

FINAL PROPOSAL EXECUTIVE SUMMARY

CRITICAL INDUSTRY ISSUES (Page 2-6)

Critical issues facing the construction industry continually plague projects. The balance between construction and turnover is one that can produce negative results for years if handled incorrectly. The Dolphin Mall Expansion project has little to no commissioning.

VALUE ENGINEERING ANALYSIS (Page 7-8)

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 public is the challenge. Value engineering by definition is the alternate/ proposed changes, adds or deducts from exiting drawings or logistics to add value to the project. Value engineering is not cost-cutting.

CONSTRUCTIBILITY REVIEW (Page 9-10)

The Dolphin Mall Expansion Project's temporary corridors control the schedule and that leaves the constructability for the project with room for improvement. The temporary egress corridors, connecting entry #1 with the public have proven troublesome for items such as demolition, foundations and block wall installation.

SCHEDULE REDUCTION/ ACCELERATION PROPOSAL (Page 10)

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WEIGHT MATRIX (Page 10)

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.

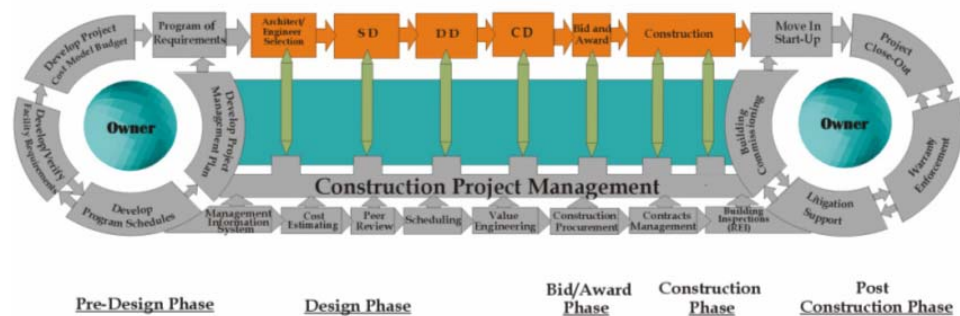
SPRING SEMESTER PROPOSED SCHEDULE (Page 11)

The Dolphin Mall Expansion Project's temporary corridors value engineering and redesign, as well as research, must be accomplished according to the proposed schedule. Because of chaos in March, the ideal situation is to accomplish the three main tasks before the break, leaving only finish work for after spring break because of the National Championships.

CRITICAL ISSUE RESEARCH

INTRODUCTION

Critical issues facing the construction industry continually plague projects. The balance between construction and turnover is one that can produce negative results for years if handled incorrectly. The Dolphin Mall Expansion project has little to no commissioning. A permanent corridor upon completion of demolition is the primary focus of the 6.4 million dollar project. The Expansion project will prepare the Dolphin Mall for the addition of a Bass Pro Shop. While commissioning does not greatly affect this project, it is very much the center of interest for many people, and so will be addressed with anticipation of finding a helpful trend for many in search of answers.



Construction Program Management for Capital Construction Programs (Traditional Approach)

Fig. 1. Where does commissioning fit in?

INDUSTRY ISSUES

The Pace Roundtable on October 12, 2006 was the origin for this research topic. The Roundtable was filled with professionals asking questions about how commissioning can be beneficial and when it should be used. As previously outlined in technical assignment three of fall 2006, there were multiple topics discussed. The following topics were opened to discussion with respect to commissioning:

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-aide 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?

CURRENT RESEARCH AS OF DECEMBER 8, 2006

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

With knowledge of what commissioning is, and how it can benefit a building, the following goal has been created for spring 2007 research: “When should commissioning take place on specific projects, and who should be involved in the implementation of the process”

SOURCES

There will be many sources for research in the spring of 2007. The primary sources utilized for survey formation and research are ARAMARK, SSRCx Facilities Commissioning (already consulted), NYCTA, and CH2M Hill.

CONTINUOUS COMMISSIONING				
Real Estates	HEATING	COOLING	WATER	ELECTRICITY
	<ul style="list-style-type: none"> • District heating • Ventilation • Heat recovery 	<ul style="list-style-type: none"> • Refrigerating machine • District cooling • Ventilation • Cooling recovery 	<ul style="list-style-type: none"> • Hot-water • Water 	<ul style="list-style-type: none"> • Primary meters • Sub meters - Switchboards
Reporting	Statistics by - year - Month - Day - hour	Statistics by - year - Month - Day - hour	Statistics by - year - Month - Day - hour	Statistics by - year - Month - Day - hour

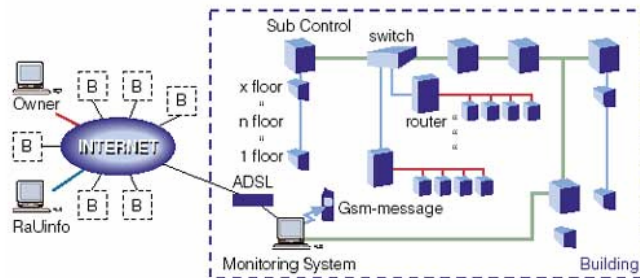


Fig. 2. Continuous Commissioning

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 the presentation of the findings occurs.

POSSIBLE SURVEY

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

- **Name:**
- **Are you a Designer, Construction Manager, General Contractor or Owner?**
- **Public or Private Project Experience:**
- **Type of project:**
- **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 positive experiences with commissioning?**
- **What are your negative experiences with commissioning?**

VALUE ENGINEERING ANALYSIS

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 public is that challenge. Value engineering by definition is the alternate/proposed changes, adds or deducts from exiting drawings or logistics to add value to the project. Value engineering is not cost-cutting.

PROPOSED VALUE ENGINEERING IDEAS

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. In addition to these statements, solutions, steps and expected outcomes, a constructability review and schedule reduction can be found in later sections of the proposal.

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



Fig. 3. Sprinkler Mainlines



Fig. 4. "Hurricane Wall" Erection

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 as 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



Fig. 5. “Hurricane Wall” At Entry #1

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

CONSTRUCTIBILITY REVIEW

INTRODUCTION

The Dolphin Mall Expansion Project's temporary corridors control the schedule and that leaves the constructability for the project with room for improvement. The temporary egress corridors, connecting entry #1 with the public have proven troublesome for items such as demolition, foundations and block wall installation.

DEMOLITION

The demolition for the project centered on Entry #1. Because of a delay in the temporary egress corridors, roof demolition was done with surgical precision to avoid destruction of any area that would be in conflict with egress. Selective demolition was done for approximately six-weeks to allow for schedule continuance while the "hurricane wall" was not installed. Without the "hurricane wall" the exterior shell demolition could not continue. The spring semester will be utilized to look at rerouting the egress to allow for earlier demolition, and consequently an easier flow of trades during construction.

FOUNDATIONS

The demolition of the exterior walls was done after column line "A" footings were installed. Constructability was flawed in this case because with footings installed, demolition still had to occur on both sides of column line "A." Machines are therefore required to cross the footings, damaging rebar dowels as well as dropping roof debris on the newly installed



Fig. 6. Demo Area "South"



Fig. 7. Column Line "A" Footings



Fig. 8. Masonry Before Demolition

footings, and first two courses of block.

MASONRY BLOCK WALL

Masonry block was started upon competition of the footings along column line "A." Column line "A" was not completed in close proximity to Entry #1 because Entry #1 previously sat on two footings. If egress is rerouted, the wall could be completed at one time, avoiding stepped, partial installation with less quality control. If schedule sequencing is altered, the masonry block wall will be substantially more constructible. Redesign of temporary egress in spring 2007 will address constructability with absolute clarity.

SCHEDULE REDUCTION

INTRODUCTION

The Dolphin Mall Expansion Project's temporary corridors control the schedule for the project. The temporary egress corridors, connecting entry #1 with the public has proven troublesome for items such as demolition, foundations and block wall installation.

SCHEDULE

Spring 2007 will allow time to analyze the value engineering breadth proposals for the structural and fire protection redesigns in a new temporary egress corridor out Entry #1. Change in durations and or start and finish dates can be expected for:

- Hurricane wall
- Temporary egress corridors
- Sprinkler relocation
- Selective demolition
- Shell demolition
- Footing Installation
- Masonry block wall installation

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%

SPRING SEMESTER PROPOSED SCHEDULE

INTRODUCTION

The Dolphin Mall Expansion Project's temporary corridors value engineering and redesign, as well as research, must be accomplished according to the proposed schedule. The bold dates are the three most important schedule dates to avoid delay. Because of chaos in March, the ideal situation is to accomplish the three main tasks before the break, leaving only finish work for after spring break because of the National Championships. Final product is listed in italics with a date of March 30, 2007.

SCHEDULE

Classes Begin

Survey Finalized and Completely Sent Out

Start Sprinkler Analysis

Sprinkler Analysis Complete

Start Structural Analysis

Compile and Tabulate Research

Structural Analysis Complete

Spring Break

DBIA National Championship in San Antonio

\$\$Final Thesis Written and Posted\$\$

Classes End

Final Exams

January 16, 2007

January 19, 2007

January 22, 2007

February 9, 2007

February 12, 2007

March 2, 2007

March 9, 2007

March 12-16, 2007

March 19-22, 2007

March 30, 2007

May 4, 2007

May 7-11, 2007