

EXECUTIVE SUMMARY

REVISED CRITICAL INDUSTRY ISSUES (Page 2-4)

The S:PACE Roundtable held on October 12, 2006 proved to be a most influential event in the brainstorming process for research ideas. I decided to attend the Start-Up, Operations and Maintenance during the Building Systems Challenges session. The questions such as: What are common call backs? What are the best practices during start up? How can owners prepare for O & M teams? created tremendous conversation in our room. Contributions from John Bechtel of OPP, Teresa of The Pentagon Renovation and Russ Manning a Doctoral Candidate were quite enlightening. There were ideas presented throughout the roundtable discussions for potential researchable critical industry issues.

CRITICAL ISSUES RESEARCH METHOD (Page 4-5)

Commissioning costs between .15 and 1 percent of total construction cost yet pays back 3 to 11 dollars for every one dollar spent in fees. The task is to place commissioning in the optimal position to succeed.

REVISED PROBLEM IDENTIFICATION (Page 6-7)

The Dolphin Mall Expansion Project has one major item that presents challenges to the project on multiple levels. The temporary egress corridors, connecting entry #1 with the pre-cast panel exterior wall in “demo area south,” and the pre-cast panel exterior wall in “demo area north” are problematic. The egress corridors have been installed to allow temporary egress throughout the building during demolition and construction of the Bass Pro Shop entrance.

TECHNICAL ANALYSIS METHODS (Page 7-9)

The Dolphin Mall Expansion project presents potential structural and fire protection technical analyses. A problem statement, proposed solution, research steps and expected outcomes will be addressed for a possible relocation of the temporary egress corridors to Entry #1 and all sprinkler and structural system alterations that will follow.

WEIGHT MATRIX (Page 9)

A weight matrix was prepared with approximately fifteen percent of time allocated to a fire protection analysis, thirty-five percent of time allocated to a structural analysis and fifty percent of time remaining for a thorough investigation into the process of commissioning.

REVISED CRITICAL INDUSTRY ISSUES

INTRODUCTION

The S:PACE Roundtable held on October 12, 2006 proved to be a most influential event in the brainstorming process for research ideas. I decided to attend the Start-Up, Operations and Maintenance, during the Building Systems Challenges session. The questions such as: What are common call backs? What are the best practices during start up? How can owners prepare for O and M teams? created tremendous conversation in our room. Contributions from John Bechtel of OPP, Teresa of The Pentagon Renovation and Russ Manning a Doctoral Candidate were quite enlightening. There were ideas presented throughout the roundtable discussions for potential researchable critical industry issues.

INDUSTRY ISSUES

Quality Control vs. Assurance of systems

- If the owner checks 25% and contractor checks 25%, what becomes of the other 50%?
- What is the best percentage to check in systems, and should it be 100%?
- Who burdens the cost if a certain percentage of systems fail?

Tracking of warranty costs for a year.

- Exactly how much money can be saved with accurate commissioning as opposed to call back work?
- Does commissioning play a roll in the number and type of callbacks?

Turnover effects on commissioning.

- Many general superintendents are hired upon conclusion of work because they make the best O & M managers.
- If personnel are rotated, hired or fired during a commissioning process, does this create exponential adverse effects?

Who hires the commissioning agent?

- Owner hired commissioning agents can create adversarial relationships with the contractor. It is often the case that a commissioning agent appears to be working against the contractor because they have alternate agendas. The contractor may not interpret specs as a commissioning agent does and therefore a situation where both parties are correct may exist.
- Contractor hired commissioning agents can be seen as having less then optimal goals for the owner. If the agent is hired by the contractor he will be more inclined to work with the contractor, but may result in a less then excellent system performance for the owner.

Should commissioning agents be a part of spec writing and is it necessary for all scenarios?

What do post occupancy reports show?

- Is commissioning successful?

- Were warranty start dates accurate i.e. did they start upon substantial completion, turnover or during construction?
- Were systems operating early enough to work out bugs before turnover?

Does commissioning actually make a building perform at a higher level?

Should commissioning agents have the power to designate the start date of a warranty?

- Is it the manufacture's job to ensure that a system runs for a period of time upon installation or effective operation?

What is the typical time needed to work out system kinks?

- Are one-year warranties accurate, or should they be 2, 3, or 5 year warranties to truly allow for a system to operate at maximum capacity?

HVAC subcontractors typically have an adversarial relationship with commissioning agent.

- If commissioning agent is involved in spec writing or paid for by the owner, will a HVAC sub be more inclined to work with him, and if so will the results benefit from this action?

Is commissioning capable of delivering better as-builts

- Are as-builts truly accurate and updated?

ARAMARK manages and operates as well as commissions

- Are there benefits in having your commissioning agent also operate your facility.
- Should a permanent member of the O&M team be a part of commissioning?
- Is commissioning really ever over?

Does the O&M operator maintain?

- Will buildings perform better or worse with different operators?
- If commissioning is done well, does the O&M manager matter?

Should O&M be outsourced?

- Is it the owner's responsibility to maintain, or a contractor's before and after a warranty is over.

Is cost up front ever really the driving force when money spent on commissioning will save ten-fold in O&M

- Does commissioning save money in the long run, or is it excess money spent early that plays no role in later costs.

Pros vs. Cons for:

- Owner commissioning agent
- Contractor commissioning agent
- Third party commissioning agent
- Should both the contractor and owner have an agent?

How costly is commissioning and does it determine the quality of building linearly to the cost of commissioning?

Does commissioning ultimately make the construction process lean?

- What is best for everyone as far as
 - Timing

- Style
- Cost
- Performance or spec quality control
- Who checks who?
- Is commissioning ultimately a band-aid for poor subcontracting and coordination, and should it be the responsibility of a sub in the first place?
- How much waste is involved in the commissioning process?

CRITICAL ISSUES RESEARCH METHOD

INTRODUCTION

Commissioning costs between .15 and 1 percent of total construction cost yet pays back 3 to 11 dollars for every one dollar spent in fees. The benefits include:

- Improved coordination of CD's
- Accurate specs
- Reduced RFI's
- Reduced costs
- Reduced callbacks
- Knowledge increase
- Smooth turnover of building
- Reduced energy costs
- Design air quality
- Enhanced documentation
- Risk mitigation
- Function from day one
- Third party reviews

STATEMENT OF GOAL

“When should commissioning take place on specific projects, and who should be involved in the implementation of the process”

SOURCES

ARAMARK, SSRCx Facilities Commissioning (already consulted), NYCTA, and CH2M Hill will be the primary targets for information sourcing on commissioning for this research.

RESEARCH

General research has already been conducted with respect to commissioning and how it is currently being implemented. The target of the research is to obtain information from those with experience to determine the exact time and personnel commissioning requires for success on projects. A survey will be returned with information critical to this topic for computation and analysis, before presentation of the findings occurs.

POSSIBLE SURVEY

This survey has been discussed with SSRCx Facilities Commissioning and the NYCTA capital program commissioning personnel.

Name:

Location:

Are you a Designer, Construction Manager, General Contractor or Owner?

Public or Private Project Experience:

Have you been involved with commissioning before on a project?

What is the number of projects with commissioning that you have been involved with?

Were the projects typically in the range of?

- < \$1 Million
- \$1-5 Million
- \$5-25 Million
- > \$25 Million

Based on your experience, who should hire the commissioning agent and why?

- Owner contracted commissioning agent
- Contractor contracted commissioning agent
- Third party commissioning agent
- Owner and Contractor each hire a commissioning agent

What is the best time to get a commissioning agent involved with the construction process?

What is the best method to utilize a commissioning agent during the construction process?

Based on your experience, should the commissioning agent be involved with the specification writing, and if not, which project types and why?

Do post occupancy reports convey any trends with respect to commissioning?

Based on your experience, do buildings perform at a higher level when commissioned at different times in the building process?

Are there trends in the number or type of callbacks in commissioned or non-commissioned building?

Who should decide the percentage of system checks for passage during the commissioning process (i.e. how many faucets/toilets/lights operate correctly?)

Does commissioning directly effect the as-built drawings turned over to the owner?

Are warranty costs lower with different commissioned buildings?

Should Operations & Maintenance be outsourced to the commissioning agent, and what is your experience with such occurrences?

Should a permanent member of the O&M team be on the commissioning team, and what is your experience with such occurrences?

Should General Contractor warranties begin at substantial completion or when a commissioning agent recommends they begin (to assure systems are at 100% before the start date?)

Is commissioning fiscally responsible for all buildings types and sizes, and if not why?

What are your negative experiences with commissioning?

REVISED PROBLEM IDENTIFICATION

INTRODUCTION

The Dolphin Mall Expansion Project has one major item that presents challenges to the project on multiple levels. The temporary egress corridors, connecting entry #1 with the pre-cast panel exterior wall in “demo area south,” and the pre-cast panel exterior wall in “demo area north” are problematic. The egress corridors have been installed to allow temporary egress throughout the building during demolition and construction of the Bass Pro Shop entrance. The following items were problematic because of this design and layout.

FIRE PROTECTION ISSUES

Logistically all major sprinkler lines had to be rerouted to accommodate the temporary egress corridor. Four six-inch mainlines had to be rerouted three to four times to accommodate an egress corridor, erected for a maximum of five-weeks. The mainlines we rerouted to be located inside the “hurricane wall.” The “hurricane wall” was a term utilized to describe the outer wall of the egress corridors that could withstand one hundred-forty-six mile per hour winds in the event a hurricane came through south Florida. Mall rules stated that in the event any shutdown work was necessary, it was to be done between 11pm and 7am to avoid interference with mall operation. Limited crew availability lengthened the duration of such shutdowns to multiple days, creating a lag in the schedule. Avoiding or minimizing the sprinkler line rerouting is an item that can be addressed by altering the hurricane wall location on the temporary egress corridor or redesigning the corridor itself. The feasibility of this maneuver would make for an interesting MEP breadth.

STRUCTURAL

The temporary egress corridors required more time than budgeted for to achieve structural certification. The original design was not acceptable and had to be altered on the fly because of Miami-Dade Bldg. Dept. requirements. The “hurricane wall” became extremely problematic to the schedule, the cost, and the work flow of the project. A

redesign of the temporary egress corridors, spreading in the shape of wings through both demo areas south and north, would require a structural analysis. Stamped professional engineering drawings were used in the design-build contract held with the temporary egress corridor framing and drywall contractor. Sixteen gauge metal studs, twenty-four-inches on center were used for the vertical structural members, and a series of bracing at the roof line to obtain a one hundred-forty-six mile per hour wind certification. By altering the path of the egress to entry #1, a structural analysis would be required to determine what shielding or shoring would be required, at minimum, to protect the public while exiting the building out entry #1. The egress would be through the opening of the Bass Pro Shop entrance until the permanent corridors obtained an occupancy clearance.

DEMOLITION WORK FLOW

The flow of work for the demolition subcontractor was limited because of the installation of the footings and masonry wall for column line "A." To help keep subcontractors busy during the early part of construction, the footings and the wall construction were given the approval of the construction manager. As soon as demolition commenced, it was clear that machine access and roof removal would have a major conflict because of the new footing placements. Machines had to cross over column line "A" to remove roofing south of the line. Vertical rebar had to be removed from the wall to allow for the vehicle maneuvering. A look at the sequencing of work would show where the schedule was flawed but also show where items could have been delayed without ultimately delaying the entire CPM. Demolition work sequencing would certainly be considered a trouble spot for The Dolphin Mall Expansion Project.

CONCLUSION

In conclusion, the structural hurricane wall, sprinkler shut offs and rerouting, and the demolition work flow are all problematic features of the project in question. With each of these issues there are mini-items that can be addressed and discussed for potential solutions. Redesigning the temporary corridors will change work flow, the hurricane wall, the rerouting of the sprinkler lines and the site work (inclusive of storm water piping.)

TECHNICAL ANALYSIS METHODS

INTRODUCTION

The Dolphin Mall Expansion project presents potential structural and fire protection technical analyses. A problem statement, proposed solution, research steps and expected outcomes will be addressed for a possible relocation of the temporary egress corridors to Entry #1 and all sprinkler and structural system alterations that will follow.

FIRE PROTECTION ISSUES**Problem Statement**

- Remove temporary egress corridors from the project and install one egress corridor through the future opening for Bass Pro Shop at Entry #1. It is no longer necessary for the mainline relocation of sprinklers but will require a branch to sprinkle the proposed corridor.

Proposed Solution

- Tie sprinkler line into Branch line located at gridline H.5 or gridline 6.
- Do not relocate any six-inch mainlines, but proceed with branch line demolition as scheduled.

Research Steps

- Consult the Miami Dade Bldg. Dept. / Arfran II's approved sprinkler plan and specifications for the Dolphin Mall. Layout will be required to match existing mall conditions regardless of "temporary" title.
- Consult Skanska U.S.A. Bldg. Inc. on-site personnel for additional assistance in addressing a redesign.

Expected Outcomes

- Less relocation of existing piping will be required. The "hurricane" wall will now run along the exterior of the existing sprinkler mainlines which will allow for a deletion of the multiple relocations for the six-inch mainlines.
- Additional sprinkler line installation to accommodate the new sprinkled path. Existing corridors dropped a line and tied into the branches feeding the demo areas. A new egress path through Entry #1 would require a new line installed through Entry #1 wall.
- Time and money will be saved on avoiding the relocation of the mainlines, however a comparison of the tie-in to the existing branch will have to be analyzed against the drops located at the extents of column line "A" as previously performed.

STRUCTURAL ISSUES**Problem Statement**

- Remove temporary egress corridors from the project and install one egress corridor through the future opening for Bass Pro Shop at Entry #1. Determine the structural requirements to proceed with egress through a demolition area.

Proposed Solution

- Do not proceed with egress corridors a previously planned. Place one egress corridor through the opening for Bass Pro Shop at Entry #1. Structure should fit through 16'x30' opening to allow for permanent masonry wall construction over temporary egress corridor.
- Structurally reinforce the egress corridor for overhead demolition.
 - Nets
 - Scaffolding

- Structural Roof

Research Steps

- Consult the Miami Dade Bldg. Dept. / Lotspeich (corridor Design-Builder) / LRFD.
- Utilize The Pennsylvania State University's Architectural Engineering Structural personnel for brainstorming on redesign.
- Consult Skanska U.S.A. Bldg. Inc. on-site personnel for additional assistance in addressing a redesign.

Expected Outcomes

- Less total material for corridors based on shortened length.
- Increased structural load capacity for material
- Increased cost of structural system
- Decreased overall installation time and impact on construction

WEIGHT MATRIX

DESCRIPTION	RESEARCH	VALUE ENG.	CONST. REV.	SCHED. RED.	TOTAL
FIRE PROTECTION-CORRIDOR REDESIGN	0.00%	5.00%	5.00%	5.00%	15.00%
STRUCTURAL-CORRIDOR REDESIGN	10.00%	5.00%	10.00%	10.00%	35.00%
COMMISSIONING PROCESS RESEARCH	50.00%	0.00%	0.00%	0.00%	50.00%