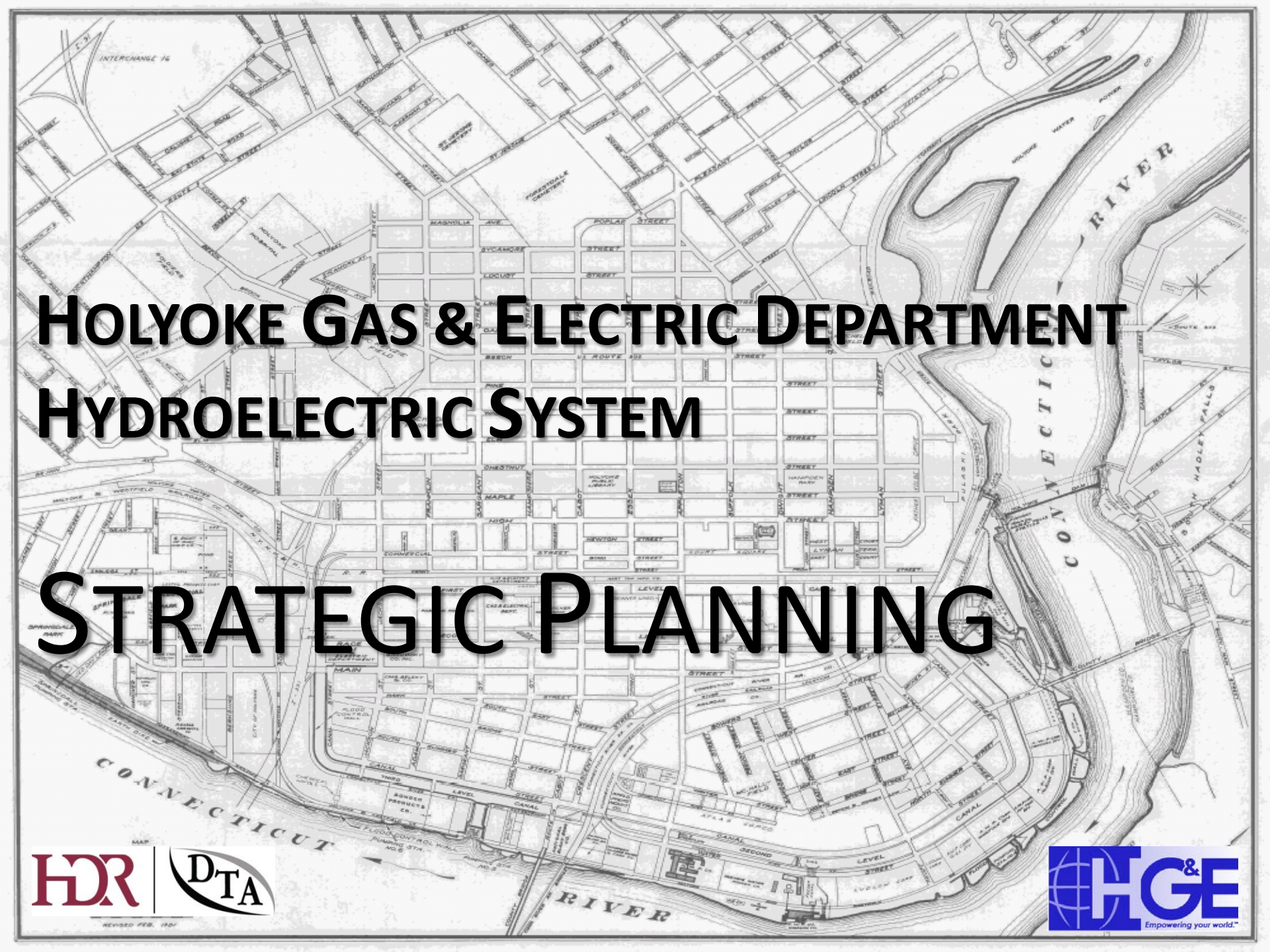
HOLYOKE GAS & ELECTRIC DEPARTMENT
HYDROELECTRIC SYSTEM
STRATEGIC PLANNING
CONNECTICUT RIVER
HDR
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H&E
Empowering your world.

ROLE OF WATERPOWER IN HOLYOKE'S PAST

- Development of water power infrastructure was integral with industrial growth of the City of Holyoke, MA
- Original timber crib dam built across CT River at Hadley Falls in 1849
- Replaced with current stone dam, completed in 1900
- Hadley units not installed until 1950 (U1-15.8 MW) and 1983 (U2- 15 MW)

LAYING OF LAST STONE IN HOLYOKE DAM. JAN. 5, 1900.-3^{05} P.M.

ROLE OF WATERPOWER IN HOLYOKE'S PAST

- Three-tiered canal system was built in 1847-1893

- Provided water for manufacturing and for water and hydro-mechanical operations

- Small hydroelectric installations along canal through early 1900s

EVOLUTION OF HG&E HYDRO SYSTEM

- Formed in 1902, HG&E is today a municipally owned utility company that provides electricity, natural gas, district steam, and fiber optic internet services to over 18,000 customers.

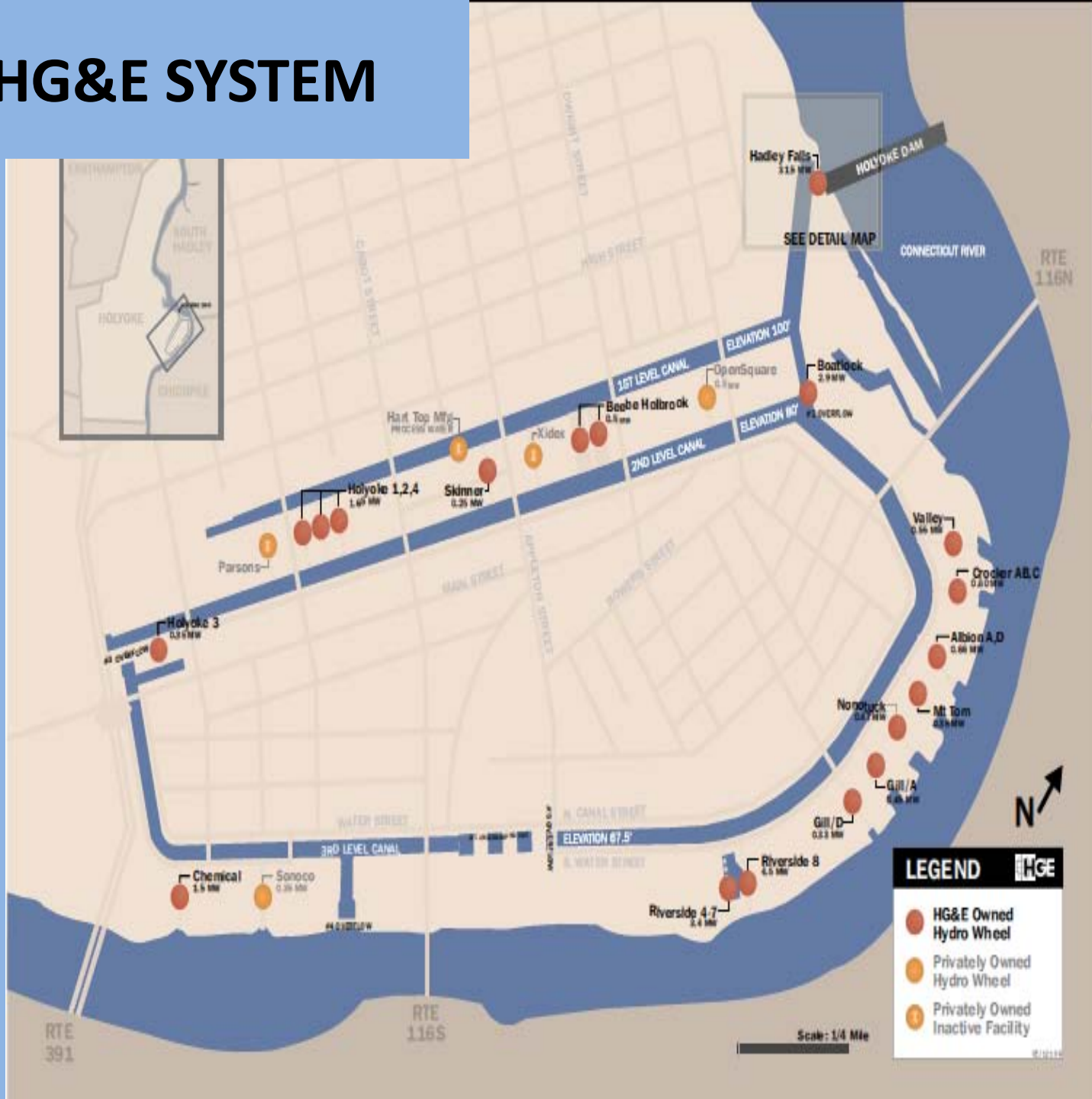
- Prior to 1999, focus was management of water rights along canal and T&D; HG&E owned only a few small stations on the canal.

- In 1999 HG&E purchased the Holyoke Project, which includes the Hadley Falls Station on the Connecticut River, and five canal stations.

- Since 1999 HG&E has purchased additional stations on the canal, and currently owns all but 5 canal units.

CURRENT HG&E SYSTEM

- Hadley Falls
- Sixteen active canal stations
- Fourteen separate FERC licenses
- Combined installed capacity of 50.7 MW
- Annual average generation 260 GWH.



STRATEGIC PLANNING OBJECTIVES

INVEST WISELY FOR THE LONG TERM

- Optimize water use and generation
- Efficient use of operations staff
- Comply with FERC licenses (notably, flow provisions related to fish passage/protection)
- Comply with water rights agreements

OPPORTUNITIES

- HG&E committed to implementation of a long term plan, but able to stay flexible to capitalize on new incentives and ideas

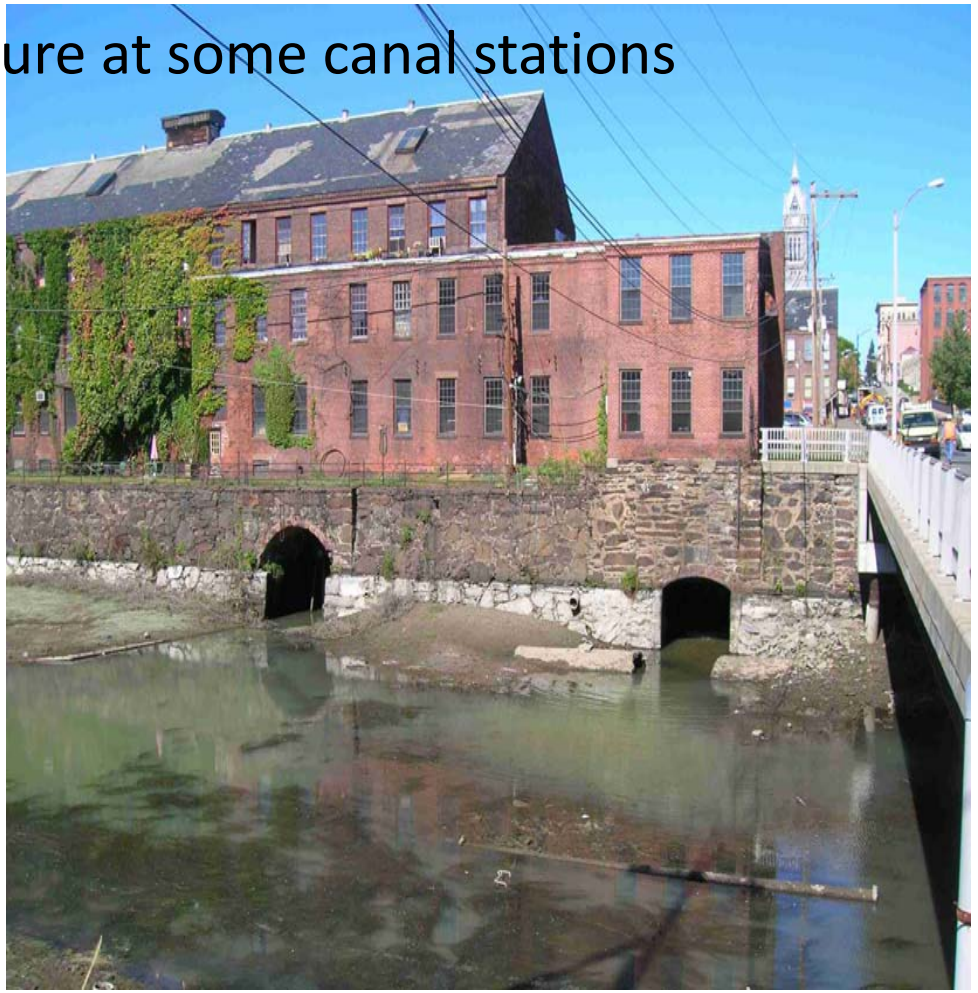
- Because it owns most of the stations, HG&E has flexibility to look at system water use holistically (within license constraints such as fish flows)

OPPORTUNITIES

- Incentives:
  - CREBs
  - MA RECs
  - Holyoke located in economic development zone
  - State interest in/programs for renewable energy growth
- Increased Options for Equipment / Suppliers

CHALLENGES

- Aging or failing infrastructure at some canal stations
- FERC license constraints
- “Graying” workforce
- Water rights obligations
- Balancing canal flows
- Funding



PLANNING THE WORK

Evaluated all stations:

- Civil/structural infrastructure
- Turbine/generator and electrical system condition
- Opportunities for improved or new generation at each site
- Needed improvements to station operations and reliability

PLANNING THE WORK

- Identified canal stations where infrastructure needs outweighed possible gains – “run to failure stations”
- Prioritized future use of water from these stations
- Prioritized remaining stations for investment
- Asked again: “Will it work?” (within license requirements and flow distribution needs)
- Funding realities/opportunities

WORKING THE PLAN - RIVERSIDE 8

- Major Rehabilitation 2006 -2008
- Resulted in being able to achieve max output of about 4.75 MW, a gain of about 1 MW
- Substantial improvement in station reliability

WORKING THE PLAN - BOATLOCK UNIT 1

- Replacement of inoperable Unit 1 with new 700 kw Mavel turbine
- CREB funded
- Will increase generation approx. 2500 mwh
- Began work early 2009 - online fall 2010

WORKING THE PLAN - CITY 4 “J” WHEEL

- City 4 has two 375 kW units, one of which has been out of service since a 2004 fire.
- Planned rehabilitation will repair damaged equipment and upgrade the controls and automation.
- Will generate approximately additional 997 MWH/yr.
- MA Clean Energy Center awarded 50% grant for the repair and upgrade.

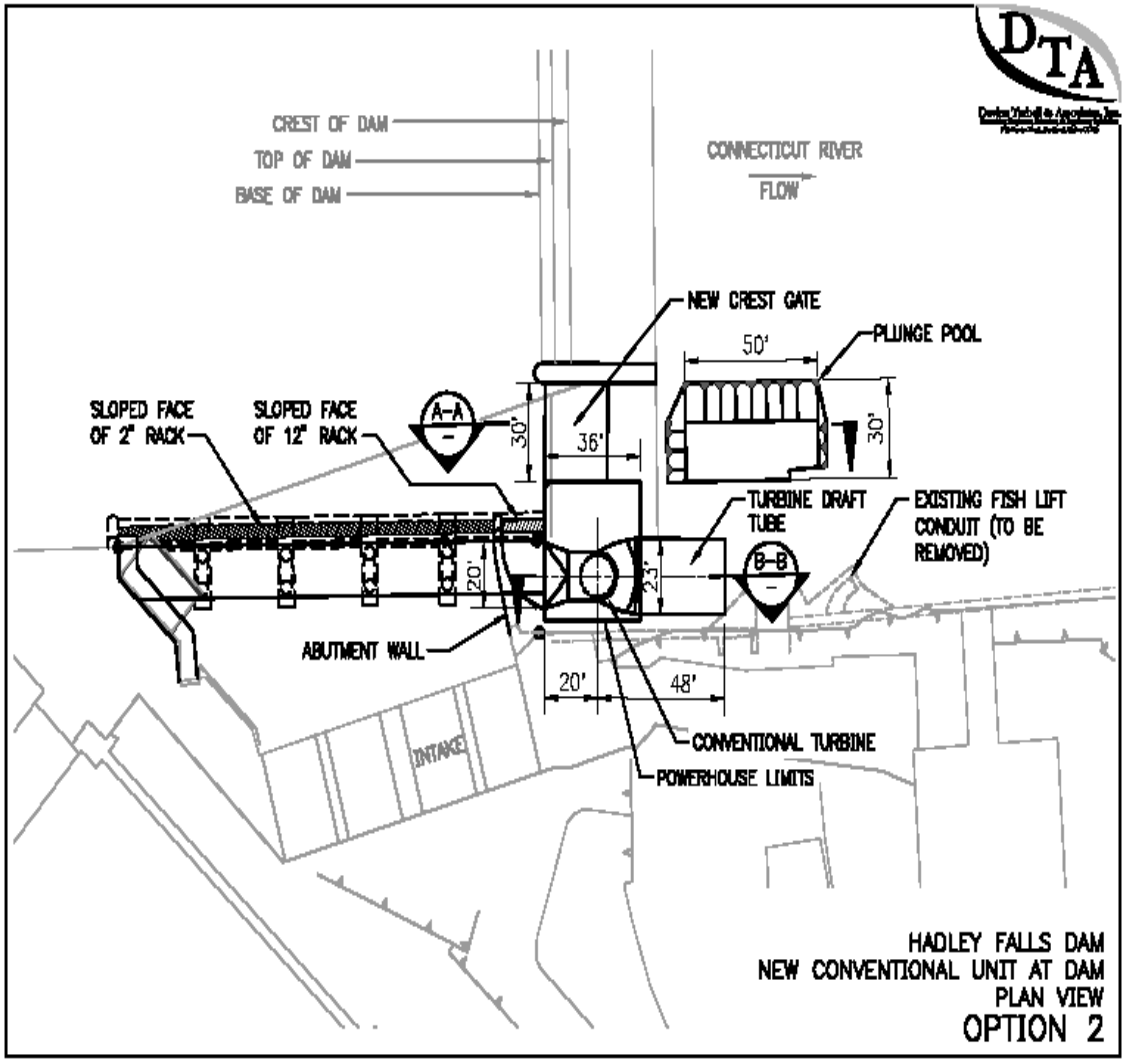
WORKING THE PLAN - #3 OVERFLOW

- #3 overflow spills average of 628 cfs between 2nd Level and 3rd Level canals, a drop in head of 12.5 ft.

- Up to four Mavel MT10 siphon units could be installed with a total output of 475 kW, for an estimated annual average generation of 1,263 MWH

- HG&E will be seeking funding though MA Clean Energy Center

WORKING THE PLAN - HADLEY 3



- New bypass flow unit at dam to be installed concurrent with new intake rack
- Estimated generation of 17,000 mwh
- CREB awarded 2009 for partial funding
- MA REC's key to viability
- Consultation with stakeholders underway
- Evaluation of funding & final feasibility underway

LOOKING FORWARD

- Use the Strategic Plan as a “living document” – stay open to reworking the plan as warranted
- New ideas being brought forward continuously - e.g., siphon units for canal overflows
- New technologies, new funding/incentive programs may make previously discounted ideas more feasible
- Several canal units slated for rehabilitation or full replacement in future
- HG&E Applying for LIHI Certification in order to qualify for MA REC’s, which will provide additional revenue for future projects.

COMING FULL CIRCLE: HYDRO'S ROLE IN HOLYOKE'S FUTURE

- Like many New England cities, Holyoke was historically dependent upon manufacturing jobs that have disappeared over the past 50 years. Unemployment exceeds 11%, and the City's population has declined.

- The HG&E hydroelectric system provides significant economical benefits for Holyoke and the region, offering lowest energy rates in region.

- Holyoke is actively working to attract new businesses, and HG&E offers discounts on electricity for new and expanding businesses within the city, and offers incentives for customers to participate in demand-side management programs.

- HG&E is able to offer these programs because of its hydroelectric system.

COMING FULL CIRCLE: HYDRO'S ROLE IN HOLYOKE'S FUTURE

- The city's economic prospects are very much tied to the availability of low cost renewable power
- In June 2009, Massachusetts and a coalition of corporate and academic institutions (MIT, BU, UMASS, Cisco, and EMC), announced a plan for developing a high-performance computing center in Holyoke
- This high tech green data and computing center powered by hydropower will bring jobs and dollars to the Holyoke region
- The coalition specifically cited the amount of clean power in HG&E's portfolio as a favorable attribute which led to proposing the new facility in Holyoke
- Continuing to invest in and expand its generating portfolio will allow HG&E to attract more new businesses that prioritize sustainability and green operations