Established 1915
BROWARD
County Public Schools

Roofing Process Analysis

September 8, 2020

RSM

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TRANSMITTAL LETTER

July 20, 2020

Joris Jabouin, Chief Auditor
Broward County Public Schools
600 SE 3rd Avenue, 8th Floor
Fort Lauderdale, Florida 33301

Pursuant to the approved internal audit scope of work, submitted April 29, 2020, we hereby submit our Roofing Process Analysis report. We will be presenting this report to the Audit Committee at the next scheduled meeting.

Our report is organized in the following sections:

Terms and Acronyms	This section defines the acronyms used throughout our analysis.
Executive Summary	This section provides a brief background and a summary of the observations related to our analysis of key components of the District's roofing process.
Process Overview	This section provides a high-level process overview of the key components included in our analysis.
Analysis and Observations	This section presents descriptions of the observations noted during our analysis, and corresponding recommended actions.
Objectives and Approach	The objectives and approach of the analysis are explained in this section.
Appendix	This section includes details process maps related to the procurement selection/assignment process.

We would like to thank all those involved for their assistance in connection with the Roofing Process Analysis at Broward County Public Schools.

Respectfully Submitted,

RSM US LLP

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TERMS AND ACRONYMS

The following terminology and acronyms are referenced throughout the report:

ATP – Authorization to Proceed
A/E – Architect / Engineer (Designer)
BCPS – Broward County Public Schools
BD – Building Department
CMAR – Construction Manager at Risk
CSMP – Continuing Services Minor Projects
DBB – Design-Bid-Build
E-Builder – Construction management software utilized by the District
FBC – Florida Building Code
GC – General Contractor
GMP – Guaranteed Maximum Price
GOB – General Obligation Bond
HVHZ – High-Velocity Hurricane Zones
ISS – Building Department's Integrated Software System
LOR – Letter of Recommendation
LWIC – Lightweight Insulating Concrete
NOA – Miami-Dade Notice of Acceptance NTP – Notice to Proceed
OFC – Office of Facilities and Construction
OR-DRT – Owner's Representative Design Review Team
OR-DRTL – Owner's Representative Design Review Team Lead
OR-PM – Owner's Representative Project Manager
PMOR – Program Manager Owner's Representative
PWS – Procurement and Warehousing Services
QSEC – District's Qualification Selection Evaluation Committee
SREF – State Requirements for Educational Facilities

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EXECUTIVE SUMMARY

Broward County Public Schools – Roofing Analysis

Observation Highlights

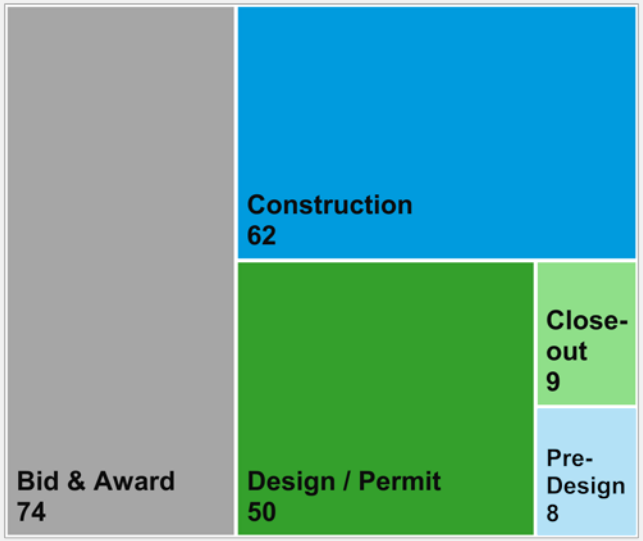
The District's SMART Bond Program created a substantial and immediate increase in the need for highly qualified and experienced design and construction professionals. The local market did not have the capacity to fulfill this need, which resulted in issues, complaints, missed expectations, project delays, and the District's Building Department (BD) having to take on a more educational and supportive role with third-party vendors with respect to roofing.

Our sample basis testing shows that in most cases, delays in the roofing plan and sub-permit review occur when pending responses from third-party vendors, and are not caused by the BD. That said, and considering the current local market environment, the BD's availability to spend time educating design and construction professionals as to why certain requirements exist is a critical component of a successful and timely delivered program. Currently, the BD's limited staff, manual processes, and unwavering commitment to building high quality roofs have further exacerbated challenges faced within the program. Key BD personnel have been relegated to performing detailed and administrative tasks manually, and without the support of lower level staff resources or information technology systems that possess modern automation capabilities.

As detailed in the pages that follow, we recommend the BD increase its involvement in the design and plan review process, accept electronic submittal of roofing sub-permits, explore technology system improvement(s), and prepare for staffing increases as the volume of sub-permit applications and construction inspections is certain to increase as more roofing projects move through the process.

Current Roofing Activity

Roofing Project Phases: 203 Total Projects



Vendors:
18 Architect/Engineers
19 Roofing subs
4 Roofing vendors on CSMP contract

Roofing Sub-Permits:
48 Permits approved*
68 Permits applied for*

RSM Approach

25+ Interviews with roofing stakeholders
12 Detailed process maps created
150+ Documents obtained | reviewed | analyzed
30+ Data analytic procedures

SMART Program (FY20)

~$1.143B

General Obligation Bond
~$800M

Other Capital Outlay Funding
~$314M

4

Building Department FTEs:
- 2 full-time roofing inspectors / plans examiners
- 2 third-party roofing inspectors

Plan Review Analysis (Averages):

53 Days in BD review per project**
196 Days for A/E to revise per project**
3.8 Rounds of review prior to approval**

Roofing Sub-Permit Analysis (Averages):

60 Days in BD review per project**
171 Days for Roofer to revise per project**
4.8 Rounds of review prior to approval**

Pay Application Processing

Ranging from **17 to 145 Days**

59 Days on Average***

** Based on summary ISS data for eighty (80) roofing projects*
*** Based on a sample of ten (10) projects*
**** Based on a sample of twenty (20) pay applications*

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EXECUTIVE SUMMARY (CONTINUED)

The following table briefly summarizes the observations noted during our analysis. Refer to the Analysis section below for further detail:

1. Roofing Design and Plan Review
Design drawings are a critical element and basis for roofing subcontractor bidding, planning, and sub-permitting submissions; however, we noted that the planning and design process excludes certain components that are key to the efficient completion of accurate and comprehensive designs.
2. Strategic Long-Term BCPS Roofing Plan
Through inquiry, we noted there is no strategic roofing plan in place for prioritizing, selecting, or scheduling roofing projects to develop a long-term plan for each of the 241 school facilities managed by BCPS.
3. Utilizing Alternative/Separate Contracting for Roofing Scopes
During our analysis, we noted an opportunity for the District to expedite project timelines by extracting roofing scopes of work into individual projects. These projects could be delivered by CSMP contractors for projects under $2M, or procured separately but parallel with other scopes, for projects greater than $2M.
4. Roofing Sub-Permit Review Process – ISS Comments & Clearance
Through our inquiry and review of ISS Data, we noted instances where the level of detail contained in ISS could be improved to allow for a more thorough explanation and timeline tracking of issues noted by the Building Department during sub-permit application review.
5. Roof Sub-Permitting Process is Manual / Printed
Through our analysis, we noted that roofing sub-permit documentation is submitted and maintained in printed (hard-copy) binders, rather than electronically.
6. Lack of Resources to Support Roofing Sub-Permitting
Currently, only one (1) individual is responsible for facilitating the entire roofing sub-permit process. While our analysis reflected that the BD reviewer was able to turn around sub-permit application reviews within thirteen (13) days (on average) we anticipate increases in future transaction volume to continue to strain this individual's capacity.
7. Lack of Formalized Procedures and Resources for Inspections
As part of our review we noted a lack of formalized procedures and resources for inspections.
8. Building Code Interpretation and District Design Standards
During our analysis, we identified multiple items related to the District's position/interpretation of the Florida Building Code and District design standards that limit available roofing manufacturers to a single provider. While predicated on the District's commitment to constructing high-quality roofs, these factors likely contribute to increased costs of roof construction.
9. Pay Application – Delayed Payment and Processing
As part of inquiry and data analysis, payment to roofing subcontractors for materials and services rendered have frequently been delayed on projects.

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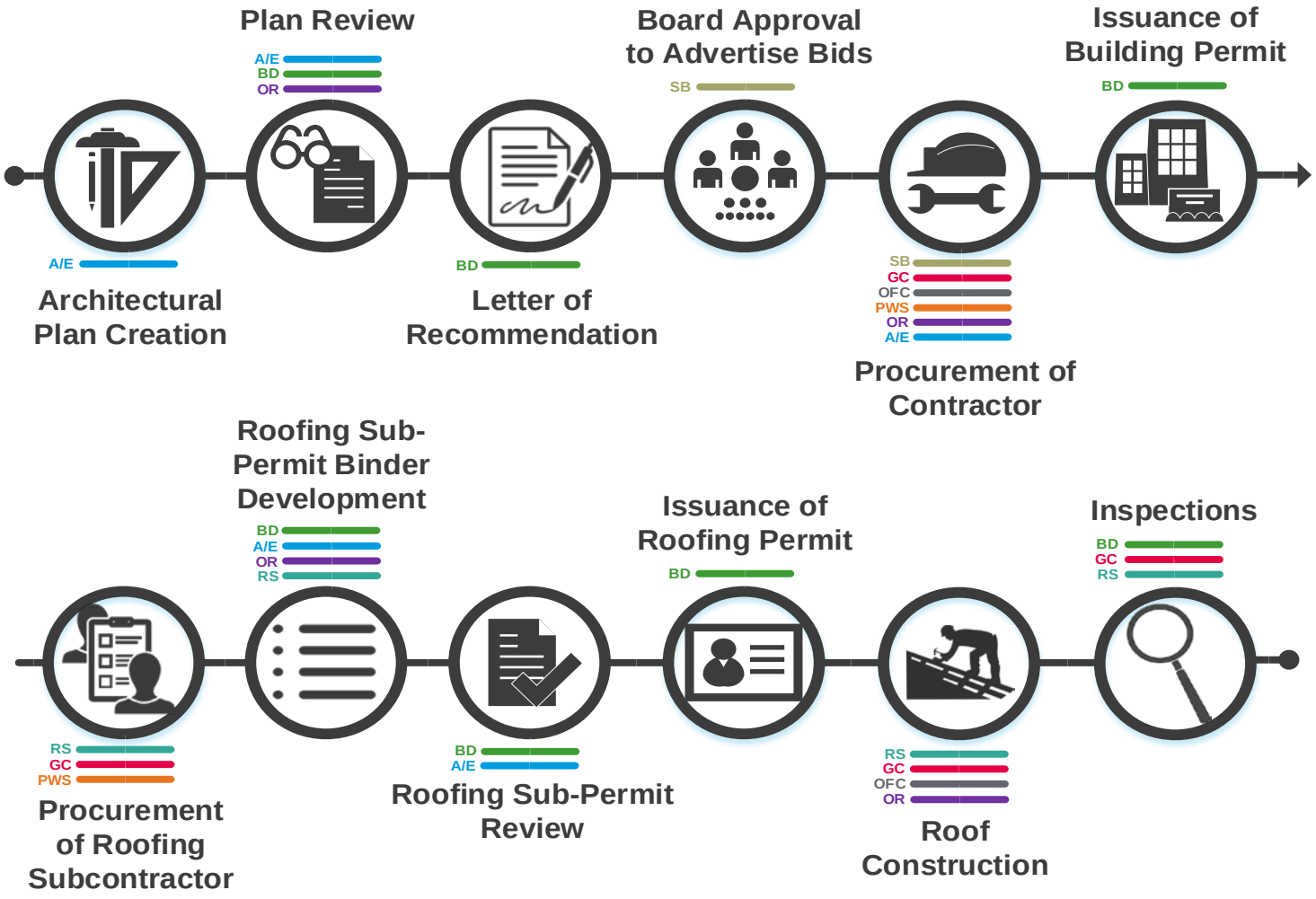
BACKGROUND

Process Overview

The process overview below depicts the roofing process starting with the creation of the designer's architectural plans. The overview does not include the processes that occur prior to the design phase (i.e. design team procurement, scope development, etc.). Refer to Appendix A for detailed process maps related to the processes depicted below.



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ANALYSIS

Plan Review Process

The design phase and plan review process are critical to the success and timeline of a roofing project. The quality of the design plans provided by the design consultant can affect the later stages of a project, including the general contractor's procurement of roofing subcontractors, roofing sub-permitting process, roof construction, and inspections process. If the design consultant's drawings are not complete, do not reflect the actual conditions of the building, or are not designed according to design standards and building code, the timeline and costs of subsequent stages of a construction project can be substantially affected.

At the beginning of a GOB Renovation project, the District will procure a design consultant to create a set of drawings or plans based on the scope of a given project. When a designer receives an Authorization to Proceed (ATP) from the District, the vendor begins the design process and starts drafting the architectural plans. The designer's plans include the architectural drawings and specifications of the design, which encompass the different disciplines or trades required by the scope of work (i.e. roofing, mechanical, electrical, etc.). To validate these plans for accuracy, completeness, and compliance with applicable codes and standards, the Owner's Representative Design Review Team (OR-DRT) and District's Building Department (BD) to perform plan reviews at various points during the design phase.

The stages of design are dependent on the size, scope, and complexity of a project; however, the typical design review process includes the following stages:

- Scope Validation
- 30% Construction Documents
- 50% Construction Documents (or 60% depending on the contract)
- 90% Construction Documents
- 100% Construction Documents

The Design Review Team is comprised of engineers and plan reviewers who perform reviews based on their specialization (i.e. mechanical, plumbing, electrical, etc.). The OR-DRT does not currently have a reviewer who specializes in roofing; however, roofing details are reviewed as part of the building envelope by the structural and architectural reviewer. The OR-DRT reviewers work remotely, and as such their review relies on the scope of work, construction documents, and information provided to them by the Owner's Representative Project Manager (OR-PM) field personnel.

The OR-PM facilitates the plan review process, serving as the intermediary between the designer, OR-DRT, and BD. The OR-DRT is typically not in direct communication with the BD unless a meeting is requested. At each design stage, the OR-PM provides the OR-DRT with the design plans for review. The OR-DRT's review mainly focuses on compliance with applicable building codes and District design criteria. After the OR-DRT provides review comments, the Owner's Representative Design Review Team Lead (OR-DRTL) compiles the comment sheets for the OR-PM to distribute to the designer.

The BD performs reviews for the 50/60% Design Development submittal and 100% Construction Documents submittal. The Department currently has one (1) District employee dedicated to reviewing plans, and multiple individuals who perform reviews on an as-needed basis. For the 50/60% submittal, the BD performs a courtesy review (or peer review) of the design plans. This review is not required, but allows for the designer to receive comments from the BD directly, prior to the BD's 100% review. Unlike the BD's 100% review, the 50/60% review is only performed once, and is not currently structured for back-and-forth communication between the designer and the BD. Refer to Observation #1 for additional information related to the BD's involvement earlier in the plan review process.

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ANALYSIS (CONTINUED)

Plan Review Process (continued)

The 100% submittal is reviewed by the BD to ensure compliance with the scope of work, Florida Building Codes, District design standards, and State Requirements for Educational Facilities (SREF). This process can take multiple rounds of review; the designer will be instructed to revise and resubmit their construction documents until the BD determines they are compliant.

The BD utilizes their in-house Integrated Software System (ISS) to provide review comments and solicit responses from the design consultant directly. The system records the date that the BD receives the plans and the date that they complete their review. The time spent between review and plan resubmittal is dependent on the number of comments provided, the severity of the issues, and response times of both the BD and designer. This process is performed for all disciplines (if applicable to a given project) as required by the Florida Building Code.

Disciplines include:

- Building
- Site Utilities
- Roofing
- Mechanical
- Electrical
- Plumbing
- Fire Protection
- Fire Safety

For the purposes of our analysis, we obtained summary ISS data of eighty (80) roofing projects. Through our review of ISS data and discussions with roofing contractors, BCPS BD, and BCPS OFC, we selected ten (10) projects for further analysis. The table below includes ISS data from the BD's 100% review for the roofing discipline for these ten (10) sampled projects*.

Sample #	School Name	Project Name	Discipline	Rounds of BD Review	Total Days in BD Review	Total Days in A/E Queue After BD Review
1	Sandpiper Elementary School	GOB Renovations	Roofing	3	36	146
2	Lake Forest Elementary	GOB Renovations	Roofing	6	134	290
3	Dillard 6-12 School	GOB Renovations	Roofing	4	92	304
4	Blanche Ely Senior High School	GOB Renovations	Roofing	4	70	230
5	Castle Hill Elementary School	GOB Renovations	Roofing	3	27	127
6	Stranahan Senior High	GOB Renovations	Roofing	4	29	176
7	The Quest Center	GOB Renovations	Roofing	4	42	179
8	Walker Elementary School	GOB Renovations	Roofing	6	69	258
9	Riverland Elementary School	GOB Renovations	Roofing	3	33	58
10	Stoneman Douglas Senior High School	GOB Renovations	Roofing	1	1	N/A

**Our sample was selected from a population of eighty (80) projects that had a Notice to Proceed (NTP) date on or before March 11, 2020.*

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ANALYSIS (CONTINUED)

Plan Review Process (continued)

The table below provides a summary of the ISS data from the BD's 100% for the ten (10) sampled projects.

Building Department Review			A/E Response / Resubmittal	
Average Rounds of BD Review Required	Avg. Days in BD Review Per Round	Avg. Total Days in BD Review Per Project	Avg. Days Between BD Review and A/E Resubmittal Per Round	Avg. Total Days Between BD Review and A/E Resubmittal Per Project
3.8	14	53	63	196

After the BD reviews and approves the 100% submittals for all disciplines, the Chief Building Official will issue a Letter of Recommendation (LOR) stating that the "documents have been reviewed for bidding/construction and are awaiting contractor information in order to issue the Construction Permit." When a contractor is on-boarded, the BD will issue a Building Permit, often referred to as the "Master Permit" or "Construction Permit". The contractor is then able to start "bidding the project" and proceed with procuring the various subcontractors who will perform the work on a given project. When a Notice to Proceed (NTP) is issued to the contractor, they are able to begin construction on the project.

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ANALYSIS (CONTINUED)

Plan Review Process – Process Maps

Plan Review Process

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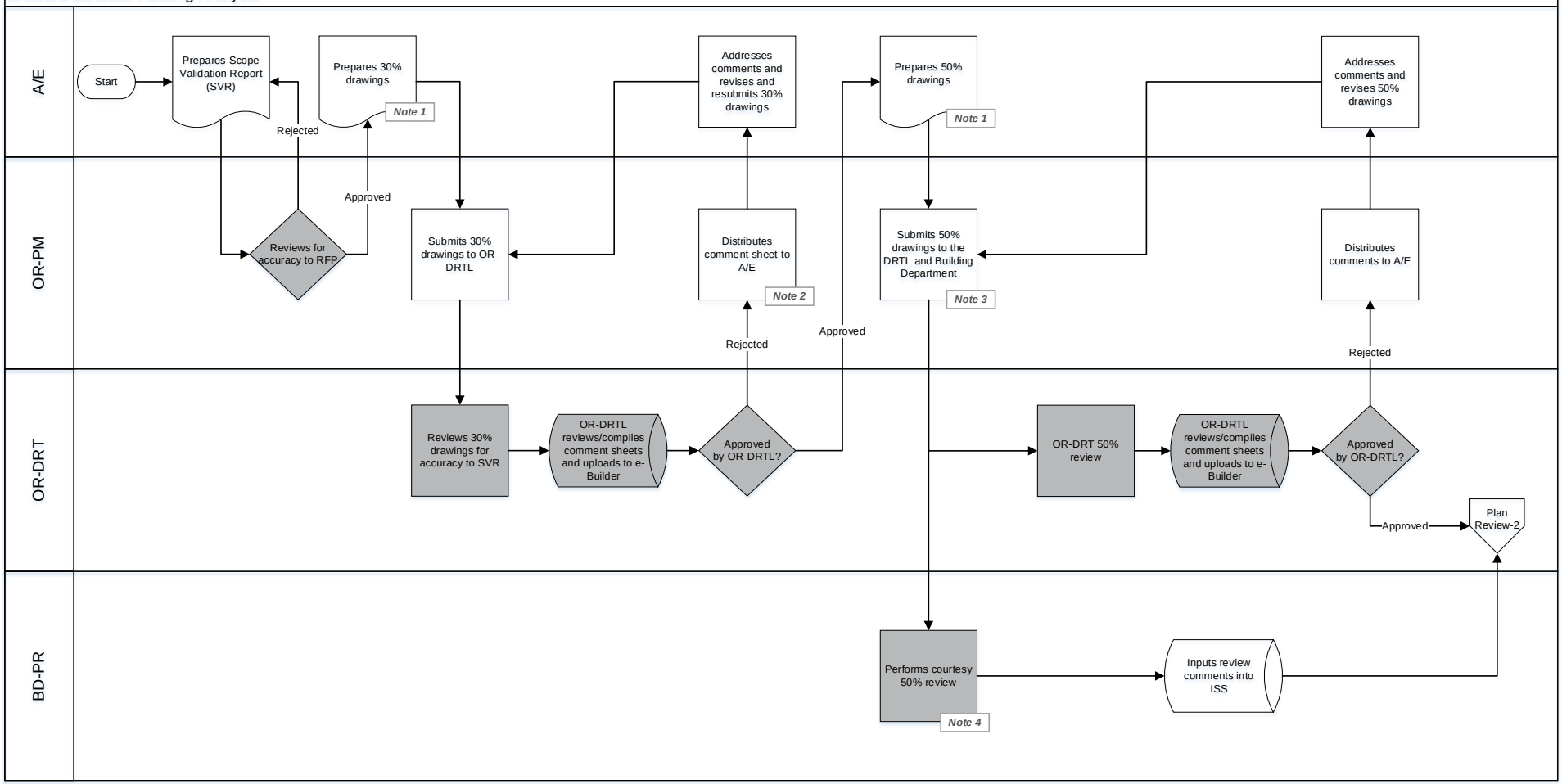
Broward Schools: Roofing Analysis



Note 1: Design stages are dependent on the size of the project, delivery method, and complexity. 30% and 50% stages may be removed.
Note 2: Comment sheets can also be generated for approved plans.
Note 3: The 50% drawings are sent to the Design Review Team Lead and Building Department simultaneously by the OR-PM. The OR-DRT and Building Department perform their reviews concurrently. Review comments are compiled by the OR-DRTL and combined at 90%.
Note 4: The Building Department's courtesy review at 50% or 60% is dependent on the scope of work and nature of the project. The Building Department provides comments, however, they do not reject a submission.

Acronyms:
A/E = Design Consultant
OR-PM = Owner's Representative Project Manager
OR-DRT = Owner's Representative Designer Review Team
OR-DRTL = Owner's Representative Designer Review Team Leader
BD-PR = Building Department Plan Reviewer

Legend:
Start/End | Off-page Connector | Decision | Document | Process Step | Database
Color: Process | Control

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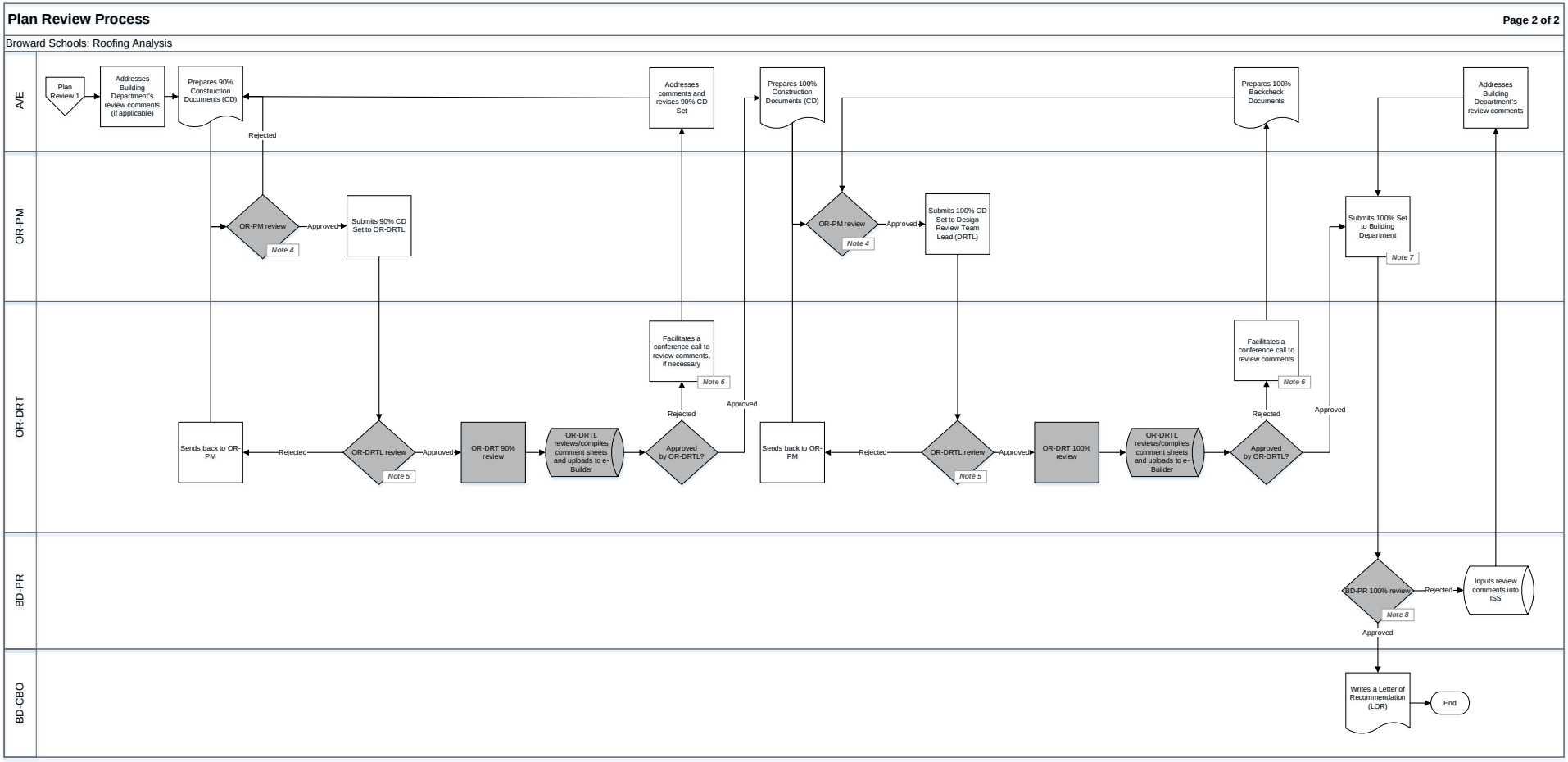
ANALYSIS (CONTINUED)

Plan Review Process – Process Maps (continued)



Note 4: The OR-PM performs a cursory review to make sure all necessary documents are included.
Note 5: The OR-DRTL's performs a cursory review to make sure all necessary documents are included.
Note 6: Conference call can include the Designer (A/E), Owner's Representative Project Manager (OR-PM), Owner's Representative Design Review Team (OR-DRT), and the Engineer of Record (EOR).
Note 7: The Building Department's 100% CD review does not occur until all of the OR-DRT's comments are closed.
Note 8: The Designer will revise their 100% Construction Documents based on the comments provided by the Building Department and resubmit for review following the same process. The Designer is required to respond to reviewer comments within the ISS system. This revise and resubmit process can go through multiple rounds until the Building Department approves the 100% Construction Documents and issues an LOR.

Acronyms:
A/E = Design Consultant
OR-PM = Owner's Representative Project Manager
OR-DRT = Owner's Representative Designer Review Team
OR-DRTL = Owner's Representative Designer Review Team Leader
BD-PR = Building Department Plan Reviewer
BD-CBO = Building Department Chief Building Official

Legend:
Start/End
Off-page Connector
Decision
Document
Process Step
Database
Color:
Process
Control

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ANALYSIS (CONTINUED)

Plan Review Process - Observations

Observation	1. Roofing Design and Plan Review
Description	Design drawings are a critical element and basis for roofing subcontractor bidding, planning, and sub-permitting submissions; however, we noted that the planning and design process excludes certain components that are key to the efficient completion of accurate and comprehensive designs. Based on inquiries with roofing contractors, BCPS BD, and BCPS OFC: • Many of the designers lack specialized roofing knowledge and do not use subconsultants to assist with the roofing portion of the plans; • Designers often utilize prior as-built drawings as a basis to create the new project drawings. Prior school drawings may be outdated (10 to 20 years old) and may not accurately depict the current conditions of the roof; • Roofing subcontractors perform a short on-site visit prior to bidding and rely heavily on the designer's plans during the bidding process; • Instances occur where roofing subcontractors learn of requirements to which they were previously unaware during the sub-permitting process which deviate from the original roofing contractor's bid; • BCPS BD is not involved in plan review until 50/60%, which is after a significant portion of the design and plan review process has occurred; and • BCPS BD review at 60% is considered a courtesy and is documented within ISS, but there is no resolution or Q&A between the BD, DRT or A/E regarding comments. Failure to identify and incorporate these critical planning elements early in the process may lead to schedule delays and cost increases in each subsequent phase of the project.
Recommendation	We recommend the following: • Evidence of a site visit should be retained to verify that the designer performed an inspection of the roof prior to design. If designer drawings do not provide sufficient detail or do not accurately represent the existing conditions of the roof, this may result in construction change orders later in the roofing process; • Designers should utilize third-party consultants when necessary to assist with the roofing portion of the design; • BCPS BD should collaborate with designers earlier in plan review (as early as scope validation or 30%) to identify required changes applicable to roofing. The BD's roofing subject matter expert should conduct an initial kickoff meeting with designers to review project scope and communicate District expectations prior to plan formulation; and • A meeting should be held after the 60% courtesy review between the BD, DRT, and A/E to discuss the review and answer any pending questions or concerns.

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ANALYSIS (CONTINUED)

Plan Review Process - Observations

Observation	1. Roofing Design and Plan Review (continued)
Management's Action Plan	**Capital Programs Response:** The SMART Program has undeniably encountered various issues and challenges related to its roofing process. Navigating these challenges has resulted in obstacles identified during or at the completion of the Design phase on earlier projects. While many of these obstacles have contributed to project delays, the lessons learned in the process have presented opportunities to identify mitigating solutions to be implemented on subsequent projects that are still making their way through the design and contractor procurement stages. As a result of this effort to apply these lessons to our process improvements, there has been a marked improvement in the number of days to obtain LOR's and Roofing Sub-permits. The observations and recommendations provided in the RSM audit are well received, noted and will serve as a basis to further expound on solutions, some of which are already in progress. Over the past 2 years, the SMART Team has worked in collaboration with the Office of Capital Program (OCP) and the Building Department (BD) to further understand the challenges as they pertain to the roofing work and to begin formulating viable solutions. A number of efforts have been initiated and are underway in earnest to address several concerns identified in the audit report. These include but are not limited to: • Establishing a focused and collaborative Roofing Team • Adding staff resources dedicated to supporting roofing efforts • Meeting with the business, contractor and roofing communities to obtain candid feedback that can inform solutions • Working with the Building Department to coach and assist roofing contractors with the sub-permit process • Review of Roof Sub-Permit binders for compliance prior to submission to BD • Developed standardized guidelines and details to assist roofing contractors with preparation of sub-permits • Performing Roofing Reality Checks for QAQC • Reviewing and identifying process improvements • Requiring site visits prior to a contractor's bid submittal • Review and update of District Design Standards • Outreach to encourage additional manufacturers to obtain NOA Our intent is to continue working collaboratively to apply these mitigating strategies and other recommended solutions on projects that are making their way through design, bid/award and sub-permitting. Our team has already been, and will continue, working with the remaining design firms early in the process to ensure they have a clear understanding of the Districts roofing requirements. We have already seen, in recent months, a marked improvement in the average timeframe and success rate for designers 100% plan approval: 109 days compared to the 196 days reported in the audit.

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ANALYSIS (CONTINUED)

Plan Review Process - Observations

Observation	1. Roofing Design and Plan Review (continued)
Management's Action Plan	**Capital Programs Response (continued):** As we all now have a better understanding of the requirements necessary for successful implementation of the SMART Program's roofing scope, the intent is to continue working with design firms to produce higher quality designs/bid documents, to increase the likelihood of a more seamless implementation process. **Building Department Response:** • Designers are in fact required by contract to conduct site visits prior to design and we agree that there needs to be an emphasis on confirming that the Consultant has verified field conditions prior to design, which normally is the responsibility of the Program Manager. As noted in the Roofing Analysis, in many cases the design documents did not provide sufficient detail or accurately show the proper details, which caused the many review submission cycles prior to obtaining a Building Permit. • Many of the Consultants in fact used third party consultant/testing agencies in the design to review the existing conditions of the roofs. However, the program was driven by budget and scope of work that did not adequately describe the scope needed to provide a code compliant roof replacement. • Generally there are not enough details in the design documents at 30% for the BD to benefit the process. Even at 50%, the design is not advanced enough to provide constructive feedback; however the 50% comments did open a dialog between the Building Department and the Consultant affording the Lead Roofing Inspector to have many meetings with the Consultants to review the roofing scope and details prior to the permit submittal. • At the Phase III 100% permit submittal all prior review comments from the BD and the PMOR are reviewed for completeness as the first step in reviewing the project for a building permit. In fact, numerous pre-submittal and interim submittal meetings with BD staff already are part of the process. The lead roofing plans examiner has often met with both consultants and contractors multiple times each to assist them in the procurement of permits. • The analysis presumes that there are enough architects and contractors that have a clear understanding of roofing in the construction industry so that visits to the site would yield a better understanding for both entities across the board. This is a rare occurrence and a breach of contract for that tenet for consultants especially and a considerable number of roofing contractors, who were provided that option at the Pre-construction meetings. This fact is proven by the very documents submitted to the BD for permits. It is important to note that the contractor's requirement to visit the site was made a requirement approximately 2 months ago. **Responsible Party:** Executive Director of Capital Programs, Chief Building Official

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ANALYSIS (CONTINUED)

Plan Review Process – Observations

Observation	2. Strategic Long-Term BCPS Roofing Plan
Description	Through inquiry, we noted there is no strategic roofing plan in place for prioritizing, selecting, or scheduling roofing projects to develop a long-term plan for each of the 241 school facilities managed by BCPS. For example, it is possible that a building may receive a roof replacement with a lifespan much greater than the expected useful life of a building, instead of less-costly repairs to extend the existing roof's lifespan to a timeline consistent with the remaining building components. Individuals making facility maintenance decisions regarding elements such as roofing should be equipped with up-to-date information to enable effective decision-making. The District prepares a District Educational Facilities Plan (DEFP) annually which includes the subsequent five (5) fiscal years. The current plan includes up to the end of FY2024. While the DEFP is critical to capital outlay planning, it does not contemplate the long-term plans for each BCPS school. Additionally, there is no system currently utilized to manage BCPS roofs as an asset to store and maintain the information necessary for long-term planning. Without proper tracking of long-term plans related to each buildings life cycle, resources may be utilized ineffectively leading to financial, operational, and reputational damage.
Recommendation	We recommend BCPS develop and maintain a long-range plan for all facilities managed. This planning document should be updated and distributed periodically, and utilized during facility maintenance decision-making processes. The strategic plan should consider the current conditions of existing facilities / roofs and include a life cycle analysis to assist in the planning and selection of future projects. If BCPS does not currently have the expertise and available resources, the District may consider utilizing a third-party roofing consultant to assist in the comprehensive evaluation of all roofs within the District and development of an enterprise-wide strategy for construction and maintenance. In addition to the current state evaluation, the District should also develop a plan for ongoing administration of warranties and maintenance activities. This process would require the collaboration of Physical Plant Operations (PPO) and Procurement and Warehouse Services (PWS) to identify and select the appropriate vendors to perform roofing-related maintenance activities. To facilitate tracking of maintenance and warranties, the District should integrate its current asset management software, Maximo.
Management's Action Plan	**Capital Programs Response:** Efforts are actively underway to explore options for both a short and long-term action plan for the ongoing roofing-related maintenance work and warranty administration. The immediate and short-term plan is to leverage the continuing roofing contracts managed by PPO, as needed, to perform required warranty inspections, repairs and maintenance on the 17 million square feet of new roofs. The ability to leverage existing contracts makes this option ideal for addressing immediate and near-term roofing maintenance activities. The recommendation moving forward, and for the longer term, is to procure and contract with a third-party Asset Management Company (Company) to develop a comprehensive plan for the ongoing management and maintenance of the District's roofing program. With Board approval, a procurement can be advertised to hire the Company with a target mobilization timeframe of early 2021.

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ANALYSIS (CONTINUED)

Plan Review Process – Observations

Observation	2. Strategic Long-Term BCPS Roofing Plan (continued)
Management's Action Plan	**Capital Programs Response (continued):** The Company will be responsible for inspecting all roofs, assessing their lifecycles, and developing an overall management plan. A third-party Company can offer a breadth of specialized resources focused on extending the lifecycle of roofs by maintaining new roofs as well as identifying the most optimal approach to repair the balance of roofs not currently included in the SMART program. Furthermore, an Asset Management company can be instrumental in helping the District to establish an in-house roofing department as part of the company's eventual exit strategy, should the District so desire. Additional details will be provided to the Board as these and other options are evaluated and resulting recommendations further defined. **Responsible Party:** Executive Director of Capital Programs

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ANALYSIS (CONTINUED)

Procurement

The District's objective is to purchase the highest quality goods and services at the lowest possible price, while maintaining compliance with School Board policies, as well as Federal and State Statutes. Procurement & Warehousing Services (PWS) is the District's centralized purchasing department that oversees all aspects of the District's procurement process. PWS works closely with the Office of Facilities and Construction and the Owner's Representative Team to procure vendors used for projects in the SMART Program.

The District's Qualification Selection Evaluation Committee (QSEC) is responsible for the evaluation, selection, and recommendation of award for construction, design, design-build, and program management solicitations. The Committee is comprised of department leaders and key stakeholders from multiple departments, including Procurement & Warehousing Services, the Office of Facilities and Construction, and the Building Department. QSEC is tasked with pre-qualifying the various construction managers, architects, and designers bidding on a contract for all procurement delivery methods.

The three (3) most common delivery methods for District construction projects are Design-Bid-Build (DBB), Construction Manager at Risk (CMAR), and Continuing Services Minor Projects (CSMP), with each contract type requiring a different procurement process. For projects that include roofing, Design-Bid-Build is the District's most common delivery method. The data in the table (right) was compiled from the population data of two hundred three (203) projects that include roofing in the scope of work.

Procurement Type	
Delivery Method	# of Contracts
CSMP	12
CMAR	30
DBB	161

The Design-Bid-Build project delivery method is a very linear and structured approach where the District engages a design professional and then a fixed price construction contractor. As the name implies, the designer designs the project, then the District solicits bids from contractors based on a complete design, and the awarded general contractor builds the project. When the general contractor is procured, they undergo their own procurement process to hire subcontractors to complete the work on the project (i.e. roofing subcontractors).

The Construction Manager at Risk delivery method (CMAR), is a more collaborative and overlapping approach where the District engages a design firm and then a construction manager prior to completion of 100% design. CMAR contracts generally include a formal, qualifications based solicitation, and require the construction manager to complete the project within the agreed upon Guaranteed Maximum Price (GMP). While a general contractor is not typically a part of the design process in the DBB delivery method, a construction manager is afforded the opportunity to be involved during pre-construction, and works closely with the designer throughout the planning and design phases of a project. This allows for more for collaboration and coordination between the designer and contractor, and allows the CMAR to procure a roofing subcontractor earlier in the process to aid in design and constructability assessments.

As part of the CSMP delivery method, PWS is responsible for the initial procurement of a pool of prequalified contractors. Once a pool of vendors is approved by the Board, the District can use these vendors for projects under $2,000,000, without having to complete a formally advertised and evaluated procurement process. PWS provides oversight throughout the CSMP process; however, the Owner's Representative Project Manager drives the process in conjunction with the Office of Facilities and Construction when the need for a contractor arises. At the time of this analysis, the District had four (4) roofing contractors on CSMP contracts.

Please reference Appendix A for detailed process maps related to the major procurement delivery methods.

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ANALYSIS (CONTINUED)

Procurement - Observations

Observation	3. Utilizing Alternative/Separate Contracting for Roofing Scopes
Description	During our analysis, we noted an opportunity for the District to expedite project timelines by extracting roofing scopes of work into individual projects. These projects could be delivered by CSMP contractors for projects under $2M, or procured separately but parallel with other scopes, for projects greater than $2M. Only two (2) of the 203 total SMART projects contain a roofing-only scope. All other projects are a combination of multiple scopes of work, and are awarded (or planned to be awarded) to a general contractor. Subsequent to award, the general contractor engages with a roofing subcontractor. We understand the District desires to expedite roofing projects, and further, that certain challenges and workflows (strict code requirements and District specifications, sub-permit process) are specific to roofing scopes. The utilization of a general contractor can prove useful for improving multi-trade coordination, but adds an additional layer of reviews, approvals, complexities, and profit margin to the roofing process that have the potential to hinder or delay progress. As of May 1, fifty-eight (58) roofing projects were in pre-award phase, and still pending final design, and seventy-four (74) are in the bidding and award phase. The opportunity exists to extract these 132 roofing scopes into individual projects. This approach could provide the following benefits to the District: • Expedite roofing work • Potential savings of >$8M, from removal of GC profit margins on roofing scopes • Alleviate delays in payment processing (see Observation #9). For roofing projects under $2 million, the District has the opportunity to utilize the Continuing Service Minor Project Pool (CSMP). For roofing projects over $2 million, the District has the opportunity to procure roofing contractors through the standard bidding process, but separate from remaining scopes of SMART Projects. Both contracts include identical language requiring the contractor to coordinate with other trades: ***10.09.03 (CSMP) / 6.03 (Doc 520 Agreement Form)*** *Contractor agrees to commence the Work when directed by Owner and to diligently and continuously perform such Work and to coordinate the Work with other Work being performed on the Project by other trades so that the Owner shall not be delayed by any act or omission of Contractor in completion of the Project within the time specified above.* The District currently has twenty (20) roofing contractors on the pre-qualified listing posted to the Procurement website. Many of these pre-qualified roofers have actively participated in prior roofing workshops, and have expressed the ability and capacity to assist the District in expediting roofing projects. During the May 2020 roofing workshop, ten (10) roofing contractors provided information regarding their capacity for additional work. Forty (40) total roofing crews are currently available from ten (10) roofing contractors who responded to the District's request regarding crew availability. Three (3) of the ten (10) roofers are contracted under a CSMP agreement and can provide a total of fifteen (15) crews.

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ANALYSIS (CONTINUED)

Procurement - Observations

Observation	3. Utilizing Alternative/Separate Contracting for Roofing Scopes (continued)
Recommendation	We recommend management and the PMOR perform an evaluation of roofing projects that have not yet applied for a sub permit, and identify candidates for extraction from GC to roofing-only scopes of work, utilizing CSMP and hard-bid contracts when applicable. This process should include consideration with respect to the current condition of the roof, and magnitude of repair work, the complexity of adjacent trade work, and the overall project timeline. In addition, the extraction of roofing scopes may require the carving out of HVAC and Mechanical scopes, since roofing is often done in conjunction with both disciplines.
Management's Action Plan	**Capital Programs Response:** The initial approach at the onset of the program was to "bundle" all scopes of work at a school campus into one project to create efficiencies and to help minimize disruptions to school scheduling. Part of the rationale for this "bundling" approach took into consideration scopes of work that had to be done simultaneously or in close coordination with the roofing scopes of work. For example, this approach was intended to avoid a scenario where roofing work would be completed first and prior to having to return with installation of mechanical equipment on a new roof which could possibly void the roof warranty and start a chain of "finger pointing" when it comes to the repair of the impacted roofs. The initial approach provided for the single source of accountability and responsibility, which is a proven strategy for programs such as this. Given much of what we have gleaned through lessons learned to date and as affirmed in the RSM audit, it is prudent to explore opportunities to "break out" and implement the roofing scopes of work separately. The SMART team has already begun reviewing projects to identify opportunities to do so via CSMP contracts or other delivery methods. While the CSMP contracts are an existing avenue, according to State Statute they can only be applied to roofing projects valued under $2 million, which represents a minority of SMART Program roofing projects. However, as of July 1st, State Statue now allows for a $2-to-4 million category for continuing services contracts. We hope to leverage this new development and are actively working with Procurement & Warehousing Services (PWS) to establish a pool of contractors that fall within this category. Additionally, as they transition on board, an expectation of the new PMOR will be to continue evaluating projects for opportunities to optimize delivery of the scope from a schedule and budget perspective. Breaking out the roofing scopes of work will be an important focus and aspect of their initial evaluation. **Responsible Party:** Executive Director of Capital Programs

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ANALYSIS (CONTINUED)

Sub-Permitting Process

In 2006, the BD created a new roofing program to address issues with ineffective shop drawings received from roofing subcontractors. This change required that roofing subcontractors obtain a roofing "sub-permit" before they can proceed with construction. The District requires a sub-permit for new roof construction, roof renovation, and re-roofing projects. The purpose of the sub-permitting process is to ensure that roofing subcontractors are constructing roofs that are in compliance with Florida Building Code, District design standards, and State Requirements for Educational Facilities (SREF). The sub-permitting process reflects the District's expectations prior to actual construction and provides an added layer of quality control. Ideally, issues can be identified through the sub-permitting process, mitigating the potential for complications during and after construction. The District's goal is to construct roofs that will last twenty (20) or more years and foster a safe environment for the building's occupants.

To facilitate the sub-permitting process and assist roofers in obtaining a permit, the BD developed a sample "sub-permit package binder". The package is organized into twelve (12) sections or tabs which contain instructions for roofing subcontractors to create a project binder and copies of the documents required by the Florida Building Code (i.e. Asbestos-Free Materials Affidavit). The BD requires roofers to follow the provided format outlined in the package. At a high level, the package should include the scope of work proposed by the roofer, the type of roofing system, the materials that will be used, and detailed drawings created by the roofing subcontractor. To create a binder, the roofers rely heavily on the drawings / plans provided by the designer to create their own engineering and specifications. As stated in the Plan Review section of this report, accurate and detailed designer plans are critical to assist the roofing subcontractors in the completion of sub-permit binders.

The BD currently has one (1) District Roofing Plan Examiner performing the review of the sub-permit binders. According to BD personnel, the Department receives approximately three (3) to four (4) binder submissions each week. The Roofing Plan Examiner provides on-demand support to roofing contractors seeking guidance during the sub-permitting process. Formal and informal meetings are often conducted with roofers to walk through their binders. Although comments are formally documented in ISS, the Roofing Plan Examiner also provides verbal feedback to roofers during in-person meetings and over the phone.

The sub-permit review process is similar to the BD's plan review process for 100% construction documents. The BD utilizes the ISS system to provide comments and solicit responses from the roofer. The system tracks the date when the binder was received by the BD, when a review was completed, and when the roofer resubmitted their binder (if applicable). Through our analysis of ISS data and interviews with key personnel, we noted that it often takes multiple rounds of review and re-submissions before a sub-permit binder is approved. The duration of the sub-permitting process depends on the complexity of the project, the time it takes the BD to review, and the time it takes the roofer to address review comments and resubmit the binder. When the binder is approved and a roofing sub-permit is issued, the roofer then begins construction.

Based on our review, roofers have experienced significant difficulties with the process of obtaining a roofing sub-permit. Some roofers are not accustomed to the District's expectations, requirements, and stringent design standards, in comparison with their experience at other school districts and clients. Of the eight (8) roofing projects that have been completed, seven (7) were constructed by one (1) roofing contractor. During our analysis of eighty (80) roofing projects, we noted that twenty-six (26) of the forty-eight (48) roofing sub permits issued were obtained by one (1) contractor. Only a small group of roofing subcontractors have been able to consistently obtain a roofing permit.

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ANALYSIS (CONTINUED)

Sub-Permitting Process (continued)

Through our review of summary ISS data and discussions with roofing contractors, BCPS BD, and BCPS OFC, we selected 10 projects for in-depth analysis. Our selection included five (5) projects that have completed the roofing sub-permitting process and five (5) projects that are currently in the process. The tables below summarize the ISS data and depict the timeline of the BD review, and the related roofing subcontractor's revise and resubmit process.

School Name	Project Name	Permit Status	Rounds of BD Review	Total Days in BD Queue*	Total Days in Roofer's Queue After BD Review	Days Until Approval**
Sandpiper Elementary School	GOB Renovations	Approved	6	67	243	310
Blanche Ely Senior High School	GOB Renovations	Approved	6	94	77	171
Castle Hill Elementary School	GOB Renovations	Approved	6	58	125	183
Stranahan Senior High	GOB Renovations	Approved	3	37	103	140
Stoneman Douglas Senior High School	GOB Renovations	Approved	3	48	58	106

** Total Days in BD Queue includes the final round of review, which only includes the days in the BD's queue (since the roofer does not revise and resubmit after approval). The BD has an additional round's worth of data compared to the roofer.*
*** Days Until Approval shows the time between when the BD first received the roofing binder (Round 1) and the date of their final review / approval.*

School Name	Project Name	Permit Status	Rounds of BD Review	Total Days in BD Queue	Total Days in Roofer's Queue After BD Review	Days Outstanding*
Lake Forest Elementary	GOB Renovations	Outstanding	4	60	292	352
Dillard 6-12 School	GOB Renovations	Outstanding	10	98	255	353
The Quest Center	GOB Renovations	Outstanding	3	46	221	267
Walker Elementary School	GOB Renovations	Outstanding	4	33	151	184
Riverland Elementary School	GOB Renovations	Outstanding	3	58	186	244

** Days outstanding shows the time between when the BD first received the roofing binder (Round 1) and the total days in the roofer's queue (as of June 10, 2020).*

The table below provides a summary of the ISS data from the Building Department's review of the subcontractor roofing binders.

Building Department Review			Roofing Subcontractor Response / Resubmittal	
Average Rounds of BD Review Required	Avg. # of Days in BD Review Per Round	Avg. Total # of Days in BD Review Per Project	Avg. Time Between BD Review and Roofer Resubmittal Per Round	Avg. Total Days Between BD Review and Roofer Resubmittal Per Project
4.8	13	60	41	171

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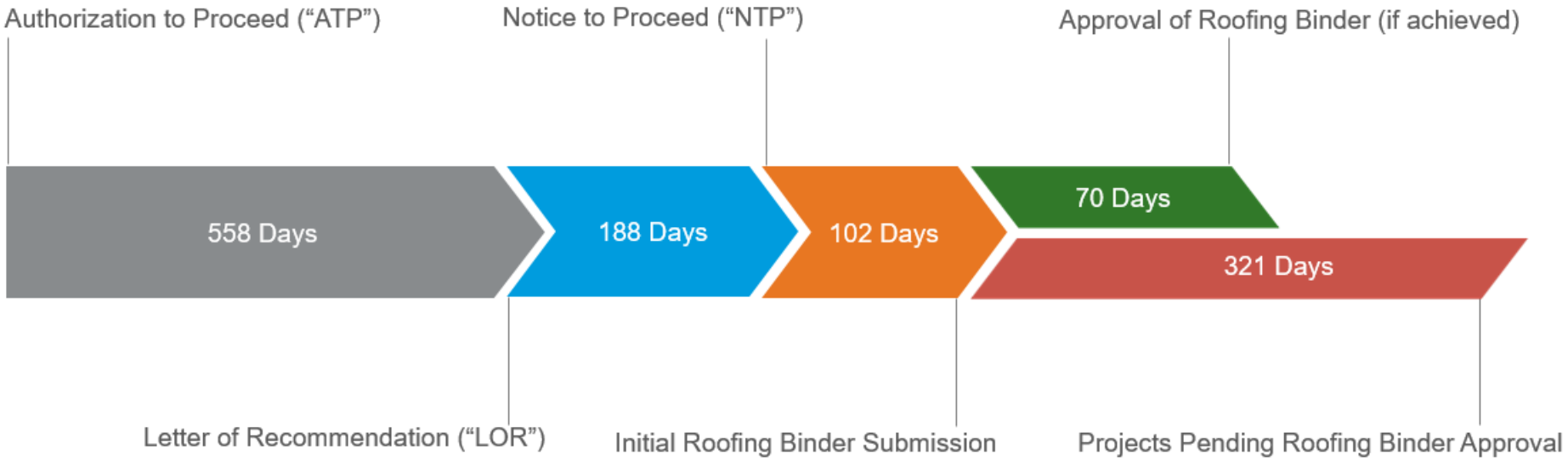
ANALYSIS (CONTINUED)

Sub-Permitting Process (continued)

The timeline below provides a high-level overview of the duration of the processes outlined in this report, using common construction milestones such as the ATP, LOR, and NTP dates. The data was compiled from eighty (80) different roofing projects, including:

- Eight (8) completed construction projects;
- Forty (40) projects that have an approved roofing sub-permit but have not completed construction;
- Twenty-one (21) projects that are currently in the sub-permitting process; and
- Eleven (11) projects that have an NTP but have not started the roofing sub-permitting process.

Timeline Analysis: Design Phase through Roofing Binder Approval



*** The 'Initial Roofing Binder Submission' to 'Approval of Roofing Binder' only includes data from the forty-eight (48) projects that have completed the sub-permitting process*

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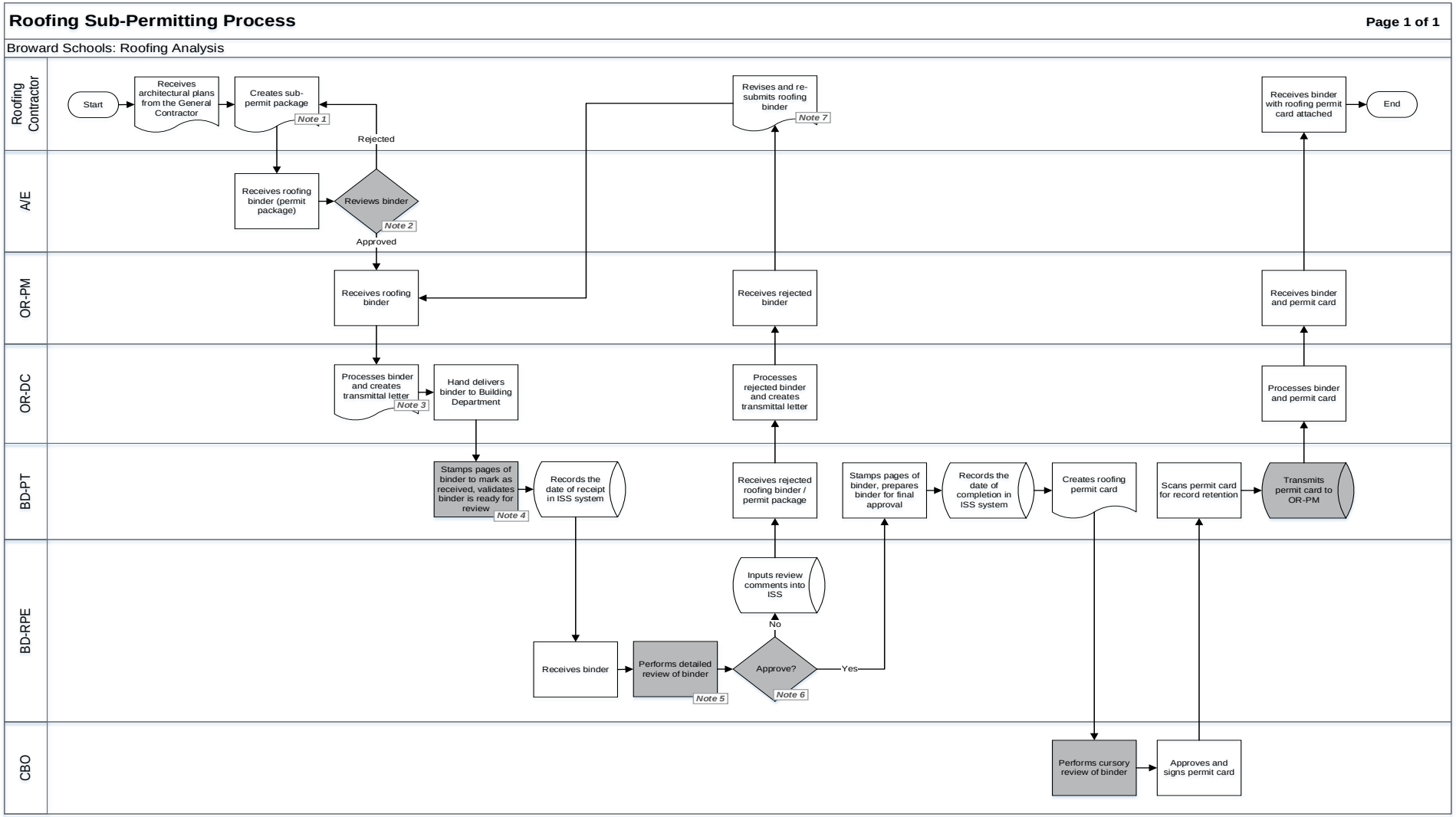
ANALYSIS (CONTINUED)

Sub-Permitting Process – Process Maps



Note 1: Roofer creates their sub-permit package / binder following the criteria outlined in the Roof Criteria booklet provided by the BD.
Note 2: The Consultant (i.e. Architect or Designer) performs a review to validate that the contents of the permit package follow the intent of the design drawings. Once reviewed, the Consultant stamps the roofing binder as a shop drawing.
Note 3: Document Control creates a transmittal letter on behalf of the PM to identify the type of document being processed, the purpose of the document, and actioned required. All transmittal letters are uploaded to e-Builder.
Note 4: For resubmittals, the BD-PT verifies that the roofer has responded to all review comments in ISS.

Note 5: A copy of the roofing binder is marked up with reviewer comments.
Note 6: If rejected, review comments are formally recorded by the Roofing Plan Examiner in the ISS system. However, feedback is often provided informally through in-person meetings or phone calls.
Note 7: The roofing subcontractor will revise their package based on the comments provided by the Building Department and resubmit for review following the same process. The subcontractor is required to respond to reviewer comments within the ISS system. This revise and resubmit process can go through multiple rounds until the Building Department approves the roofing permit package and issues a permit card.

Acronyms:
A/E = Design Consultant
OR-PM = Owner's Representative Project Manager
OR-DC = Owner's Representative Document Control
BD-PT = Building Department Permit Technician
BD-RPE = Building Department Roofing Plan Examiner
CBO = Chief Building Official

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ANALYSIS (CONTINUED)

Sub-Permitting Process - Observations

Observation	4. Roofing Sub-Permit Review Process – ISS Comments & Clearance
Description	Through our inquiry and review of ISS Data, we noted instances where the level of detail contained in ISS could be improved to allow for a more thorough explanation and timeline tracking of issues noted by the Building Department during sub-permit application review. Based on a sample of ten (10) roofing projects, the average BD review required ~13 days and contractors utilized ~41 days to re-submit sub-permitting documents. Our samples included an average of 4.8 reviews and five (5) samples included a round of revisions which took over one-hundred (100) days for re-submission. As a result of fieldwork, the following items were identified related to the roofing sub-permitting process: • Inconsistent documentation of review comments within ISS related to format and comment structure; • Lack of evidence in ISS surrounding closure of review comments. In one (1) instance, comments were compiled into one (1) large paragraph through six (6) rounds of review. In each subsequent round, comments were added to the previous round's comments without evidence of closure, making it difficult to determine which parts of the comment were addressed; • New review comments for contractors to address were provided after the first or second round of review; • Lack of details provided to contractors to enable expedited clearance of review comments; • Frequently, the first round of review is focused on formatting; • Notification of the completion of the roofing sub-permit review, and subsequent comments, is not provided to the applicable roofing contractors; and • There is no PM-OR monitoring of aging (outstanding) review comments, and ISS lacks the capability of automatic notifications. Lengthy and complex roofing sub-permitting processes affect the ability of projects to be completed on-time, within budget, and may reduce the pool of roofing contractors willing or able to deliver services. Increasing the level of detail contained in ISS, can help to ensure that (1) roofing subcontractors have clear and documented guidance regarding issues noted during Building Department review of sub-permit binders and changes required to obtain a sub-permit and (2) the BD has access to relevant information to allow monitoring of aging comments and applications.

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ANALYSIS (CONTINUED)

Sub-Permitting Process - Observations

Observation	4. Roofing Sub-Permit Review Process – ISS Comments & Clearance (continued)
Recommendation	To elaborate on the opportunities identified above, we recommend the following: • The BD should utilize a consistent structure to document comments including numbering, bulleting, and other means to improve organization and clarity. Each individual comment should be provided in its own subsection within ISS. For example, if there are five (5) deficiencies identified, there should be five (5) separate comments to be addressed, instead of one (1) paragraph with five (5) comments. • The reviewer should clearly document the satisfaction of prior review comments within ISS. • After the initial BD review, new comments requiring revision should be minimized and should not be recorded unless brand new information was submitted by the roofing subcontractor. • If a revision is required, the corresponding comment should provide clear guidance to the contractor for resolution. References to applicable state building code, district standards, etc. should not be broad and limited to section names or numbers. • Notify roofing contractors when roofing sub-permit review have been completed and review comments have been issued. • Begin regular monitoring the aging of sub-permit review comments to be addressed by roofing contractors. The OR-PM Project Manager assigned to the project should assist in expediting the roofing sub-permit binder review/approval process by following up with vendors to address comments and provide revised submittals in a timely manner. • The BD may consider exploring alternative software with enhanced comment tracking, aging, and notification functionality to assist in monitoring efforts. • To potentially reduce the number of review comments in ISS, roofing subcontractors should be required to conduct a site visit to inspect the existing conditions of the roof prior to drafting their design drawings. BCPS BD roofing sub-permitting reviewer should meet with the roofing subcontractor during this preliminary site visit to establish expectations and review the roofer's scope of work. • The BD should dedicate qualified technical resources to support the roofing sub-permitting process. *Reference Observation #6 for additional details.*
Management's Action Plan	**Capital Programs Response:** The SMART program team is committed to supporting a more efficient sub-permit review process by tracking and following up with contractors to ensure Building Department comments are addressed in appropriately and in a timely manner. A dedicated staff resource was already been hired in April 2020 by the PMOR to focus on providing support to contractors for roofing related matters. **Building Department Response:** • We concur with the majority of the analysis' observations and recommendations, in fact many of the recommendations have been implemented. As an example, one comment per deficiency. Additionally many of the roofing subcontractors submissions, which require voluminous comments from the plan reviewer are not addressed for several generations of submittals. As such even with added clarity, many of the comments will still remain unaddressed and uncorrected for additional generations of submittals.

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ANALYSIS (CONTINUED)

Sub-Permitting Process - Observations

Observation	4. Roofing Sub-Permit Review Process – ISS Comments & Clearance (continued)
Management's Action Plan	**Building Department Response (continued):** • Once the Sub-Permit review is compete, the PMOR is notified, and the review is returned to the PMOR marked approved or revise and resubmit. Throughout the review process in the BD, the roofing contractor can monitor the review through the ISS system in real time and actually see the review comments before the submittal package is returned to the contractor through the PMOR. • Currently, the ISS System is being reviewed and updated by a third-party vendor enhancing the system for Inspections and Plan Review. Phase I is underway, this is much needed and costly, so a commitment is needed to support these improvements. From the inception of the GOB, there has been little to no maintenance for the ISS system. There are many aspects of data gathering that are non-functional and the system itself is extremely slow. What is envisioned is a repair of a technological system that is 10 years old to salvage the last decade's data, while a current technological version, which is capable of employing the recommendations of this analysis and providing the efficiency and speed possible in today's technology. **Responsible Party:** Chief Building Official

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ANALYSIS (CONTINUED)

Sub-Permitting Process - Observations

Observation	5. Roof Sub-Permitting Process is Manual / Printed
Description	Through our analysis, we noted that roofing sub-permit documentation is submitted and maintained in printed (hard-copy) binders, rather than electronically. As part of each project, the roofing binder is hand delivered from the roofing contractor to the Designer, then the Project Manager, then Document Control, then to the Permit Technician, then to the BD Roofing Plan Examiner (*Reference Appendix A for detailed process maps related to the sub-permitting process).* If revisions are required, the binder follows the same hand-off review process. Additionally, as part of inquiry it was noted that review comments requiring revisions are in some cases provided by phone or in-person which may lead to misinterpretation of failure to address. As part of our comparative analysis, it was noted that electronic submissions are required by neighboring jurisdictions, and that roofing subcontractors expressed a willingness to migrate to electronic submission. Printed plan binders increase the risk of long review processes, incomplete documentation, and an ineffective audit trail.
Recommendation	We recommend BCPS implement electronic submission of roofing sub-permit documentation. This may include evaluation of ISS's capabilities to adopt electronic submission, or implementation of an additional plan review technology. Considering that the District's e-Builder platform allows for electronic submission and workflow review/approval of large documents, and that most parties involved in the creation/review of sub-permit binders are already familiar with the e-Builder platform, the District should evaluate whether implementing electronic submission of the roofing sub-permit submission process through e-Builder is a viable option.
Management's Action Plan	**Building Department Response:** We also concur with this aspect of the analysis and would like to add that modifications to existing systems are usually extremely time consuming in the constitution of an RFP, bid selection and execution of the product. The Building Department will begin looking at programs that can assist in the electronic plan review and submittal process, keeping in mind the regulations of the Florida Building Code and Statutes regarding electronic signatures and record keeping. Upon subsequent research, if the e-Builder platform cannot support the needed requirements for the use of a building department system, the alternate solution could very well be created in the new version of ISS in keeping with the response to Recommendation 4 above. **Responsible Party:** Chief Building Official

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ANALYSIS (CONTINUED)

Sub-Permitting Process - Observations

Observation	6. Lack of Resources to Support Roofing Sub-Permitting
Description	Currently, only one (1) individual is responsible for facilitating the entire roofing sub-permit process. While our analysis reflected that the BD reviewer was able to turn around sub-permit application reviews within thirteen (13) days (on average) we anticipate increases in future transaction volume to continue to strain this individual's capacity. Considering that only ~24% (135+ remaining) of the roofing projects planned have received roofing sub-permits, there is a large amount of sub-permitting to be performed that could significantly impact project timelines and budgets. Further, implementation of the additional ISS documentation requirements in Observation #3 may result in an increase to the level of effort required in the sub-permit review process and by the current resource dedicated to roofing sub-permit review. Due to the deep level of experience possessed by the current sole sub-permit reviewer, we believe expanding the current pool of resources can create more opportunity for this person to extend their value elsewhere within the roofing process. This may include: • Increased involvement within Design / Plan Review processes (see Obs #1) • Oversight and technical support of multiple sub-permit reviewers • Oversight and technical support of multiple inspections personnel (See Obs #7) Continued utilization of a single individual for the roofing sub-permitting process, similar to many construction processes, increases the likelihood of: project delays, process breakdown due to unexpected absences or position vacancy, conflicts of interest, ineffective vendor management, among others.
Recommendation	The BD should consider allocating additional resources to support the sub-permitting process. Multiple individuals facilitating the sub-permitting process should enable shorter review periods and improved contingency planning. The District is currently contracted with a third-party vendor who specializes in building department services specifically for government clients and may have the expertise necessary to assist in roofing sub-permit binder review. The scope of their services include inspections, plans review, code enforcement, etc. The individual currently responsible for reviewing the sub-permitting binders could provide training for third-party reviewers and supervision throughout the process.
Management's Action Plan	**Building Department Response:** • Despite years of searching for competent individuals with roofing expertise that has met with frustration and failure. The type of individuals that the audit recommends, if they were available to hire would require creating job descriptions and incorporating them into the ORG Chart. It is common knowledge that this process can take anywhere from 6 to 8 months. The BD would welcome the added reinforcements. The two supplementary code enforcement providers, who employ over 600 code enforcement personnel in the tri-county area do not employ such individuals (See attached email from CAP Government). They may exist, but probably not at the current inspector salary level; Therefore, a salary study should be performed for fulfilling these important positions that rise above the charted pay grade 25 salary level of an inspector. Hence, a new job description may need to be created to avail the District of suitable employees to fulfill this need.

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ANALYSIS (CONTINUED)

Sub-Permitting Process - Observations

Observation	6. Lack of Resources to Support Roofing Sub-Permitting (continued)
Management's Action Plan	**Building Department Response (continued):** This may attract more well-rounded individuals that have a technical background that is well suited to the roofing industry, such as the lead inspector, who would currently qualify for such a position. As the analysis states..."Continued utilization of a single individual for the roofing submitting process" is not recommended (paraphrased). Therefore, two or three would likely meet the anticipated goals, if and when the staffing increases are given support and we are successful in finding such individuals. If this process moves forward, an additional consideration would be the pay grade represented, which would include such positions. A step up would be pay grade 26, which tops out at about $107,000 or $108,000. Pay grade 27, a supervisor's position would be the next pay grade at about $115,000. So it would seem obvious that the District could offer no more than $108,000, which probably will not likely yield any fruit in our search for necessary human resources. In this case we are trapped by our own salary structure. • Much like the issue of trying to improve roofing contractor capacity, plan review and inspection of the roofing scope needs to be by experienced qualified licensed people. Added bodies will not add capacity unless a plan and schedule are developed and maintained in reference to the remaining roofing scope of work. **Responsible Party:** Chief Building Official

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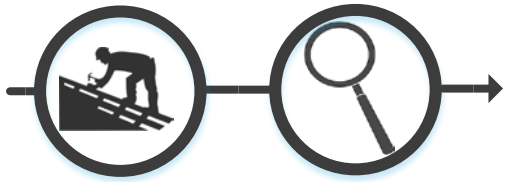
ANALYSIS (CONTINUED)

Inspections Process

The scheduling of inspections on roofing projects is fluid and informal due to the dynamic nature of roof construction. Roofing is an ongoing activity, and thus requires additional attention from BD inspectors that is typically not required for other disciplines. Inspections are performed on an as-needed basis by the BD's Lead Inspector and two (2) third-party inspectors. Although there is not a formalized schedule or structure to roofing inspections, they are performed during specific phases of the roofing process as required by the Florida Building Code.



Chapter 15 of the 2017 FBC, Section 1512.4 "Inspections" states,

"Required inspections for *continuous roofing systems*:

- During application of any roofing system prior to the full concealment of the adhesion/attachment process to the roof deck or to the existing roofing assembly.
- In cases where a roof area is less than 1,500 square feet (139 m), and when the building official is not able to perform any of the above requested inspection in a timely manner, the building official may authorize to continue with the work and may require that satisfactory evidence be provided to show that the covered work was performed in compliance with this code.
- After all roofing work has been completed, a final inspection shall be performed by the building official.

Required inspections for dis*continuous roofing systems*:

- During or after application of the base sheet, anchor sheet or underlayment of any roofing system.
- During the installation of the cap sheet.
- During the installation of any prepared roof covering, such as shingles, tiles, slates, shakes and similar.
- Upon completion of all adhesive-set and mortar-set tile systems, and prior to the final inspection, a field verification and static uplift test, in compliance with TAS 106 shall be required to confirm tile adhesion to the underlayment. This test may be required by the building official for mechanically attached tile systems. All results of this test shall be submitted to the building official."

In the past, roof inspections were requested from the general contractor and scheduled in advance by calling a specified phone number. Since the emergence of the GOB, the volume of roofing projects has increased, causing a growing demand for inspections. The process begins early in the morning when the Lead Inspector receives calls and text messages from roofing subcontractors requesting an inspection. The Lead Inspector then sends a group text message to the two (2) third-party inspectors to assign inspections for the day. The inspectors then proceed to the assigned project site to conduct an inspection of the roof. Based on their observations and discussion with the roofer, an "Inspection Report" is completed, which identifies the nature of the inspection or current stage of the roofing process. Comments are provided on the report and the inspection is given a pass/fail designation. Only in extreme cases will construction be stopped as a result of a failed inspection. When the roof has been constructed and the project is complete, the BD will perform a final inspection with the general contractor and roofing subcontractor to close out the project.

Timeliness of inspections is essential to maintain the project and construction schedule. A roofer may not be able to proceed to the next stage of the roofing process until an inspection is conducted, or until issues are addressed from previous inspections and re-inspection is performed. If the roofer continues with the next stage of the roof without an inspection, the roofer could be instructed to re-perform the work, resulting in additional time, labor, and materials expended by the roofer.

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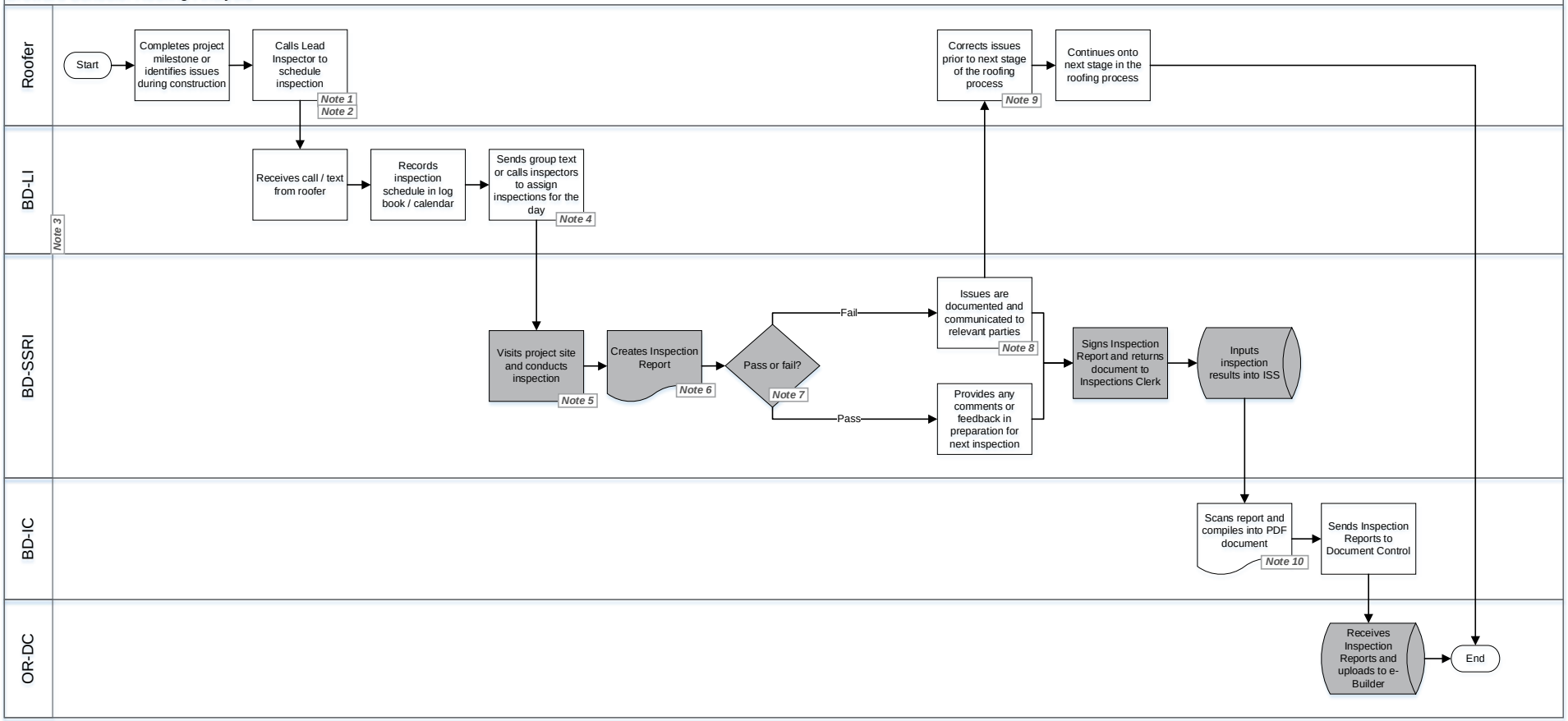
ANALYSIS (CONTINUED)

Inspections Process – Process Maps

Roof Inspections Process

Page 1 of 1

Broward Schools: Roofing Analysis



Note 1: In-progress inspections are conducted before any major roofing milestone (i.e. prior to lightweight insulated concrete).
Note 2: The Roofer notifies the BD as to where and when they will be working on a given day, or if rained out.
Note 3: The Lead Inspector conducts roofing inspections following the same procedures as the Supplemental Services Roofing Inspectors do, but is also responsible for supervising and providing guidance to the third-party inspectors during the process.
Note 4: The Asst. Chief Building Official is included on all group texts and correspondence. The Asst. Chief Building Official provides oversight for the Inspections process.
Note 5: The inspection is conducted primarily with the Roofing Contractor, but can also include the General Contractor. If issues are identified that require the assistance of the Lead Inspector, the Supplemental Inspector will call the Lead Inspector and often use FaceTime to walkthrough issues on the roof.
Note 6: Inspection Reports are made out of NCR carbonless paper, which provides 4 total copies. The General Contractor (white copy), Roofer (yellow copy), Inspections Clerk (pink copy), and Inspector (gold copy) all receive a copy of the report.

Note 7: If an inspection is failed, the Inspector will not delay the progress of the roof (unless it is an extreme case). Remediation of the issue happens subsequently to that inspection, and prior to the next step in the roofing process. The roofer will be instructed to continue construction, but to make corrective changes to existing conditions. For example, if an issue is identified prior to putting down the membrane (temporary roof), that issue will need to be corrected before the roofer can install the lightweight insulated concrete (LWIC).
Note 8: Issues are documented on the Inspection Report, but are sometimes communicated to the General Contractor, Owner's Representative Project Manager, Office of Facilities and Construction, and Roofer depending on the severity.
Note 9: Although there is no formal procedure for closing-out Inspector comments, issues documented in previous reports are often identified as addressed on subsequent Inspections Reports.
Note 10: All Inspection Reports for the day are compiled into a PDF by the Inspections Clerk and sent to Document Control for processing.

Acronyms:
BD-LI = Building Department Lead Inspector
BD-SSRI = Building Department Supplemental Services Roofing Inspector (Third-Party)
BD-IC = Building Department Inspections Clerk
OR-DC = Document Control

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ANALYSIS (CONTINUED)

Inspections Process - Observations

Observation	7. Lack of Formalized Procedures and Resources for Inspections
Description	As part of our review we noted a lack of formalized procedures and resources for inspections. Specifically, we identified the following: • No centralized system is utilized for roofers to schedule roof inspections; • Roofing contractors contact (call / text) the Lead Inspector directly to schedule inspections. This one (1) individual is responsible for the scheduling and organization (assignment) of inspections. There is no specified BD phone number to schedule roof inspections in advance, although other disciplines have dedicated lines; • Roofing contractors often begin working late at night / early in the morning when the BD does not have resources readily available to accommodate inspections requests. The Lead Inspector frequently receives calls / texts from roofers as early as 3:00 AM to schedule inspections; and • Lead Inspector manually maintains an inspection schedule (i.e. day planner) Roof inspections cannot follow the same procedures that are implemented for other disciplines. Inspections for other trades are scheduled by the general contractor, and typically take one (1) to two (2) days to process and complete. In order to facilitate the progression of roofing projects, inspections must occur on an on-demand basis. The volume of inspections is also much higher compared to other disciplines, given that work completed on the roof is often performed one (1) section at a time. Roofs must be covered / sealed at the end of each day to prevent water intrusion, which creates an immediate need for inspections before subsequent sections can be completed. Based on a sample of five (5) completed construction projects, an average of 220 individual inspection reports were generated for each project within ISS. Multiple roof inspections can occur in a day on a given project based on various components and sections of a roof. As stated previously, one (1) individual is responsible for managing all roof sub-permitting process and roof inspections. This individual manages two (2) inspectors which are provided through a third-party vendor agreement. The lack of resource availability and the increase in inspection volume arising from the GOB gave rise to the need to bring efficiencies to the process. These efficiencies naturally manifested themselves through the abandonment of the centralized and structured process, and have been replaced by the informal text messaging and phone call process noted herein. With approximately (~195) roofing projects yet to enter into construction, it would appear that the current inspection resource pool of three (3) will be inadequate to execute a more structured process, a problem which will increase as more roofing projects come online. A decentralized manual process for organizing inspections may lead to errors, inefficiencies, contingency issues and unanticipated events.

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ANALYSIS (CONTINUED)

Inspections Process - Observations

Observation	7. Lack of Formalized Procedures and Resources for Inspections (continued)
Recommendation	We recommend the following: • Implementation of an electronic system to schedule and manage inspections; • Addition of an inspections scheduler to intake requests and assign inspections. The BD should consider adding an additional shift to account for late night / early morning requests for roof inspections; • Reestablishment of a BCPS inspections phone line and/or email box to be managed by the scheduler; and • Consider expanding the use of third-party inspectors as project volumes increase. In conjunction with the recommendations noted in Observation #5, the District can optimize use of the Lead Inspector's expertise through providing oversight and technical support to the process. This can be achieved through a reduction of administrative duties currently performed by this role, facilitated by the addition of a scheduler and additional inspectors.
Management's Action Plan	**Building Department Response:** • Some of the recommendations generally speaking may not be feasible. Finding a staff member that will work a night shift given push back from the union would be difficult. Perhaps a job description that catered to such details would be possible. As mentioned above that scenario takes substantial time. Third party (supplemental) inspection firms have no available roofing personnel. The BD already has an inspection call line; However with the understanding that most of what is suggested in the recommendation is being performed by the Lead Roofing Inspector, the Building Department could look into the addition of a roofing phone line for Inspection Requests and clerical/scheduler personnel along with Building/Site Security. • Regarding the consideration of expanding the use of third-party inspectors, see the reply in Recommendation 6 as to the availability of these additional inspectors. • The on-going nature of the roofing process is what caused the BD to move away from the conventional work flow that was incorporated into the ISS System. For 90% of the construction the contractor can schedule a building or trade inspection through the ISS System the day or days before the inspection is needed. With roofing inspections, each day on a particular project the need for inspection is usually established the day the work will be performed or work will be postponed in the early morning hours due to weather conditions. **Responsible Party:** Chief Building Official

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ANALYSIS (CONTINUED)

Roofing Requirements and Preferences – Standards, Codes, and Guidance

RSM performed an analysis to gain an understanding of critical elements and interpretations of related roofing design requirements. Key stakeholders explained that variances between and complexities within the Florida Building Code, SREF, and the District's Design Standards drive certain issues when executing the roofing projects. Therefore, we obtained and reviewed the related documentation below as part of our analysis. Additionally, we performed a comparative analysis of BCPS to neighboring jurisdiction's corresponding requirements (Miami-Dade and Palm-Beach).

RSM reviewed the following as part of our analysis:

Codes, Requirements, and Guidance	BCPS District Requirements
2017 Florida Building Code (FBC)	Section 2A-2 Architectural Design Criteria
2017 Florida Building Code – Existing Building	Design Standards: • 07500 Roof Assembly • 07501 RA Special Warranty Forms • 07502 RA Lightweight Insulating Concrete (LWIC) • 07551 RA Modified Bitumen Roofing • 07600 RA Flashing and Sheet Metal • 07631 RA Gutters and Downspouts • 07716 RA Roof Expansion Joints • 07721 RA Supports for Rooftop Equipment • 07722 RA Roof Scuttles and Automatic Fire Vents
2017 Florida Building Code – High-Velocity Hurricane Zone	
2014 State Requirements for Educational Facilities (SREF)	
Life Cycle Guidelines for Materials and Buildings for Florida's Public Educational Facilities	
Florida Safe School Design Guidelines	
Test Application Standards (TAS) of the FBC	
Roofing Application Standards (RAS) of the FBC	
American Society of Civil Engineers (ASCE) 7	
Information available from the Factory Mutual Research Corp, as applicable.	
Florida State Statutes, section 553	
Miami-Dade Notification of Approvals website and materials	

The Florida Building Code is adopted by the Florida Building Commission and updated every three (3) years. It is amended annually to incorporate interpretations, clarifications and to update standards. Minimum requirements for permitting, plans review and inspections are established by the code, and local jurisdictions may adopt additional administrative requirements that are more stringent. According to the FBC, "Eleven Technical Advisory Committees (TACs), which are constituted consistent with American National Standards Institute (ANSI) Guidelines, review proposed code changes and clarifications of the code and make recommendations to the Commission." There is a formal process to obtain interpretations of the code which establishes precedent and are typically incorporated into the next amended code.

Broward County and Miami-Dade County are included as part of the "High-Velocity Hurricane Zone" (HVHZ) and adhere to an additional separate code—Florida Building Code – High-Velocity Hurricane Zone. Although Palm-Beach County is not included in a HVHZ, we performed an interview with School District of Palm-Beach due to relevant proximity. Palm-Beach County does not utilize a roofing sub-permit process, does not require System Riders for roofing warranties, and requires electronic submission of roofing plans.

When developing their design standards, the District met with Miami-Dade County given their experience in roofing within the HVHZ. In fact, the District copied Miami-Dade's design standards document and made adjustments as desired. For instance we noted, the District's Design Standard document related to roof assemblies (07500 Roof Assembly.docx), published on the District's Design Standards web page, only approximately five (5) differences as it related to over 150 roof assembly requirements.

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ANALYSIS (CONTINUED)

Roofing Requirements and Preferences – Standards, Codes, and Guidance (continued)

As part of our review, the following highlights were identified:

1. Chapter 4 of the 2017 FBC, Section 453.1 "Scope" states, "Public educational facilities shall comply with the Florida Building Code and the Florida Fire Prevention Code as adopted by the State Fire Marshal. **These are minimum standards; boards may impose more restrictive requirements."**
2. Chapter 15 of the 2017 FBC, Section 1501.1 "Scope" states, "The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies, and rooftop structures. **Exception: Buildings and structures located within the high-velocity hurricane zone shall comply with the provisions of Section 1503.7 and Sections 1512 through 1525."**
3. Chapter 4 of the 2017 FBC, Section 453.5.14 "Renovation" provides the following definition for renovation, "The rejuvenating or upgrading of existing facilities by installation or replacement of materials and equipment. The use and occupancy of the spaces remain the same. Only that portion of the building being renovated must be brought into compliance with the Florida Building Code and Florida Fire Prevention Code as adopted by the State Fire Marshal unless the renovation adversely impacts the existing life safety systems of the building."
4. Chapter 4 of the 2017 FBC, Section 453.8.4 "Standards for remodeling and/or renovation projects" states, "Standards for remodeling and/or renovation projects. Portions of buildings being remodeled and/or renovated shall be brought into compliance with current required Florida Building Code and the Florida Fire Prevention Code as adopted by the State Fire Marshal **as required by the plan review authority in its best judgment**."
5. Chapter 15 of the 2017 FBC, Section 1515.2.2 "Minimum Slope" states, "All roofing assemblies must be installed in compliance with the slope requirements specified in the product control approval, in compliance with Table 1515.2."
6. Chapter 15 of the 2017 FBC, Section 1515.2.2.1 then states, "**In new construction** the minimum deck slope shall be not less than 1/4:12"
7. **Chapter 4 of the 2017 FBC, Section 453.5.8 "New Construction" states, "Any construction of a building or unit of a building in which the entire work is new**. An addition connected to an existing building is considered new construction."

Based on the exception included in #2 (1501.1) above, although Chapter 15 of FBC includes the minimum requirements and applicable exceptions from the code for roof assemblies and rooftop structures, only certain sections of the chapter are applicable which may cause confusion among roofing contractors. Additionally, given the number of applicable codes and guidelines, roofing contractors must rely on the District to understand specific requirements and interpretations.

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ANALYSIS (CONTINUED)

Roofing Requirements and Preferances – Standards, Codes, and Guidance – Observations

Observation	8. Building Code Interpretation and District Design Standards
Description	Included in the state building codes, as referenced above, the BD has the ability to require standards above the minimum. Additionally, elements of the FBC and related documents require interpretation by District Building Officials. These interpretations allow the district to make preferential decisions enabling alignment with the organization's risk tolerance. In many cases, requiring standards above the minimum results in additional time and resources spent by roofing contractors to understand the standards, identify adequate manufacturers, finalize roofing plans, obtain approvals, etc. RSM identified the following primary issues as they relate to the interpretation of the Florida Building Code and District design standards: **Requiring compliance with the FBC as a new roof system for existing roof replacement projects** – Per BCPS documentation obtained as part of our review, "It has always been the position of the BCPS BD that on existing roof replacement projects in which the existing substrate system is removed due to the existing conditions and replaced with new installation of lightweight insulating concrete as the substrate, we have required compliance with the FBC as a new roof system, and therefore must meet the minimum design per Section 1515.2.2.1". Based on the Chapter excerpts #5, #6, #7 identified in the analysis section and the BD's position to require compliance with the FBC as a new roof system, the District utilizes their expertise to interpret specific details of the code to meet the quality standards that support their overall mission and objectives. The treatment of roofing projects as new construction is an example since new construction requires certain specific standards (minimum slope of 1/4:12). Additionally, the BD requires lightweight insulating concrete (LWIC) for all new roof assemblies. LWIC addresses many roof risks including: superior moisture protection, fire protection, prevents air infiltration, bonds the total insulation system to the substrate, is re-roofable, and supports building sustainability. Although there are other insulating materials, it has been decided that LWIC is the best insulating material and it is their chosen standard. Polyisocyanurate was previously utilized and is still utilized for minor repairs when use of LWIC is not appropriate. **Miami-Dade Notice of Acceptance (NOA) for manufacturers for re-roofing projects** – NOAs specific to HVHZs are required by FBC for roofing products and building permitting authorities must determine whether products comply with the requirements of the Code specific to the building they are used in. As part of our review, we searched Miami-Dade's NOA product search database for a District required roofing system (Modified Bitumen Roof System Over Lightweight Concrete Decks). We identified thirteen (13) manufacturers with seventeen (17) Miami-Dade NOAs for "Modified Bitumen Roof System Over Lightweight Concrete Decks" with Maximum Design Pressures ranging from 75 to 500 PSF (lbs/sqft). Interviewees in the BD noted that individual NOA(s) exist for the temporary roofing required on District roof replacement projects, and for the new roofing assembly. Only one (1) of these NOAs evidences that the entire roofing assembly (temporary + new system) has been tested to the design standards required by the District. As such, only one (1) manufacturer is able to meet the District's standard, which may drive an increase in quality, but likely minimizes competition and increases costs. Based on inquiry with OFC, we noted that multiple manufacturers are in the process of obtaining an NOA that adheres to the District's standards.

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ANALYSIS (CONTINUED)

Roofing Requirements and Preferances – Standards, Codes, and Guidance – Observations

Observation	8. Building Code Interpretation and District Design Standards (continued)
Description	**To complement the required NOA, the BD also requires warranties with "System Riders" and "Wind Riders"** to improve the District's ability to meet applicable standards and protections in the event that roofs fail to operate as specified. o A System Rider provides assurance to the District that the Manufacturer is supplying a warranty for the entire roof assembly, not strictly the roofing membrane. o A Wind Rider provides assurance to the District that the roofing assembly meets the HVHZ wind load and uplift requirements of the FBC for the specific project. Elements unique to re-roofing projects are required by the BD to be included in the System Rider covering the entire roof assembly. Since only one (1) manufacturer has received an NOA for roofing assemblies with elements specific to a re-roofing project—meaning the entire system was tested, it is logical that other manufacturers whom have not obtained a comparable NOA would not want to include those elements in their System Riders. While Miami-Dade NOAs provide evidence that roofing products are tested for the specific conditions required by the BD, a Wind Rider is required to specify the wind velocity as evidence that the products meet the BD's standards. It is the District's position that while Miami-Dade NOAs include a Maximum Design Pressure (in PSF), this does not specify the wind velocity that the assembly can withstand. The OFC noted during interviews, that Miami-Dade also required Wind Riders and System Rider for the same purposes. We were unable to validate Miami-Dade's use of Wind Rider and System Riders. During inquiries with roofing stakeholders and neighboring jurisdictions, it was noted that warranties / riders are not always effective considering claims are commonly not covered because of weather events and other factors. We obtained a sample of an executed warranty that included a warranty from the roofing contractor, the manufacturer warranty, and the Wind and System Riders that provide amendments to the manufacturer warranties. Based on the language included within the sampled warranty and riders, there are many conditions, situations, and damages that are not covered and the determination of the cause and extent of the repairs is performed by the manufacturer and is "final and bonding." For example, damages caused by hurricanes, tornados, or microbursts are not covered and the wind speed warranty "excludes damage where the cause includes any of the following: (a) primary or secondary structural components, (b) wood nailers or blocking and edge system components, (c) deck and deck fastening;… (e) substrates that are deteriorated, rusted, rotted, deformed, weakened, crushed, compressed, or otherwise failed;…(g) windborne debris; or (h) neglect or physical abuse." Additionally, the manufacturer's Care and Maintenance Guide must be followed, installation must meet the manufacturer's standards, photo documentation must occur before and after cleanup for all severe wind events (including instances of no damage), and claims must be made within two (2) and fourteen (14) days for System and Wind Rider claims, respectively. Additional factors are included in the warranty documentation that may cause claims to not be covered.

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ANALYSIS (CONTINUED)

Roofing Requirements and Preferences – Standards, Codes, and Guidance – Observations

Observation	8. Building Code Interpretation and District Design Standards (continued)
Recommendation	The BD has established the aforementioned requirements and interpretations in conjunction with their understanding of the District's mission and risk tolerance. In the event that existing roof conditions for a project in design present an opportunity, in the opinion of the design professional, where conditions exist that could give rise to a different interpretation, the District may consider encouraging the design professional to request a clarification from the Florida Building Commission to better understand whether certain thresholds may exist to dictate re-roofing versus new roofing assembly requirements. Based on the 2017 FBC, the Preface states, "The Commission may only issue official code clarifications using procedures of Chapter 120, Florida Statutes. To obtain such a clarification, a request for a Declaratory Statement (DEC) must be made to the Florida Building Commission in a manner that establishes a clear set of facts and circumstances and identifies the section of the code in question. Requests are analyzed by staff, reviewed by the appropriate Technical Advisory Committee, and sent to the Florida Building Commission for action. These interpretations establish precedents for situations having similar facts and circumstances and are typically incorporated into the code in the next code amendment cycle. Non-binding opinions are available from the Building Officials Association of Florida's (BOAF) web site (www.BOAF.net) and a Binding Opinion process is available online at www.floridabuilding.org." Requested clarifications, whether submitted to the Florida Building Commission or through the Building Officials Association of Florida, should include sufficient detail regarding the existing conditions of the roof in order to provide the Commission or BOAF enough information to determine whether the conditions require a "new construction" or "re-roofing" standard of repair. The District may also consider assessing the conformance of roofing packages using engineering calculations for a proposed roof assembly to satisfy requirements (i.e. wind loads) outlined by the Florida Building Code. The FBC requires that a roofing system must be designed to meet the performance requirements in Section 1512-1525; however, the FBC does not specify which materials must be used to meet those requirements. The District could allow roofing contractors to engineer a roof assembly based on the engineer's calculations as an alternative to an NOA, provided that the materials used adhere the District's design standards. This could allow for the use of other roofing manufacturers, which could increase the pool of vendors and potentially reduce material costs. To provide roofing contractors with alternatives to the one (1) NOA accepted by the District, BCPS should consider requiring or encouraging additional roofing suppliers to apply for NOA. BCPS should also continue to track the progress made by other manufacturers with NOA testing already in process.

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ANALYSIS (CONTINUED)

Roofing Requirements and Preferences – Standards, Codes, and Guidance – Observations

Observation	8. Building Code Interpretation and District Design Standards (continued)
Management's Action Plan	**Capital Programs Response:** The SMART Team continues to support efforts to expand the pool of manufacturers that have obtained NOA's. As such we have encouraged additional manufacturers to begin the testing process and to seek an NOA. Some progress in this regard has been made already, with the manufacturer Johns Manville having just completed testing and will become an additional option once their NOA is officially approved. A third manufacturer is preparing for testing and approval as well. **Building Department Response:** • If the choice to carry a wind rider or a system rider is up for consideration, it should be a decision which would come out of Risk Management. • The interpretation of the Florida Building Code is the sole purview of Florida's building officials. In my experience, if a DEC statement is requested and it concerns an aspect that is as clearly written in the code as this is, the Florida Building Commission (FBC) will defer to the judgment of the local Authority Having Jurisdiction, which in this case are the Board's appointed Building Officials. Since the District's Building Officials are of a certain opinion concerning this aspect of the analysis, it is counter-intuitive to present an argument against themselves. Someone else would need to ask for a DEC statement. None of the analysis's recommendations explain why the other major school districts are encountering the same roofing costs as BCPS. The bottom line is that the BD disagrees with the analysis on this particular point. • Reference is made in the analysis with Notice of Acceptance (NOA) and engineering calculations, the opinion by many is that they are one in the same and can be used interchangeable with each other. This opinion is supported with a code section from the Florida Building Code – Section 1504 which explains the performance requirements of roofing designs. However Section 1504 is not pertinent to the High Velocity Hurricane Zone (HVHZ) as stated in the exception to Section 1501. Chapter 15 – Roof Assemblies and Rooftop Structures – Section 1501 General 1501.1 Scope, states: The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies, and rooftop structures. *Exception: Buildings and structures located within the high-velocity hurricane zone shall comply with the provisions of Section 1503.7 and Sections 1512 through 1525.* Refer to Appendix B for an additional summary provided by the Building Department. **Responsible Party:** Executive Director of Capital Programs, Chief Building Official

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ANALYSIS (CONTINUED)

Pay Application Processing and Payment

A payment application or "pay application" is a detailed invoice submitted by a contractor to the Owner (the District) for the purposes of receiving payment for completed work during a particular time period. A payment application serves as the contractor's request for payment and also the designer's certification of the work completed by the contractor. A pay application is an amalgamation of the costs incurred by the general contractor (GC) and the various subcontractors who completed work for a given time period. Subcontractors must submit their individual pay applications to the general contractor for review and integration into the GC's pay application.

Before a pay application is approved and paid, the District is responsible for reviewing the general contractor's payment application package for completion, accuracy, and proper supporting documentation. Contractor pay applications require an intensive review process through multiple levels of review, and typically require approval signatures from the Owner's Representative Project Manager, Owner's Representative Deputy Director, Director of Facilities Design & Construction, and the Executive Director of the Office of Facilities and Construction before they can be paid by Capital Payments. It is important to note that subcontractor pay applications do not require District approval signatures and are not reviewed individually. The initial review of a subcontractor pay application is performed by the general contractor. Depending on the language and structure of the general contractor's agreement with the subcontractor, the subcontractor may not receive funding until the general contractor receives payment from the District.

As part of our roofing analysis, we examined the District's payment application process to evaluate the time it takes from initiation to payment. Through our interviews with key stakeholders and roofing subcontractors, certain vendors cited significant delays in receiving payment for work performed. We understand this issue is often attributed to errors on the general contractor's payment application, resulting in rejection by the District, though rejections may also occur due to errors on the subcontractor pay applications. Each time a GC's pay application is rejected by the District for revisions, the entire payment process (and pass-through to subcontractors) is delayed. While larger roofing companies can survive without receiving payment for many months, smaller roofing contractors may not be able to handle the same financial burden. In an effort to ease the burden of non-payment to GCs and subcontractors, the District has recently decided to no longer reject an entire pay application and delay payment of the invoice, but instead will issue partial payment for approved costs.

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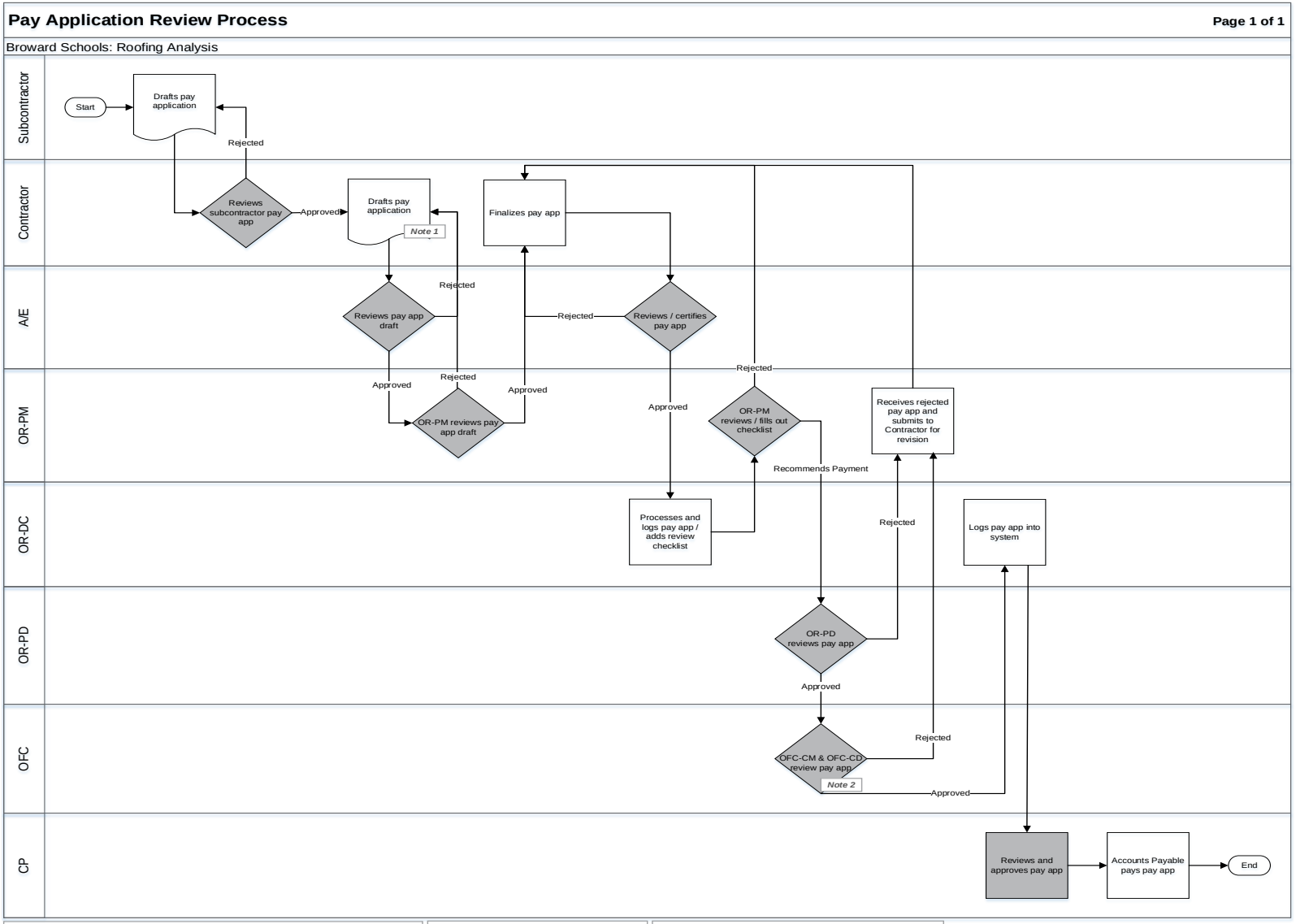
ANALYSIS (CONTINUED)

Pay Application Process – Process Maps



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ANALYSIS (CONTINUED)

Pay Application Process – Observations

Observation	9. Pay Application – Delayed Payment and Processing
Description	As part of inquiry and data analysis, payment to roofing subcontractors for materials and services rendered have frequently been delayed on projects. Payment applications submitted by the general contractor include costs related to all subcontractor work-to-date. After the general contractor has received funds from BCPS, funds are disbursed to subcontractors for costs included in the payment application. Therefore, roofing subcontractors do not receive disbursements until all payment application issues or questions have been resolved by the general contractor. According to multiple roofing subcontractors and general contractors, Project Managers are not conducting “pencil requisitions” with subcontractors prior to pay application submission to BCPS. Pencil requisitions are a process for general contractors and subcontractors to review a draft of the payment application to validate accuracy of information included. Pencil requisitions typically reduce the amount of issues or questions received by the client (i.e. BCPS). To assess the possible payment delays experienced by general contractors and subcontractors, we analyzed four (4) pay applications from five (5) sampled projects for a total of twenty (20) pay applications. These projects were identified as examples of delayed payments through discussions with roofing subcontractors and through review of data within e-Builder. On average for the selected projects, fifty-nine days (59) elapsed from the time the pay application was submitted for review to the final processing of payment by Capital Payments. Four (4) out of the twenty (20) pay applications required more than three (3) months for approval. The table on the next page provides a detail of the twenty (20) samples analyzed.

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ANALYSIS (CONTINUED)

Pay Application Process – Observations

Observation

9. Pay Application – Delayed Payment and Processing (continued)

Description

The table below provides the detail of the twenty (20) pay applications analyzed:

Pay Application Information			GC Invoice Processing		
School Name	Billing Period	Current Payment Due	Submittal Date	Capital Payments Final Bundle	Processing (Days)
Silver Trail Middle School	9/1/2019 - 10/31/2019	79,796	10/2/2019	2/11/2020	132
Silver Trail Middle School	11/1/2019 - 12/31/2019	48,596	1/14/2020	3/13/2020	59
Silver Trail Middle School	1/1/2020 - 3/31/2020	124,841	4/8/2020	4/27/2020	19
Silver Trail Middle School	3/1/2020 - 3/31/2020	118,241	4/22/2020	6/17/2020	56
James S. Rickards Middle School	11/30/2019	54,320	11/26/2019	1/27/2020	62
James S. Rickards Middle School	2/1/2020 - 2/29/2020	4,851	3/31/2020	4/17/2020	17
James S. Rickards Middle School	3/1/2020 - 3/31/2020	461,683	4/3/2020	4/24/2020	21
James S. Rickards Middle School	4/1/2020 - 4/30/2020	687,281	5/12/2020	6/17/2020	36
Stranahan High School	7/1/2019 - 7/31/2019	1,144,258	8/13/2019	11/19/2019	98
Stranahan High School	8/1/2019 - 8/31/2019	1,041,028	9/13/2019	2/5/2020	145
Stranahan High School	11/1/2019 - 2/29/2020	1,193,188	12/9/2019	4/20/2020	133
Stranahan High School	3/1/2020 - 3/31/2020	622,786	4/27/2020	5/28/2020	31
Pioneer Middle School	9/13/2019 - 9/30/2019	137,277	10/7/2019	12/19/2019	73
Pioneer Middle School	10/1/2019 - 11/30/2019	379,699	12/10/2019	1/14/2020	35
Pioneer Middle School	12/1/2019 - 12/31/2019	612,891	1/10/2020	2/13/2020	34
Pioneer Middle School	1/1/2020 - 1/31/2020	207,672	2/14/2020	3/19/2020	34
Forest Glen Middle School	9/1/2019 - 12/31/2019	389,790	10/11/2019	2/14/2020	126
Forest Glen Middle School	1/1/2020 - 1/31/2020	106,832	2/24/2020	3/12/2020	17
Forest Glen Middle School	2/1/2020 - 2/29/2020	963,579	3/31/2020	4/24/2020	24
Forest Glen Middle School	3/1/2020 - 3/31/2020	256,279	4/26/2020	5/14/2020	18

Based on a sample of payment applications, processing time ranged from 17 to 145 days with an average of 59 days.

Untimely payment of payment applications is detrimental to BCPS's reputation, increases legal risks, and significantly affects contractor cash flow. We noted that during our fieldwork, BCPS implemented procedures to improve the speed of payment application disbursements by allowing approved portions of pay applications to be processed when submitted correctly (short pay). As illustrated in the table above, pay application processing times have substantially decreased in recent billing periods.

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ANALYSIS (CONTINUED)

Pay Application Process – Observations

Observation	**9. Pay Application – Delayed Payment and Processing (continued)**
Recommendation	We recommend the following: • General contractors should be required to perform a pencil requisition to validate the accuracy of payment application information prior to submission to BCPS; and • Continue the practice of isolating and paying for portions of payment applications submitted correctly, and require subsequent revisions for non-conforming line items.
Management's Action Plan	**Capital Programs Response:** Concerns regarding timely payments were brought to our attention during recent conversations held with the SMART Program's contractor community regarding delays in the invoicing process. The OCP, CBRE|Heery, Atkins, and Capital Budget staff met regularly to identify, review, and prioritize the delayed invoices as well as identifying some key factors in improving the process, such as: INVOICE LINE ITEM CONSISTENCY Lack of consistency in invoice formatting and line item descriptions creating a time-consuming and ineffective review process. With a new Schedule of Values (SOV) now in place to avoid those inconsistencies, the amount of effort spent in review has been minimized. E-BUILDER WORKFLOW TRAINING The use of E-Builder for payment processing has met with a longer-than-expected period of initiation as staff was required to learn the new process. Training is being amplified to gain comfort with the workflow, with its utilization refocused toward the intended purpose and benefits. PAY APPLICATION CHECKLIST The Contractor Pay Application Checklist that must be completed by the contractor prior to submission to the design firm was intended to ensure that hired firms met the standards and expectation outlined in their contracts but has often become a roadblock to payment processing. To improve its usage and avoid continued frustration, all relevant parties have been trained in its proper usage, and the process itself has been adjusted to address warranted concerns. Since February 2020, Project Managers have been responsible for conducting "pencil" reviews of vendor pay applications to help address discrepancies up front and to mitigate potential delays in processing payments. This added step in the process includes identifying opportunities to adjust pay applications so that approved items can be processed while remaining comments are addressed. Much progress has already been made, and most of the outstanding payments previously awaiting fulfillment have been resolved. Additionally, since we are currently dealing with the closure of locations during the Coronavirus protocols, we have implemented a process that allows invoice review, approvals, and payment processing to be effectively managed by staff remotely. **Responsible Party:** Executive Director of Capital Programs **Estimated Completion Date:**

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OBJECTIVES AND APPROACH

Objectives

The objective of our work will be to identify opportunities for improvement related to the permitting, construction, and inspection of roofing projects. The scope of our work will include the following:

- Plan review process for roofing design
- Procurement selection/assignment of roofing projects to contractors
- Roofing sub-permit application process, inception to approval
- Usage of ISS software for tracking submission and resolution of permitting review comments
- Benchmarking of roofing sub-permit requirements with comparable entities
- Comparison of District standards to Building Code requirements
- Pay application processing and review, payment timeline analysis for roofing contractors / subcontractors

Note: this review was not performed by professional roofers, certified inspectors, or any qualified roofing specialist. This review is meant to provide an objective perspective on technical areas of roofing as they relate to the scope of our project. We are not able to validate the completeness of applicable requirements, standards, and criteria reviewed as issued by the State of Florida or any other related issuing entity. The requirements depicted below were identified as part of our document inspection, research, and inquiry.

Approach

Our audit approach consisted of the following:

Process Mapping

- Conducted 20+ interviews with OFC, the BD, and roofing contractors to obtain an understanding of each in-scope process. Produced process flow diagrams to identify the current process, key controls, and areas of concern or delay related to:
  - Roofing plan review
  - Procurement selection/assignment
  - Sub-permitting
  - Inspections
  - Pay applications (roofing contractors / subcontractors)

For each process, selected a sample of transactions to walkthrough each process, and to confirm understandings obtained through inquiry.

Florida Building Code / SREF / District Design Standards Analysis

- Conducted interviews with management, and reviewed select documentation, to facilitate an analysis of the Florida Building Code, State Requirements for Educational Facilities (SREF), and the District s Design Standards. The purpose of this analysis was to identify key differences, if applicable, and to document the District's justifications for implementing standards more stringent than Building Code and/or SREF (if applicable).

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OBJECTIVES AND APPROACH (CONTINUED)

Objectives (continued)

Benchmarking

- Contacted comparable jurisdictions to obtain an understanding of how they permit and inspect roofing projects, and whether or not they have implemented design standards deemed more stringent than the Building Code. Documented the results of benchmarking activities performed and highlight similarities and differences from SBBC's current state. The following jurisdictions were included in our benchmarking: Miami/Dade and Palm Beach.

Reporting

At the conclusion of our procedures, we summarized our findings related to the Roofing Process Analysis. We have reviewed the results of our testing with Management and incorporated management's response into our report.

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APPENDIX A – PROCUREMENT PROCESS MAPS

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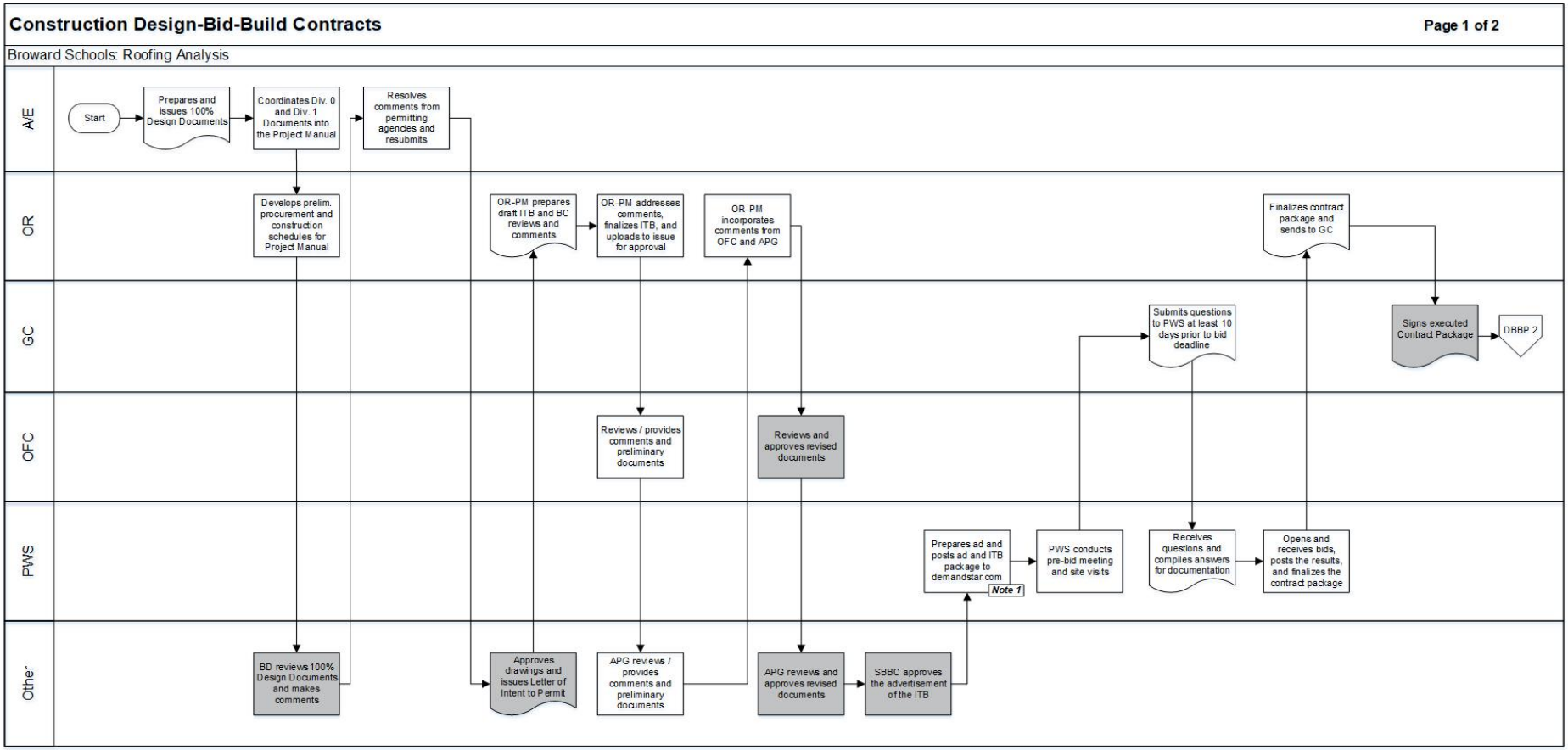
APPENDIX A – PROCUREMENT PROCESS MAPS



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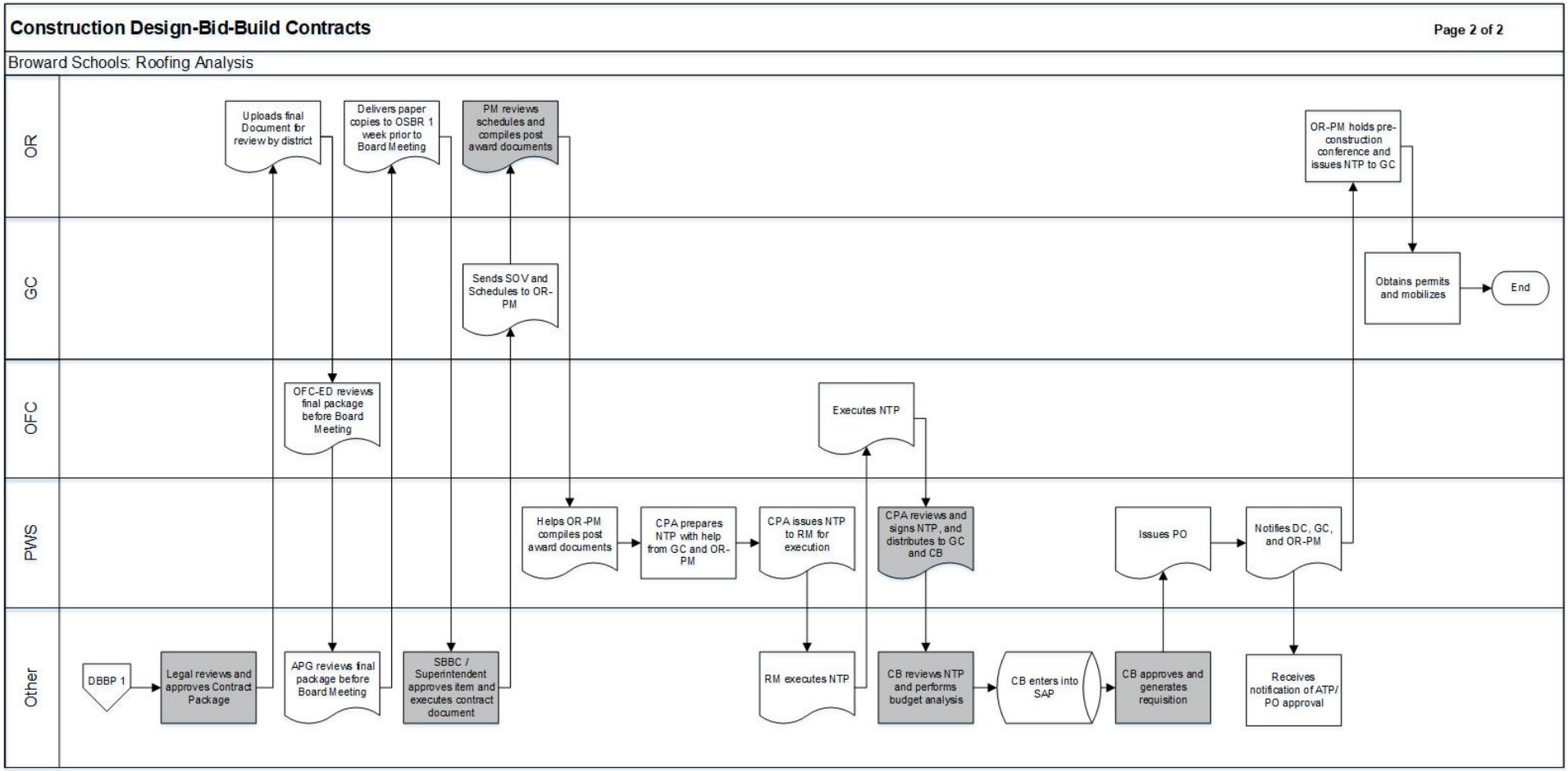
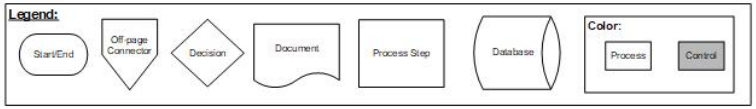
APPENDIX A – PROCUREMENT PROCESS MAPS (CONTINUED)



Acronyms:
OR = Owner's Representative
OR-PM = Owner's Representative Project Manager
GC = General Contractor
OFC = Office of Facilities and Construction
PWS = Procurement and Warehousing Services
ITB = Invitation to Bid
APG = Agenda Planning Group
SBBC = School Board of Broward County
OFC-ED = Office of Facilities and Construction Executive Director
SOV = Schedule of Values
RM = Risk Managements

Acronyms:
NTP = Notice to Proceed
CB = Capital Budget
PO = Purchase Order
DC = Document Control
ATP = Authorization to Proceed
CPA = Construction Purchasing Agent



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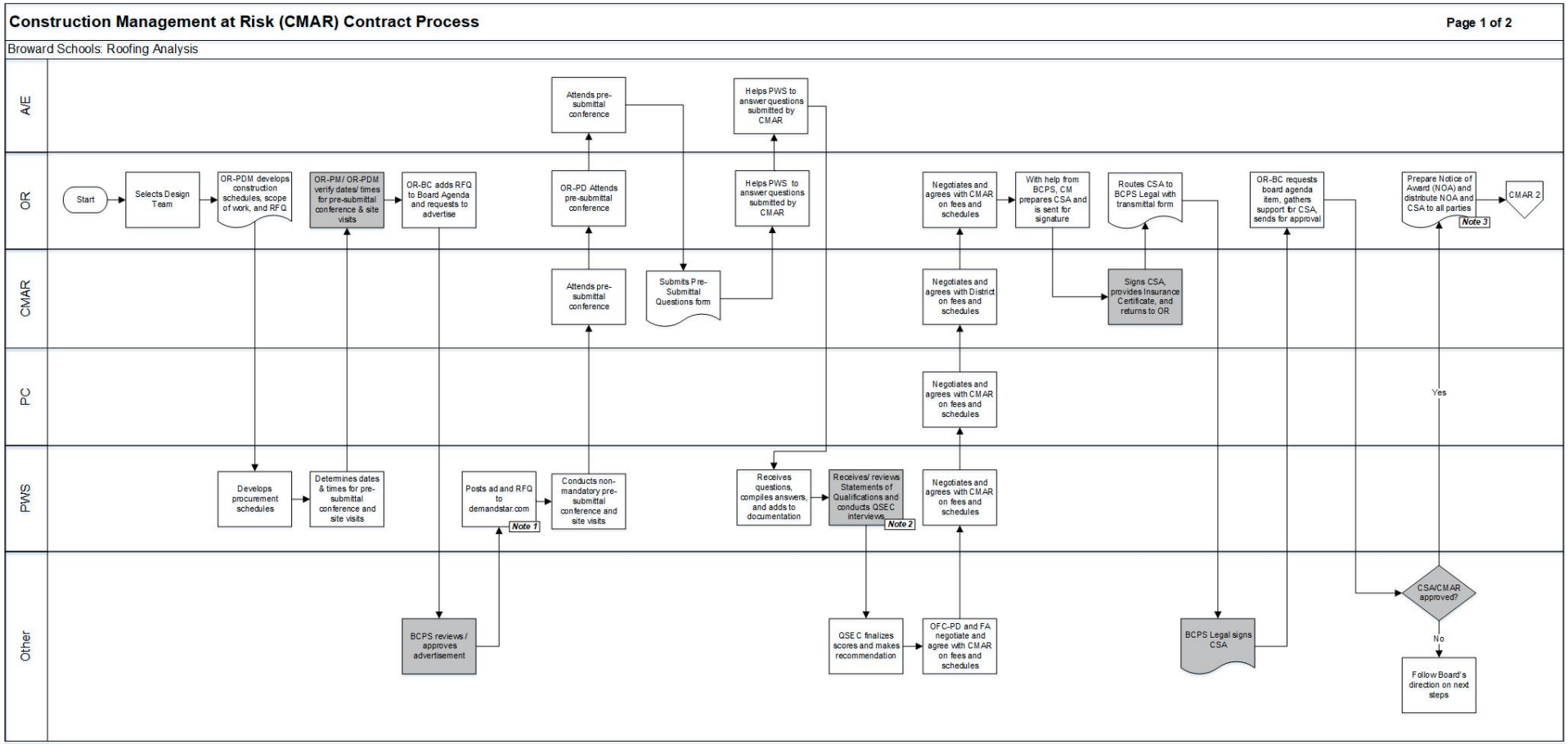
APPENDIX A – PROCUREMENT PROCESS MAPS (CONTINUED)



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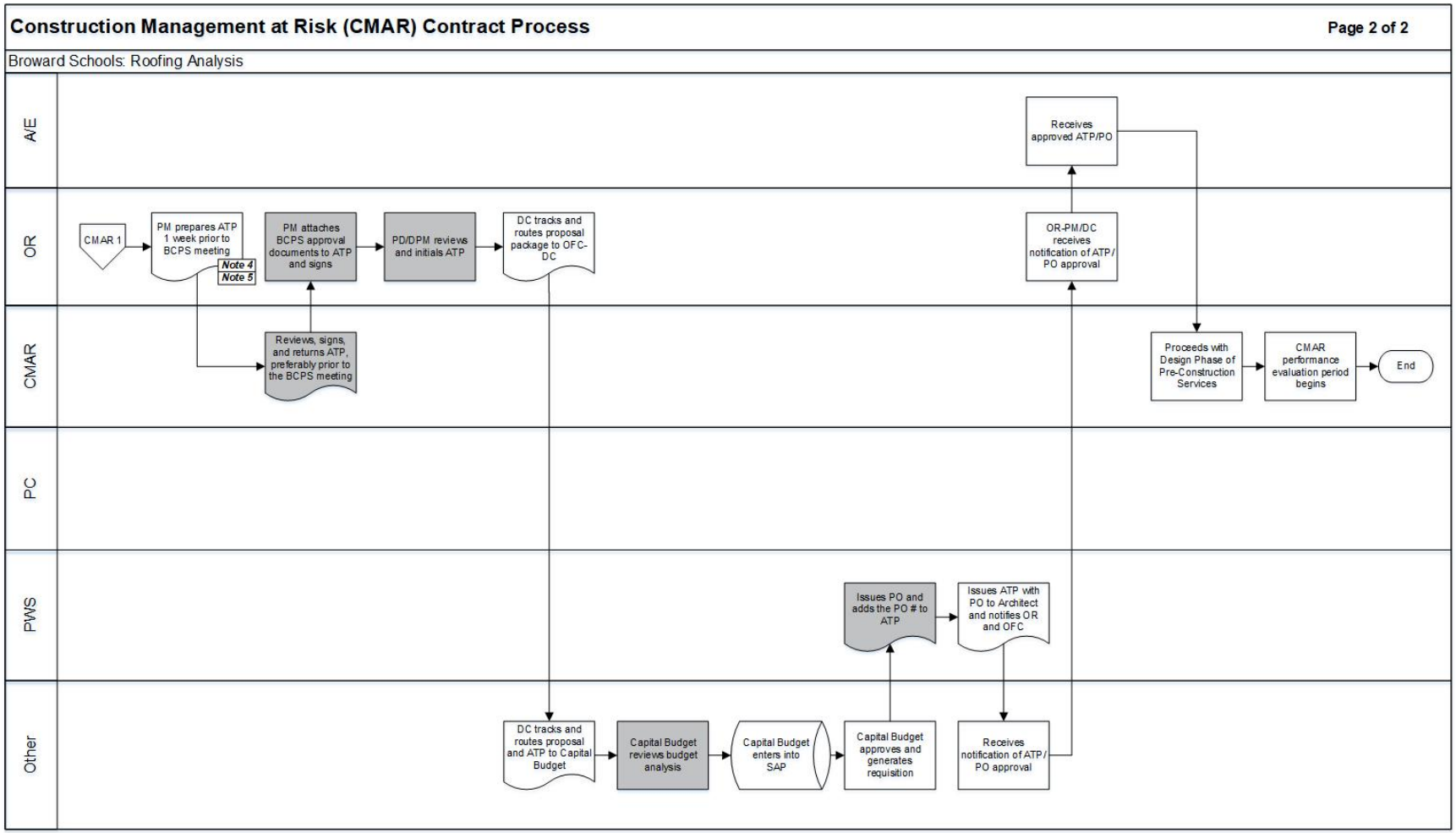
APPENDIX A – PROCUREMENT PROCESS MAPS (CONTINUED)

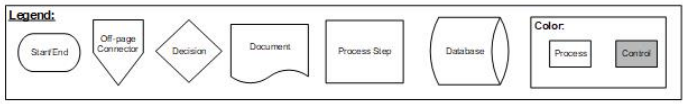


Note 4: The ATP is filled out as follows:
- Page 1: The ATP should only include a brief description of the scope of services the consultant will be providing, e.g., Architectural, MEP, etc.
- Page 2: Should include the schedule, if not included on a separate document.
- Page 3: It is not necessary to qualify services any further on the ATP, since the governing document is the PSA.

Note 5: Part of the ATP will include 1 of 3 options evidencing board approval:
- Superintendent Approval Memo (If chosen, during this step the OR-BD will prepare the memo for the Superintendent to sign)
- Board Meeting Recap
- OSBR signed ARF

Acronyms:
A/E = Architect/Engineer
OR = Owner's Representative
OR-PM = Owner's Representative Project Manager
OR-PDM = Owner's Representative Program Des. Manager
ATP = Authorization to Proceed
PC = Program Controls
BCPS = Broward County Public Schools
BD = Building Dept.
CMAR = Construction Manager at Risk
OR-BC = Board Document Specialist

Acronyms:
FA = Facilities Auditor
OFC = Office of Facilities & Construction
OFC-CD = Director of Construction
OFC-CFO = Chief Facilities Officer
OFC-DC = Document Control
OFC-PCM = Program Controls Manager
OFC-PD = Pre-Construction Director
QSEC = Qualification Selection Evaluation Committee
CSA = Construction Services Agreement
PO = Purchase Order



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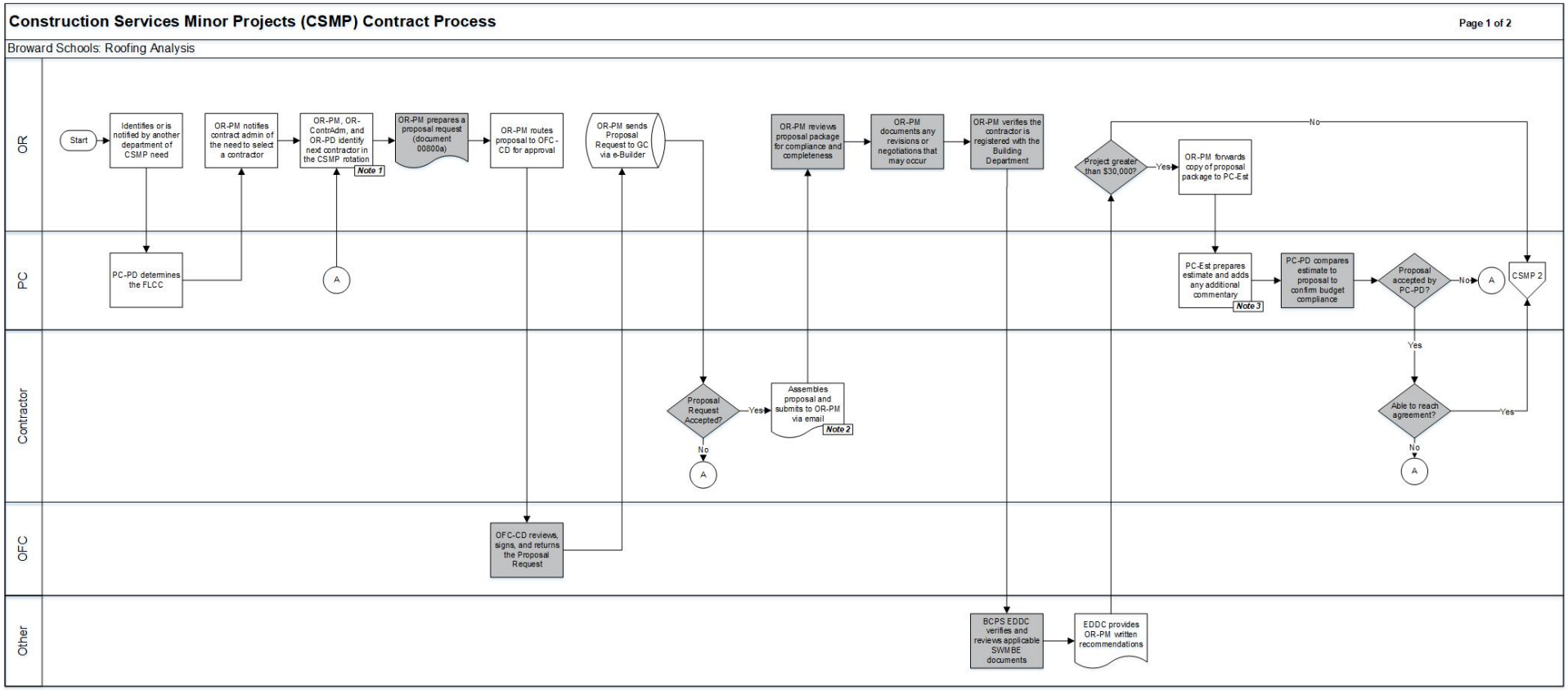
APPENDIX A – PROCUREMENT PROCESS MAPS (CONTINUED)



Note 1: Contract rotation will be determined by utilizing the CSMP-CMAR Selection Matrix.

Note 2: The Contractor assembles their proposal and submits via email to the OR-PM, along with the following documents:
- Estimating Order (Document 00800a)
- Estimating Recap Form (Document 00800b)
- Contractor Proposal
- Schedule of Values (Document 00435)
- Project Specific Certificate of Insurance
- Project Schedule
- Statement of Intent to Perform as an S/M/WBE Subcontractor (Document 00470)
- S/M/WBE Subcontractor Participation Schedule (Document 00475)
- S/M/WBE Good Faith Effort Form (Document 00480)

Note 3: Estimate of the work is based on RS Means cost information. The estimator applies the Contractor's multiplier as per their approved bid contract.

Acronyms:
OR = Owner's Representative
OR-PM = Owner's Representative Project Manager
PC = Program Controls
PC-PD = Program Controls Program Director
PC-Est = Program Controls Estimator
OFC = Office of Facilities & Construction
OFC-CD = Office of Facilities & Construction Director of Construction
FLCC = Fixed Limit of Construction Costs
BCPS = Broward County Public Schools
OR-PD = Owner's Representative Program Director
EDDC = Economic Development & Diversity Compliance

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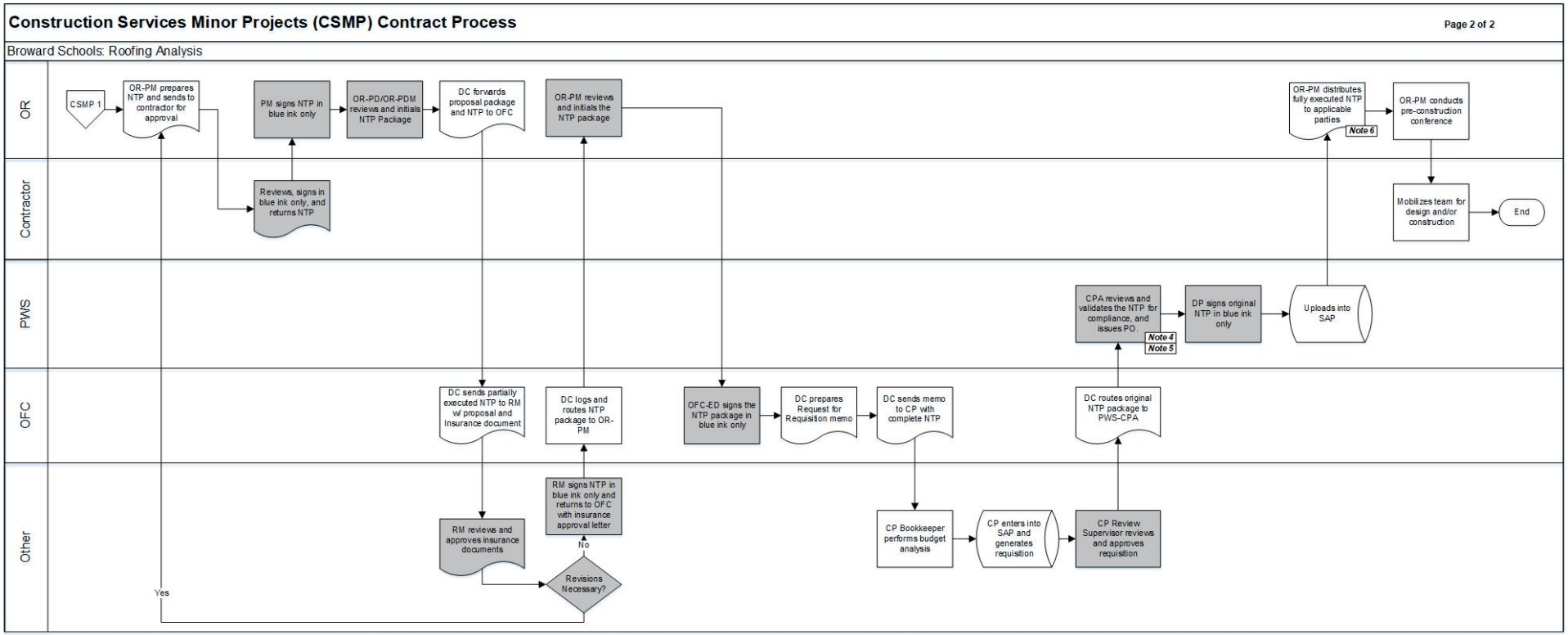
APPENDIX A – PROCUREMENT PROCESS MAPS (CONTINUED)



Note 4: CPA validates the following:
- The Bid No. and Name are accurate, and that contractor is awarded on the contract.
- The contractor has not exceeded contract approved limits.
- Risk Management has signed the NTP and Certificate of Insurance is present
- OFC-ED Signature has signed the NTP.
- Contractor's Pre-qualification certificate is active and attached.
- NTP amount is substantiated by Contractor's Proposal and Document 800b – Estimating Recap; NTP amount matches M/WBE document total.
- Approved Schedule of Values and Schedule are attached.
- M/WBE documents are accurate and comply with the contract terms.
- SDOP Compliance check has been completed, signed, and attached.
- If the NTP is for $200,000 or more, the performance and payment bonds are attached, the amount and the template form used are correct, and the bonds are recorded with Broward County.
- Building Permit is attached. If not attached, verify the assignment is for design/build.
- Stakeholders to be copied are included on NTP.
- The Contractor Selection Matrix was utilized and is signed by OFC-DC.

In the event, any item is not in compliance, the NTP Package will be returned for correction and re-validated once returned to OFC-DC.

Note 5: PWS inserts the construction start date of seven (7) days after PO issuance date

Note 6: Distributes fully executed NTP with PO to Contractor, Capital Payments, OR-PM, other stakeholders identified on NTP form and project file.

Acronyms:
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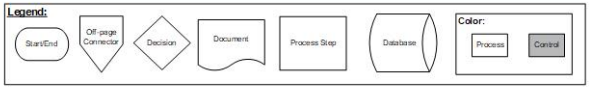
OR-PM = Owner's Representative Project Manager
OFC = Office of Facilities and Construction
PWS = Procurement and Warehousing Services
DC = Document Control
OR-PDM = Owner's Representative Program Des. Manager
OR-PD = Owner's Representative Program Director
RM = Risk Management
NTP = Notice to Proceed
OFC-ED = Office of Facilities and Construction Executive Director
CP = Capital Payments
CPA = Construction Purchasing Agent
DP = Procurement Director



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APPENDIX B – ADDITIONAL BUILDING DEPARTMENT RESPONSE

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APPENDIX B – ADDITIONAL BUILDING DEPARTMENT RESPONSE

The following summary was provided by the Building Department in response to the analysis and observations presented in this report.

"There is no doubt that RSM's analysis has yielded some credible ideas, which is the benefit of a system analysis. Recommendations initiated by RSM, subsequent meetings between RSM and the BD, the Roofing Process Analysis and resultant responses are cumulatively to the benefit of the District. Given that the analysis was prompted by Facilities, we need to clarify a couple of points: The goals of both departments are to provide a building for the students. Each department involved has its own agenda to accomplish that goal. The Facilities Department's goal is to complete the facility on time and within budget. The Building Department's goal is to provide a structurally sound roof that should meet the required life cycle as outlined in FS 1013.37, FBC453.4, 453.8.7 and SREF 2014 section 4.3 (8) (a) and that meets the Florida Building Code minimums and is constructed to the District's design and material standards. The BD does not have much flexibility in the interpretation of either the FBC or the pre-determined design and material standards. The FBC can be quite rigid as such and does not allow for arbitrary decisions made by BD personnel. If the construction does not meet either the time or financial goals, that is not brought about by the Building Department's requirement to enforce the Florida Building Code or to adhere to the District's design and material standards. As we know the majority of the report is based on opinions and/or thoughts from construction management that do not fully understand the intricate workings of the Florida Building Code. Understanding the recommendations are still based on opinions, I am more concerned how the back-up information appears to only support the observations and do not tell the complete story.
It is the BD's goal to work toward achieving the technical and personnel recommendations to fortify the department's role in the process. It is our hope that the finances be made available to achieve that process."

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RSM US LLP
100 NE 3rd Avenue, Suite 300
Fort Lauderdale, FL 33301
954.462.6351
www.rsmus.com

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