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· August 15-18, 2010 · Dallas, Texas ·
· Dallas Convention Center ·

Compressed Air Decentralization Strategies and Technologies at Naval Base San Diego (NBSD)

Goal/Agenda

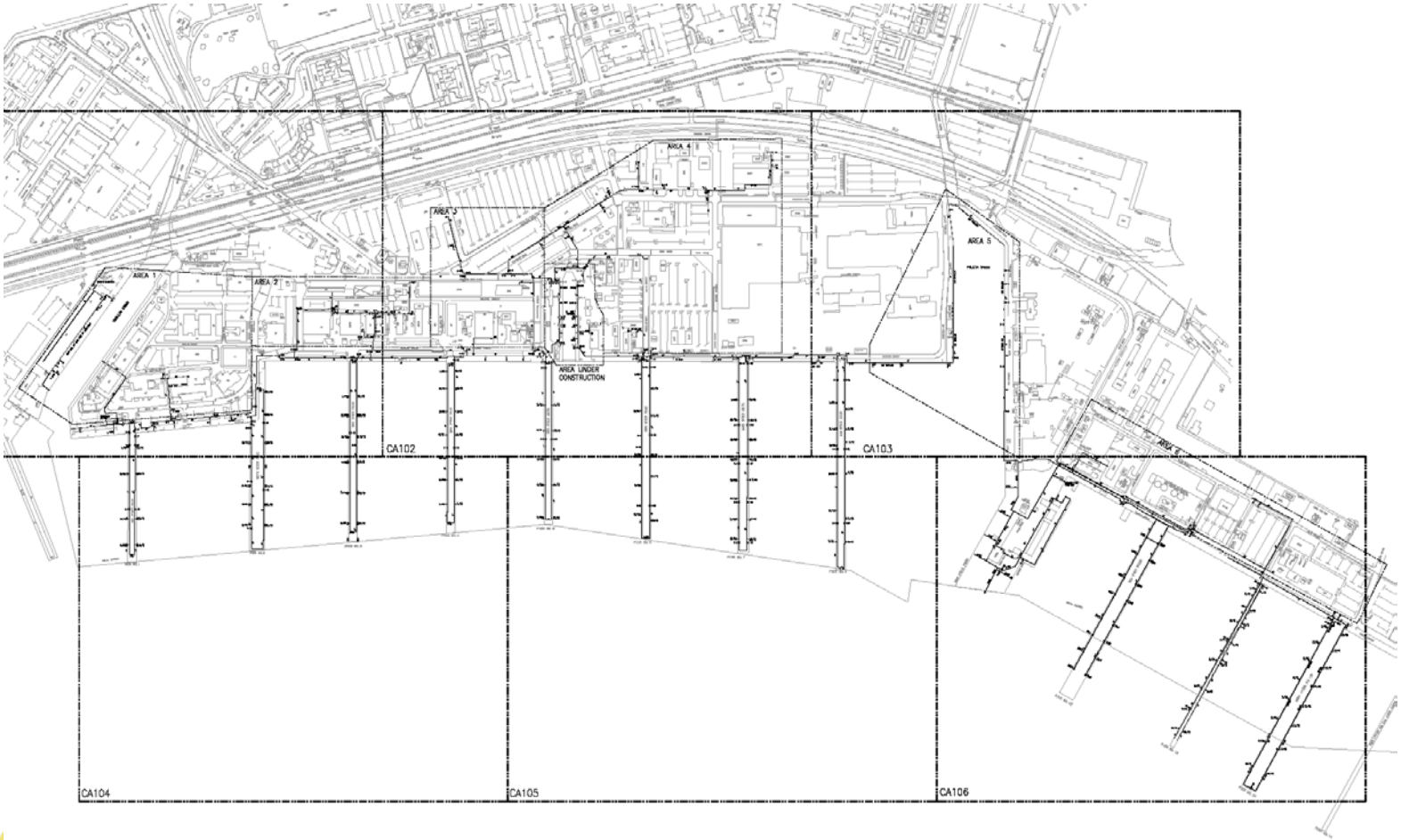
- Bottom Line Up Front (BLUF)
  - Decentralizing compressed air will save Navy $8-12M over the next 20 years.
- Goal
  - Accomplish mission at minimum cost and acceptable risk.
- Agenda
  - System Description
  - Contractor Demand
  - Facility Demand
  - Options, Summary and Suggested Way Forward
  - Lessons Learned

End-user Requirements

- Compressed air is provided for use by contractors (maintenance availabilities), facilities and ships.

- Mechanical Utility investigation has shown that contractors and facilities take advantage of the available compressed air while ships produce their own.

Centralized system (two air plants and associated piping)



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System components

- Tools and Equipment: Compressed air tools and equipment operate using air flow under pressure.
  - Higher efficiencies are realized by appropriate pressure

- Distribution: NBSD has 60,000 feet of pipe, a third of which is direct buried.

System components

- B3355 plant: Primary plant consisting of three operable compressors and associated equipment (heat exchangers, receiver tanks, dryers, condensing water pumps and cooling towers).

- B148 plant: Trim plant consisting of four operable compressors and associated equipment (heat exchangers, receiver tanks, dryers, condensing water pumps and cooling towers).

System status and production

- System status
  - Distribution piping deteriorated with severe corrosion and air leaks causing increased pressure drop driving compressors to run more frequently thereby increasing equipment wear and associated maintenance costs.
  - All compressors in need of replacement.
  - Two of five cooling towers inoperable.

- System production
  - End-user point of use commodity as low as 60 psig at various locations in addition to presence of excessive moisture and impurities due to system capacity and condition.

Maintenance Availability Demand

- Availabilities occurring pier-side for multiple ships at one time.
- Typical applications: Grinding, bilge pumps.
- Alternate compressed air source typically rented.

Facility Demand

- Facilities using air consist of Southwest Regional Maintenance Center (SWRMC), Transportation, Graving Dock and Ship to Shore.
- Less than 20 buildings with low demand for majority.

Options

Options	Initial Central Capital Cost ($M)	Yrly Central Elect Cost ($M)	Yrly Central Maint Cost ($M)	Yrly De-Central End-user Cost ($M)	20 Year Cost Present Value (2009 Annual Treasury Rate 2%) ($M)	Risk (Air Availability and Cost) (Low, Med, High)	Comments
1. De-centralize Air System	0.5	0	0	1.0	17	Med (Multiple separate systems with contractor accountable, cost is sensitive to equipment rented (capacity/hours)	Pro: Additional considerable potential cost savings due to a) flexibility of air made available and b) reduced labor hours due to higher pressure air Con: Uses pier space, Ideally reroute funding to cover costs.
2. Replace Centralized Air	18.1	0.2	0.3	0	26	Med (Two fixed plants)	Pro: Maintains pier space Con: Complexity increases risk of failure, Limited practical flexibility of air made available.
3. Upgrade Centralized Air Plant	3.9	0.8	0.6	0	27	High (Two fixed plants, Existing piping will continue to decay)	Pro: Maintains pier space Con: Complexity increases risk of failure, Limited practical flexibility of air made available, Old piping will continue to decay and decrease quality and increase costs.

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Contracted 750 CFM electric rental setup

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Summary

- Option 1 de-centralize air system vice Option 2 replace centralized air system demonstrates a 20 year present value savings of 35% ($26M vice $17M).
  - Reduced labor hours due to higher pressure air.
  - Plant capital cost savings
  - Energy savings (localized air on demand).
  - Contracting decentralized air allows unlimited air made available flexibility whereas centralized air availability is limited to permanent air plant construction parameters.
  - Pier impact is limited to approximately 60 (6ft x 13ft) square feet for largest 900 CFM air compressor rental unit.

Suggested Way Forward

- Exercise Option 1 De-centralized Air.
  - Establish date to secure centralized compressed air system and promulgate same base-wide.
  - Purchase and install minimum required facility air compressors by centralized air system secure date.
  - SWRMC contract compressed air requirements by centralized air system secure date.

Lessons Learned

- Knowledge of compressed air supply and demand critical to option analysis in addition to other factors.
- Clear communication required to ensure multiple player buy-in (technical and billing).
- Technical oversight required for all options.