Demolition and Environmental Fundamentals 101

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INVESTMENT RECOVERY ASSOCIATION
Promoting Professional Managment of Surplus Assets

Agenda

- Demolition Defined-Overview
- Overview of D&E Projects
- Elements of D&E Projects
- Examples of Types of Demolition
- Tools of the Trade
- Demolition vs Construction

Agenda

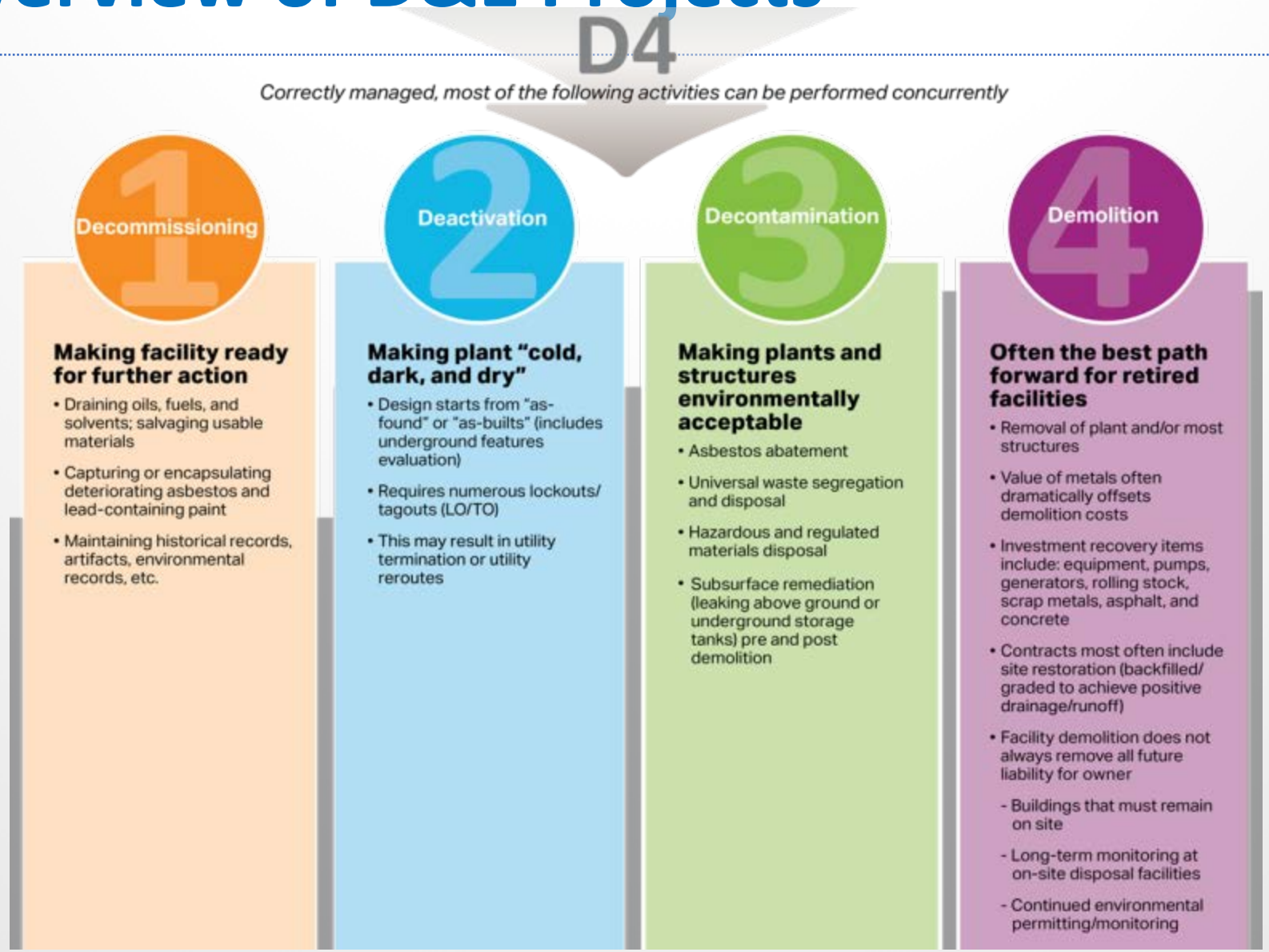
- Challenges on Demolition Projects
- Safety Communication and Management
- Selecting a Quality Demolition Company
- Technical and HSE Plans
- Investment Recovery
- Estimating and Bid Evaluation
- Break-out Session (15 Minutes and Reconvene)

Basic Terms Used to Describe Demolition and Environmental (D&E) Projects

Each industry calls it something different, but for the purposes of this presentation we will refer to it collectively as “Demolition & Environmental Projects”

- Decommissioning, Deactivation, Decontamination and Demolition (D4)
- Demolition
- Dismantling
- Decommissioning
- Decontamination
- Abatement
- Decommissioning and Demolition (D&D)
- Remediation

An Overview of D&E Projects



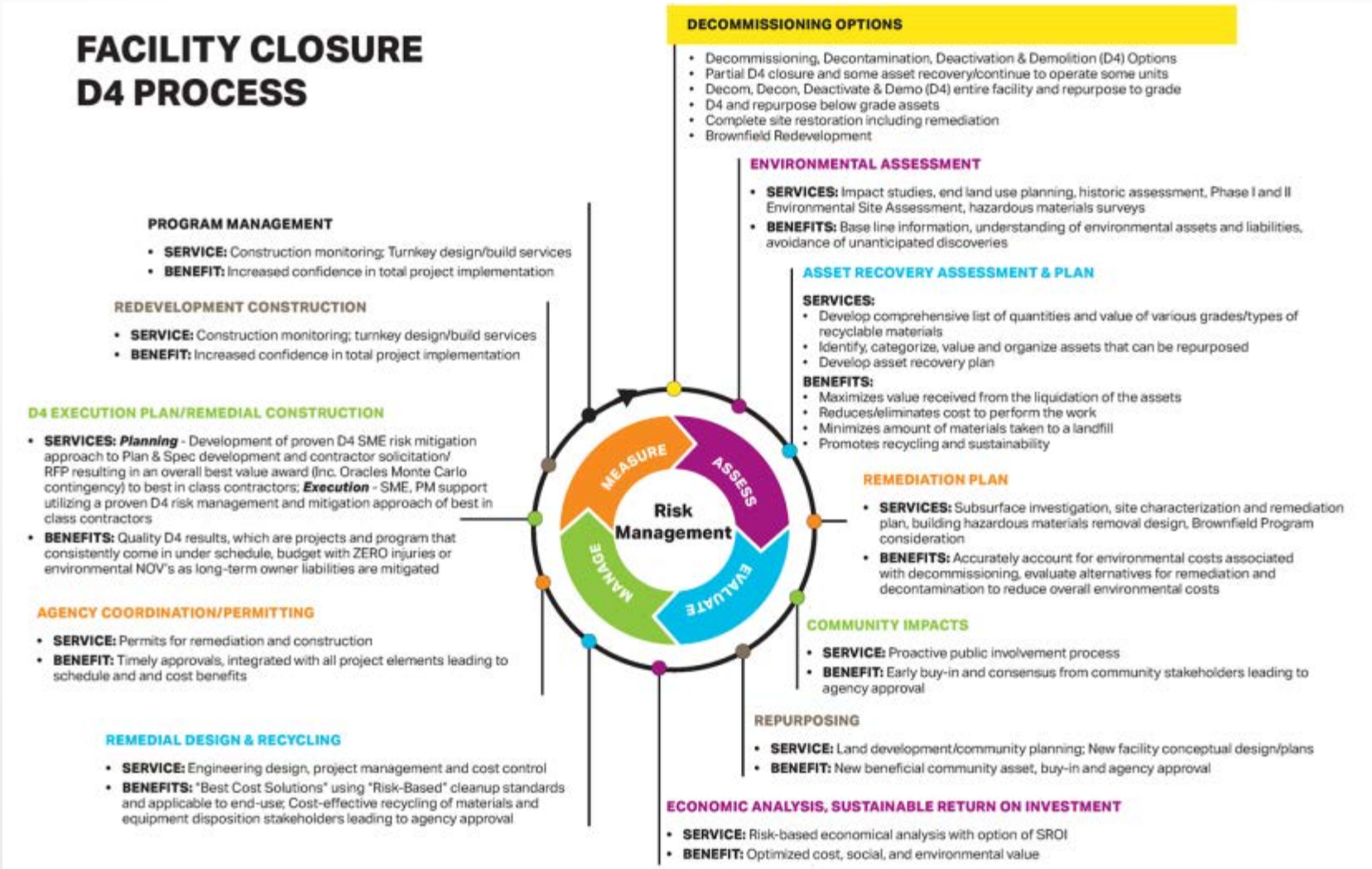
D&E 3 Phase Project Management Approach

Phase 1 Project Planning	Phase 2 Project Engineering	Phase 3 Project Execution

• Environmental due-diligence
• Project Planning Document (PPD), including high level options analysis:
  • Reuse or sell
  • O&M where is as is
  • Decommissioning, Decontamination, Deactivation options
  • Cold, Dark and Dry
  • Demolition (Demo), including reuse & asset recovery/investment recovery (IR)
• Procurement of Phase 2 services
• Asset Recovery & Management
• Permitting
• CCR and non-CCR unit management
	• Development of Decommissioning, Decontamination, Deactivation and Demo (D4) Plans and Specifications, including:
	  • Environmental investigation/HazMat survey
	  • Remediation design
	  • Asset inventory transfer or valuation for IR and/or Demo
	  • Utility re-route design
	• Procurement of Phase 3 services
		• Execution, including partial or full D4 approach;
		• Decommission
		• Deactivation options (Cold, Dark and Dry, Utility re-routes, “Mothball”)
		• Decontamination (pre-demo and post demo)
		• Demo, including IR and possible site restoration
		• Project monitoring, construction administration, construction management
		• Brownfield redevelopment
		• Project close-out
		• Owners Engineer Services
		• Engineering, Procurement and De-construction services (EPD) e.g. EPC & CM/PM

Overview of the D&E Process

An Engineering Perspective



Elements of a Demolition/Environmental Project

- Design of Scope of Work/Limits of Design/Risk Register (Hazard & Economic);
- Phase 1 and Phase 2 Hazardous Materials assessments/Hazardous Materials surveys (Rad, NORM, PCB's LBP, Mercury, PFAS, NAPL, etc.);
- Ecological Impact Assessments/Budget Development;
- Waste Minimization/Management and Planning;
- Budget development/Estimating including development of asset recovery assessment/Plans;
- Contractor Prequalification/Bidders List Development
- RFP development and/or review;

Elements of a Demolition/Environmental Project

- Tech Work Plan/HASP & Safety Plan Development and/or Review;
- Oversight of RFP Process/Schedule Development;
- Contractor Selection and Award/Contracting mechanisms;
- Negotiation/Implementation of contracts and subcontracts;
- Contractor/Subcontractor planning & execution, oversight and management/Demolition, Abatement, Environmental, above ground, below ground, site restoration and Reuse;
- Project Close-out/Records Retention

Decommissioning

Types of Demolition

Controlled Blasting

The most spectacular only comprises a very small percentage of the work

Types of Demolition

Mechanical Demolition

Widely used with fewer man-hours exposed to hazards

Types of Demolition

Demolition by Torch

Widely used with additional man-hours exposed to hazards

Types of Demolition

Dismantling

Widely used with more man-hours exposed to hazard and maximum use of cranes

Tools of the Trade

Grapple

Universal Processor

Shear

Pneumatic Breakers

Hydraulic Hammer

Tools of the Trade

Skid Steer Loader

Demolition
Cutting Torch

If you can't measure it,
you can't manage it!

…BUT

Make sure you are using
an effective measurement tool!

How is demolition, compared to construction, an entirely different animal?

Demolition as Compared to Construction

- Modern demolition is mostly mechanized so there are fewer man-hours
- Demolition crews are normally considerably smaller than construction crews and job classifications are different
- There are very few formal classes to learn the techniques so mentoring in demolition is more the norm than the exception
- Demolition contractors must be more diversified
- Management of change is in reverse in demolition (taking it down versus putting it up)
- Many demolition projects are short-term
- Crane and rigging is more flexible in demolition, but with more hazard considerations
- Accurate drawings are a rarity in demolition
- There are more unknowns in demolition both above and below ground

Challenges on Demolition Projects

- Rigging that is nonstandard and unsymmetrical
- Fall protection (life lines and where to tie on to)
- Uncharted Asbestos, Lead Based Paint, NORM and Universal Wastes
- Hot work
- Unauthorized access to the work area
- Being struck by items being removed
- Stray electrical
- Trapped product and residue

Challenges on Demolition Projects

- Structural fatigue of walk ways and ladders and items being lifted;
- Lack of understanding by clients (sometimes the safest way to take something down is to let it fall, known as a controlled fall)
- Ineffective safety and technical work plans
- Poor training and mentoring of workers
- Failure to make all workers aware of the big picture on a project

Challenges on Demolition Projects

There is a potential for trapped product in all low lying spots, behind all closed valves, blind flanges and in the process equipment. These areas must be opened, purged and cleaned prior to demolition.

Most plants purge and clean process systems prior to a demolition contractor coming onsite. Contractors must be alert and perform their own due diligence prior to beginning work to ensure the plant is clean.

Challenges on Demolition Projects

Stray Electrical

Never assume that everything has been locked and tagged out!

Verify ! Verify! Verify!

Challenges on Demolition Projects

Fall Protection

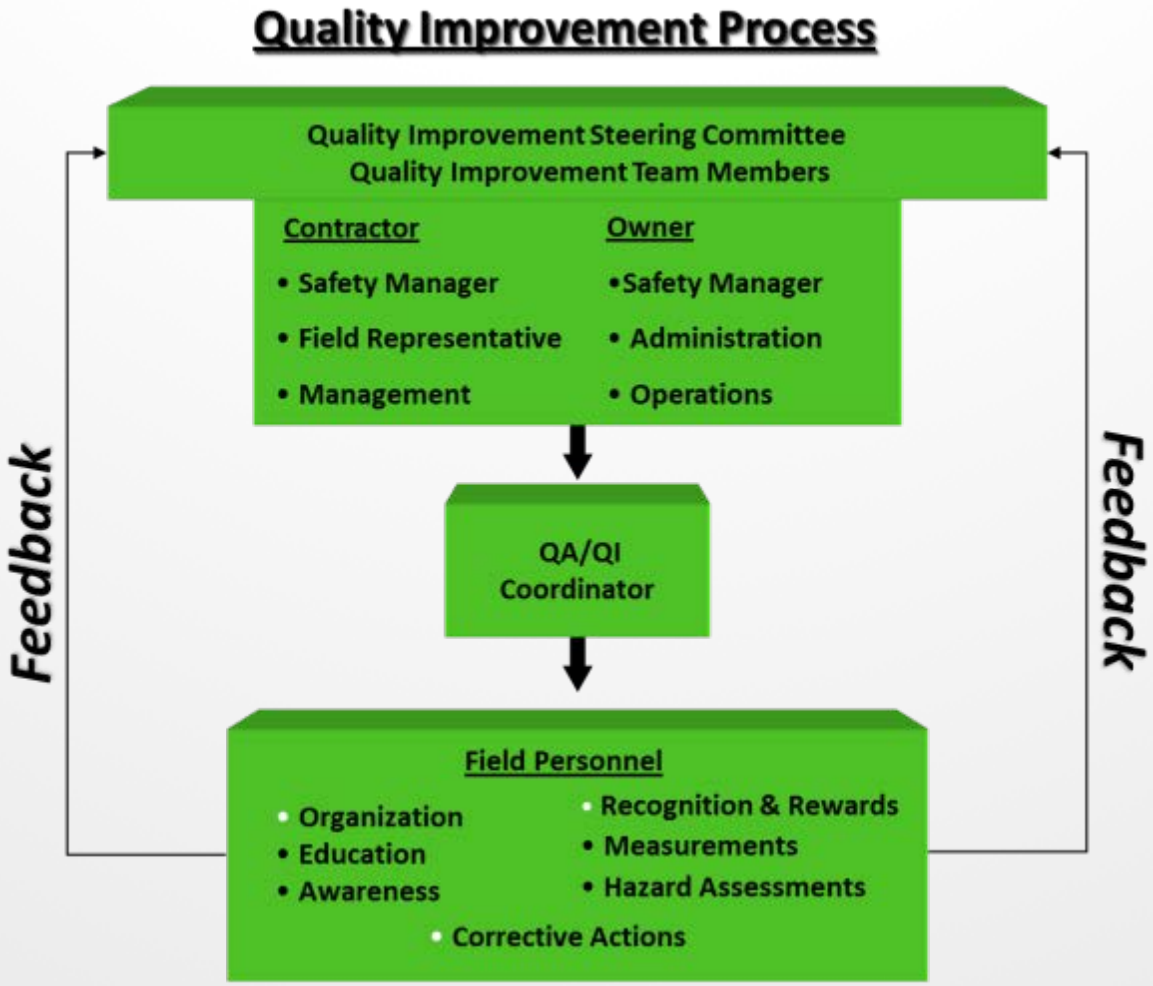
- Make sure what you tie “on” to is more than adequate
- Do not cut yourself down
- Use lifelines when necessary
- Watch for grating that has been removed or holes in the floor
- Remember the night shift !!
- Never assume catwalks, staircases, and ladders will support you
- Be aware of where you are at all times/Situational awareness
- Properly barricade the work area to prevent unauthorized access

Challenges on Demolition Projects

How can a can of spray paint cause an injury or a fatality?

Safety Communications and Management

360 Degree Perpetual Communications



What to Look for in a Quality Demolition Company

- First and foremost, an excellent safety record and HSE program! Verify those stats!!
- Employee retention and experience;
- Financial stability & bonding capacity;
- Experience on similar projects in similar industries;
- Experience in using investment recovery to offset costs;
- Management and length of time in business;

What to Look for in a Quality Demolition Company

- Every contractor should have a site specific technical work plan as well as a site specific health & safety plan on every project!
- Every worker should understand and sign-off on that plan before being allowed on the project!
- Every worker should have the right to stop all work on a project if they perceive a safety hazard might exist!

If they cannot explain it, they probably cannot do it!

What to Look for in a Quality Demolition Company

Remember that it is all about the people….

You could have a good company and a bad crew or a mediocre company with a good crew. Properly evaluate both!

What to Look for in a Quality Demolition Company

The site specific plans should:

- Be concise in length and tied into a master plan
- Concentrate on getting the point across rather than volume
- Be in addition to the corporate safety manual
- Encourage input from the field workers
- Not be resistant to change
- Promote questions and suggestions

What to Look for in a Quality Demolition Company

The site specific plans should:

- Be relevant and effective
- Include BBS and stop work component
- Educate every worker on the entire scope of the project and not just their part
- Explain the hazards <u>before</u> the workers are exposed to them

What to Look for in a Quality Demolition Company

The contractor's technical work plan should include at a minimum the following:

- Contractors understanding of the scope of work
- The work schedule
- Key contractor contact personnel/including after hours
- Average crew size and composition
- Hospital, landfill, scrap yard to be utilized
- Waste Management
- Third Party Waste Stewardship Management
- Approximate total # of man-hours

What to Look for in a Quality Demolition Company

The contractor's technical work plan should include at a minimum the following:

- Major equipment and quantity of each to be used for the project
- Subcontractors to be used
- Community awareness program
- Journey management plan (all trucks and equipment)
- Crisis management
- Estimated quantities of each type of material to be removed from the project by area
- Method statements for safely completing each of the most hazardous/critical tasks

What to Look for in a Quality Demolition Company

The contractor's site specific health and safety plan should include at a minimum the following:

- Mission statement & company policy
- Stop work authority and policy
- Description of corporate safety program
- Description of the scope of work, hazards and mitigation measures
- Emergency evacuation plan
- Method of verification of purging and cleaning of process lines and equipment
- Training procedures of onsite personnel
- Management of Change
- Visitor and new hire orientation
- Short-term employee program
- Above and below ground utilities management/lock-out or reroute

What to Look for in a Quality Demolition Company

The contractor's site specific health and safety plan should include at a minimum the following:

- Materials management program
- Physical hazards and mitigation measures
- Chemical hazards and mitigation measures
- Hazard communication
- Site specific working from heights
- Asbestos and environmental abatement
- Securing and isolating the work area
- Job safety and risk analysis
- Accident and incident investigation/communications
- Spill Prevention
- Inclement weather response

What to Look for in a Quality Demolition Company

The contractor's site specific health and safety plan should include at a minimum the following:

- Third Party Waste Stewardship Standards
- Levels of personal protective equipment used during each phase of the project
- Storm water pollution prevention
- Safety incentives for workers
- Heavy equipment safety
- Crane and rigging procedures including lift plans
- Behavioral Based Safety (BBS)
- Hot work
- Safety meetings
- Sanitary and decontamination procedures/ facilities
- Housekeeping

What to Look for in a Quality Demolition Company

Behavioral Based Safety (BBS)

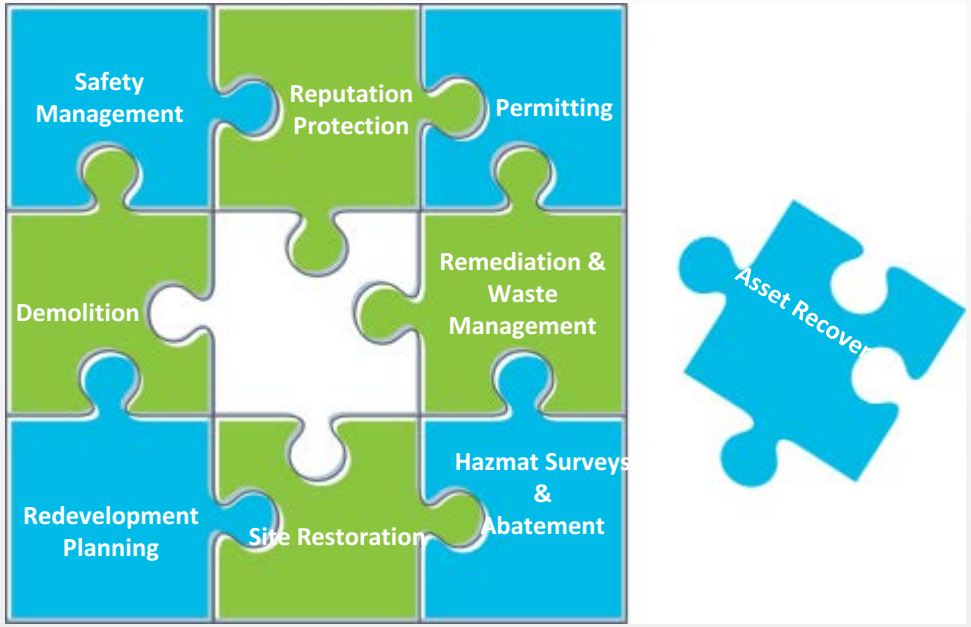
- BBS is the study of human behavior as it relates to the tasks that are performed on a jobsite;
- The BBS Program is proven to prevent accidents by predicting the future from past metrics;
- Do not reinvent the wheel, but rather adjust the thought process of the workers to meld into an ever changing work environment;
- Perpetual change in the work environment on demolition projects makes it challenging to recognize and track trends.
- Use the BBS Observations to develop trends and influence an effective blend of worker attitude & worker behavior.

What is Asset Recovery

Asset Recovery – The process of recovering, re-using, and recycling assets generated from a project for the highest dollar possible

- Turbines
- Generators
- Ball Mills
- Rolling Stock
- Valves & Instruments
- Process Equipment
- Pipe
- Structural Steel
- Transformers
- Rail
- Spent Chemicals & Off Spec Product
- Catalyst
- Concrete
- Complete Plants and Units

Effective Asset Recovery is essential to a successful closure project



- Ferrous # 1 HMS
- Ferrous Plate & Structural
- Ferrous Cast Iron
- Ferrous Light Gage Scrap
- Stainless Steel
- Nickel
- Copper
- Monel
- Hastelloy
- Monel
- Tantalum
- Admiralty
- Yellow Brass
- Red Brass

Learn to look at a project as the sum of its components and not just as scrap overall

How Does Asset Recovery Impact the Bottom Line?

Scenario # 1 –Poor Asset Recovery Return

Gross Bid including overhead and profit…….$1,000,000
Revenue received from the sale of the assets…….$100,000
Net **Cost** to Client…….$900,000

Scenario # 2 –Excellent Asset Recovery Return-Same Project

Gross Bid including overhead and profit…….$1,000,000
Revenue received from the sale of the assets……$1,100,000
Net **Credit** to Client…….$100,000




Bid Comparison

Bid Comparison Sheet-Note qtys, costs and unit prices are plug numbers only with no relevance

Task Area 1	Contractor 1	Unit of Measure	Qtys	Unit Cost	Contractor 2	Unit of Measure	Qtys	Unit Cost/ (Credit)
Mobilization/Safe-out/Utility Disconnect	$ 75,000	Each	1	$ 75,000	$ 110,000	Each	1	$ 110,000
General and Administrative	$ 2,700,000	Month	36	$ 75,000	$ 1,200,000	Month	6	$ 200,000
Area 1								
Demolition Cost Above Ground Piping and Structu	$ 8,700,000	Ton	15000	$ 580	$ 5,600,000	Ton	5000	$ 1,120
Asset/Scrap Credit	$ (2,000,000)	Ton	15000	$ (133)	$ (600,000)	Ton	5000	$ (120)
Removal of Underground Piping	$ 600,000	LF	150000	$ 4.00	$ 1,200,000	LF	400000	$ 3
Purge Process Equipment	$ 2,100,000	Gallon	600000	$ 3.50	$ 1,500,000	Gallon	300000	$ 5
Purge Above Ground Piping	$ 750,000	LF	200000	$ 3.75	$ 1,200,000	LF	175000	$ 7
Purge Below Grade Piping	$ 1,200,000	LF	300000	$ 4.00	$ 500,000	LF	90000	$ 6
HazMat Abatement	$ 3,000,000	LS	1	$ 3,000,000	$ 1,000,000	LS	1	$ 1,000,000
Transport and dispose of trash and debris	$ 120,000	Per Load	400	$ 300	$ 120,000	Per Load	400	$ 300
Remove, transport and dispose of concrete	$ 2,000,000	CY	25000	$ 80	$ 2,800,000	CY	45000	$ 62
Site Work	$ 600,000	Acre	50	$ 12,000	$ 700,000	Acre	50	$ 14,000
Demobilization	$ 45,000	Each	1	$ 45,000	$ 30,000	Each	1	$ 30,000
Total Cost Area 1	$ 19,890,000				$15,360,000			

Total Cost Entire Project								
Average Cost per Day	$ 25,114				$ 116,364			
Estimated Workdays	792				132			
Tons scrap removed	15000				5000			
Tons concrete removed	50000				90000			
Tons Trash Removed	4800				4800			
Total Tons Entire Project	69800				99800			
Tons moved per day to meet schedule	88				756			
Trucks per day to meet schedule at 12 tons per tru	7				63			
Manhours	227314				175543			

Breakout Session

- What are some of the best practices you have experienced on environmental and demolition projects?
- What are some of the worst practices you have experienced on environmental and demolition projects?

Conclusion

Everything you see will come down at some time or another. Gravity makes it want to come down. The trick is to make it come down safely without getting anyone hurt or damaging anything.

Questions?


Gracias


Ευχαριστώ


Vielen
Dank


THANK YOU


Köszönettel


Merci


Grazie