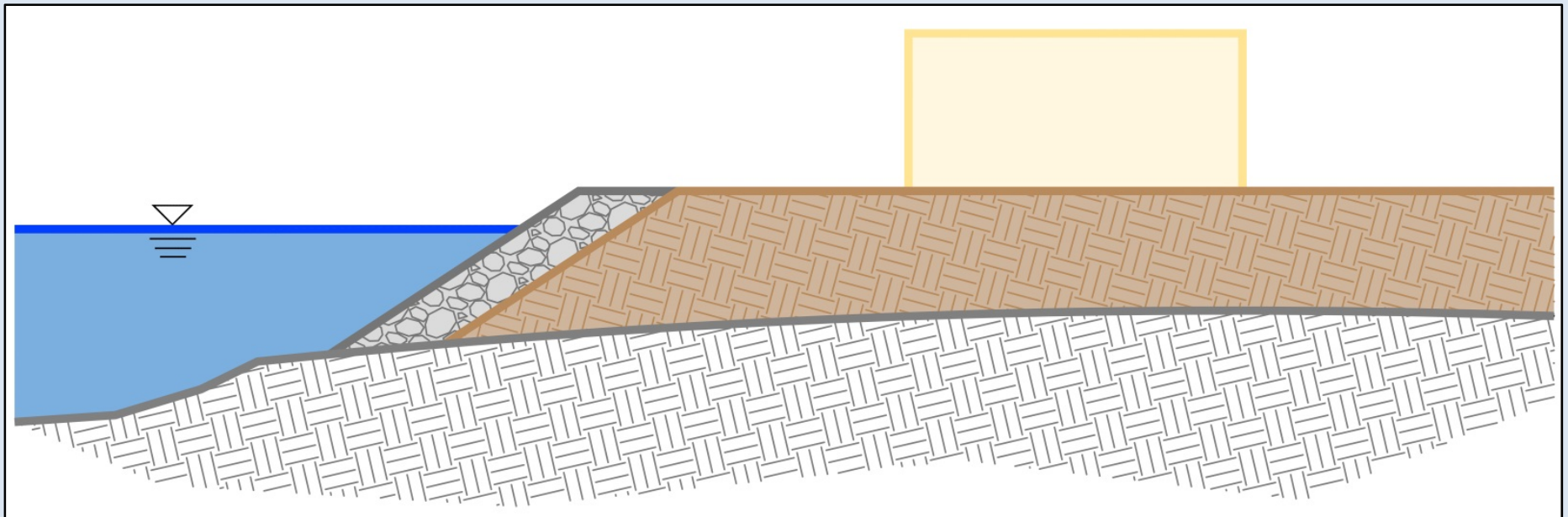
# 6. Flood Management Appr. (cont.)

## “Paired Capacity Investment” (cont.)



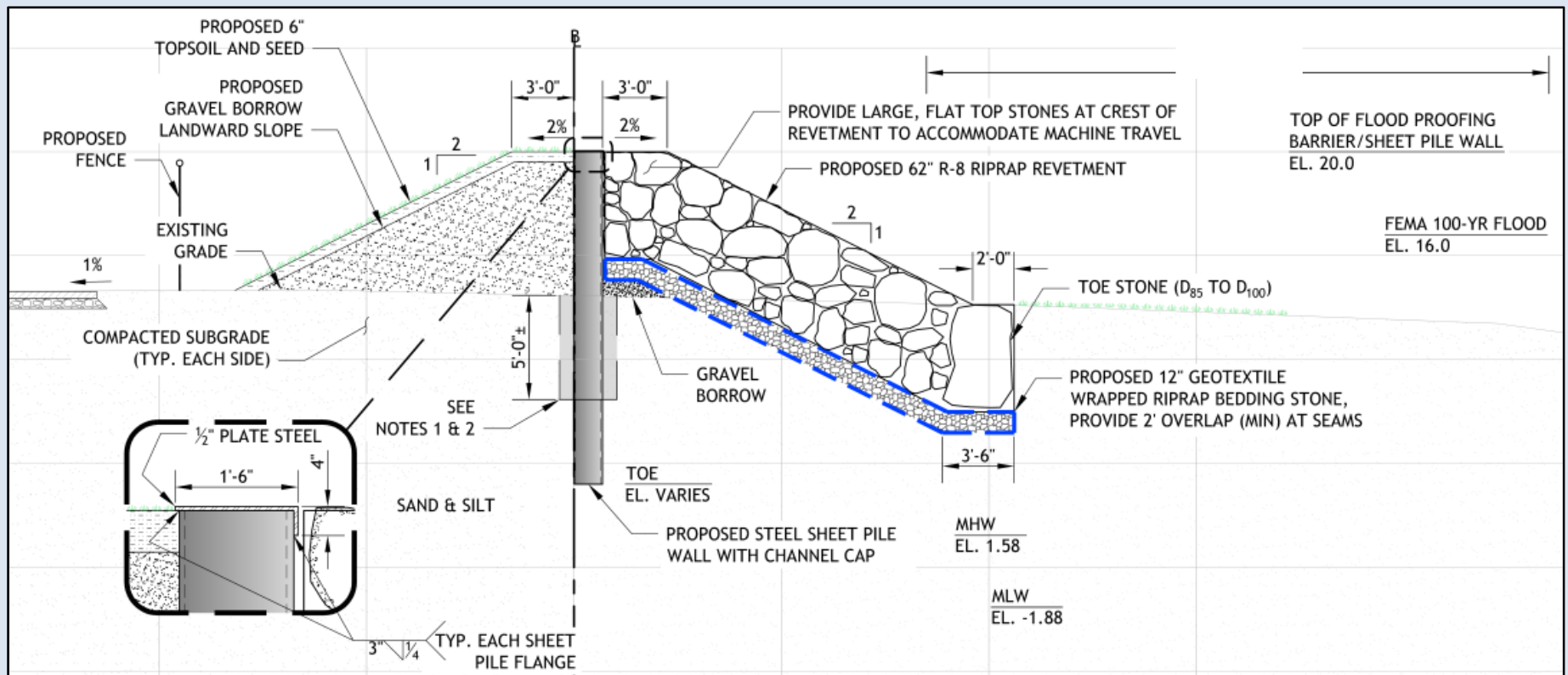
# 6. Flood Management Appr. (cont.)

## “Paired Capacity Investment” (cont.)



# 6. Flood Management Appr. (cont.)

## "Paired Capacity Investment" (cont.)





# 6. Flood Management Appr. (cont.)

## "Paired Capacity Investment" (cont.)



# 6. Flood Management Appr. (cont.)

## "Paired Capacity Investment" (cont.)



# 6. Flood Management Appr. (cont.)

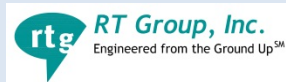
## “Intensive Infrastructure Investment”<sup>1</sup>

- District-Wide Flood Protection Measures
- Upland Areas Protected

1. Mill River District Planning Study



City of New Haven





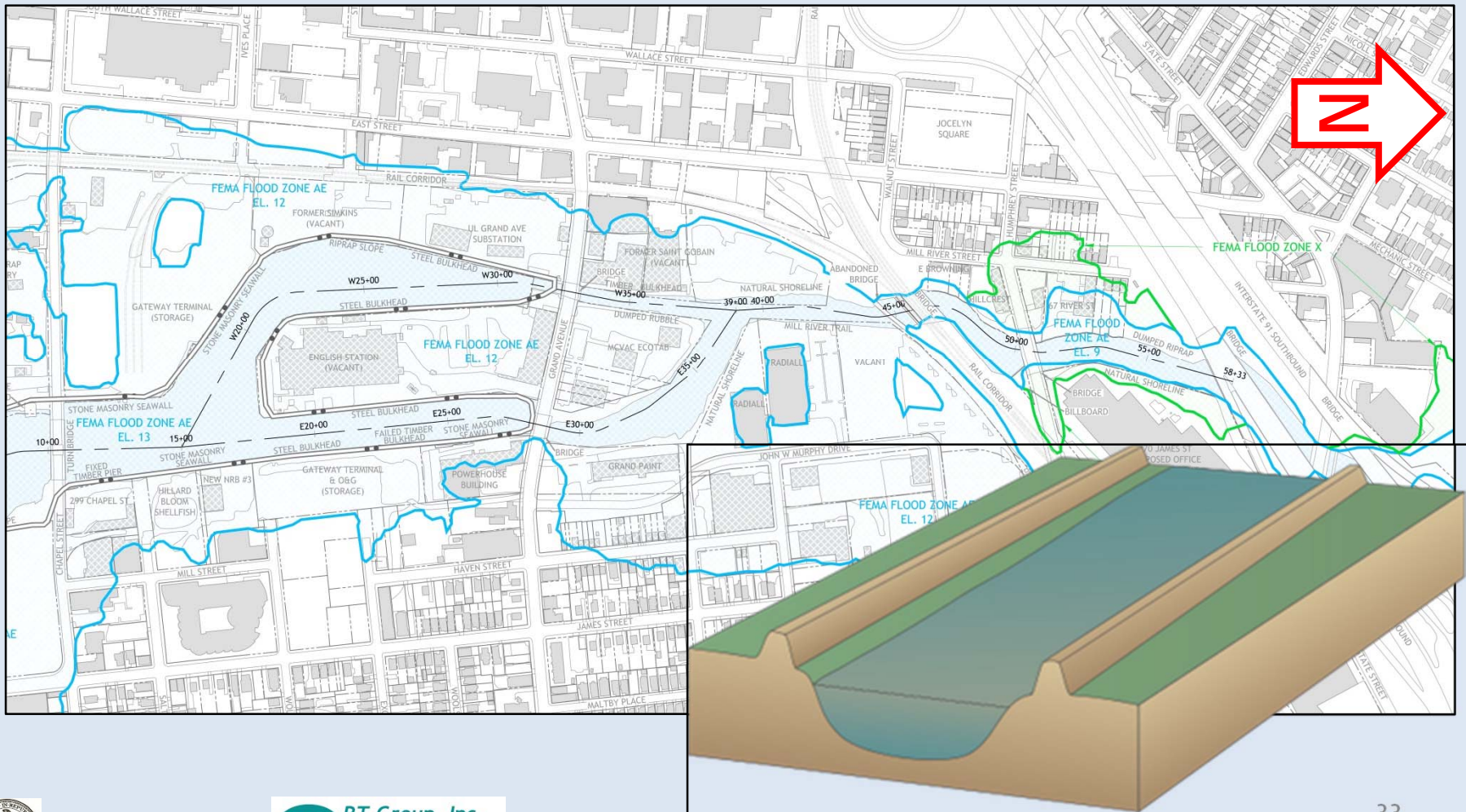
# 6. Flood Management Appr. (cont.)

## “Intensive Infrastructure Investment” (cont.)



# 6. Flood Management Appr. (cont.)

## “Intensive Infrastructure Investment” (cont.)





# 6. Flood Management Appr. (cont.)

## “Intensive Infrastructure Investment” (cont.)



# 7. Next Step

## Alternatives Evaluation Report

- City and Public Feedback
- Focus Evaluation on Selected Flood Protection Measures
- Evaluate and Rank Flood Protection Measures
- Selection and Implementation





An aerial photograph of a city area, likely New Haven, Connecticut. A large river flows through the center of the image. To the right, a multi-lane highway runs parallel to the river. The surrounding area is densely packed with residential and commercial buildings, streets, and green spaces. The text "Q & A Session" is overlaid in the center of the image.

# Q & A Session

