SUSTAINABLE, ENERGY - EFFICIENT PUBLIC BUILDINGS PROGRAM

WHAT?

NEW LEGISLATION ADDRESSING NEW AND RENOVATED MAJOR PUBLIC FACILITIES.

N.C.G.S. 143-135.35 thru 143-135.40
(Senate Bills 668 and 1946)

Sustainable, Energy Efficient Buildings Advisory Committee

1. MADE RECOMMENDATIONS FOR IMPLEMENTATION OF THE LEGISLATION.
2. PROVIDE ON-GOING ADVICE TO THE SCO.
3. FUTURE RECOMMENDATIONS TO THE LEGISLATURE FOR ADDITIONAL SUSTAINABILITY REQUIREMENTS.

Doug Brinkley US Green Building Council Co-Chair
Bill Laxton DENR
Ginger Scoggins ASHRAE
Jeff Tiller ASU Energy Center
Tommy Harrill SCO
Robert Fraser NCSU
Jim Wise RMF Engineering Inc.

Herb Stanford Stanford White Co-Chair
Bob Powell NC A&T
Herb Eckerlin NCSU
Julie McLaurin AIA O'Brien Atkins
Renee Hutcheson AIA Small Kane
Rod Rabold NC Commissioning Task Force/UNC CH
Thomas Hunter NC Community College System

APPLIES TO MAJOR FACILTIES

- STATE-OWNED BUILDINGS, UNIVERSITY AND COMMUNITY COLLEGE BUILDINGS.
- NEW CONSTRUCITON: 20,000 GSF OR LARGER.
- RENOVATION: 20,000 GSF OR LARGER, WHERE COST OF RENOVATION EXCEEDS 50% OF INSURANCE VALUE.

Minimum Energy Performance Goals

- **REDUCE NEW BUILDING ENERGY CONSUMPTION BY 30+% COMPARED TO THE REQUIREMENTS OF ASHRAE STANDARD 90.1-2004.**

- **20+% ENERGY REDUCTION FOR RENOVATED BUILDINGS.**

Minimum Water Performance Goals

- **20% LESS WATER CONSUMPTION FOR INDOOR PLUMBING COMPARED TO THE 2006 N.C. STATE PLUMBING CODE.**

- **50% LESS WATER CONSUMPTION FOR OUTDOOR LANDSCAPING BY APPROPRIATE TURFGRASS PLANTING AND REDUCED SPRINKLER APPLICATION.**

Minimum
Performance Goals

COMMISSIONING

- ENSURE DESIGN INTENT AND IS WELL DEFINED.
- ENSURE THAT THE BUILDING FUNCTIONS IN ACCORDANCE WITH THAT DESIGN INTENT.

Minimum Performance Goals

PERFORMANCE VERIFICATION

- **WATER AND ENERGY CONSUMPTION *METERING* REQUIRED.**
- **12-MONTH MONITORING PERIOD AFTER BUILDING OCCUPANCY (10 month "trending" evaluation).**

WHEN?

NEW REQUIREMENTS FOR SUSTAINABLE, ENERGY EFFICIENCY BUILDINGS BECAME EFFECTIVE AUGUST 8, 2008.

WHY?

1. **SUSTAINABLE, ENERGY-EFFICIENT BUILDINGS ARE ENVIRONMENTALLY PREFERABLE.**

2. **SUSTAINABLE, ENERGY-EFFICIENT BUILDINGS ARE ECONOMICALLY PREFERABLE.**

ENVIRONMENT

- REDUCE RESOURCE DEPLETION…ENERGY AND WATER.
- REDUCE GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE IMPACT.
- REDUCE WATER RUNOFF AND POLLUTION.
- IMPROVE QUALITY OF LIFE.

STATE POLICY: THE RIGHT THING TO DO!!!

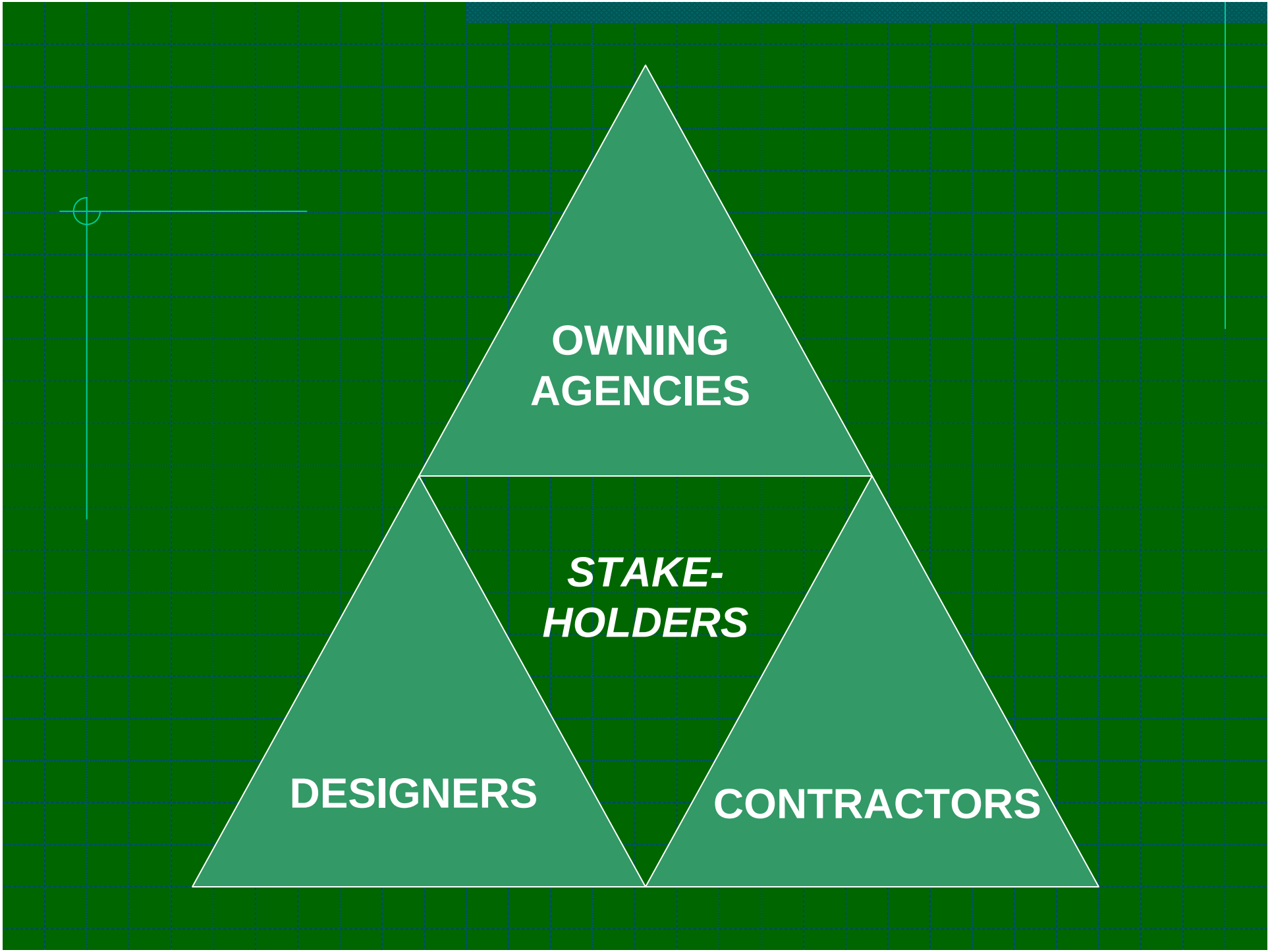
STATE POLICY: THE RIGHT THING TO DO!!!

ECONOMICS

- 30-50% REDUCTION IN UTILITY COSTS.
- 0-4% INCREASED CAPITAL COSTS.
- 0-5 YEAR TYPICAL SIMPLE PAYBACK.
- SIGNIFICANTLY REDUCED LIFE-CYCLE COSTS.

HOW?

STAKEHOLDER COMPLIANCE


OWNING AGENCIES
STAKE-HOLDERS
DESIGNERS
CONTRACTORS

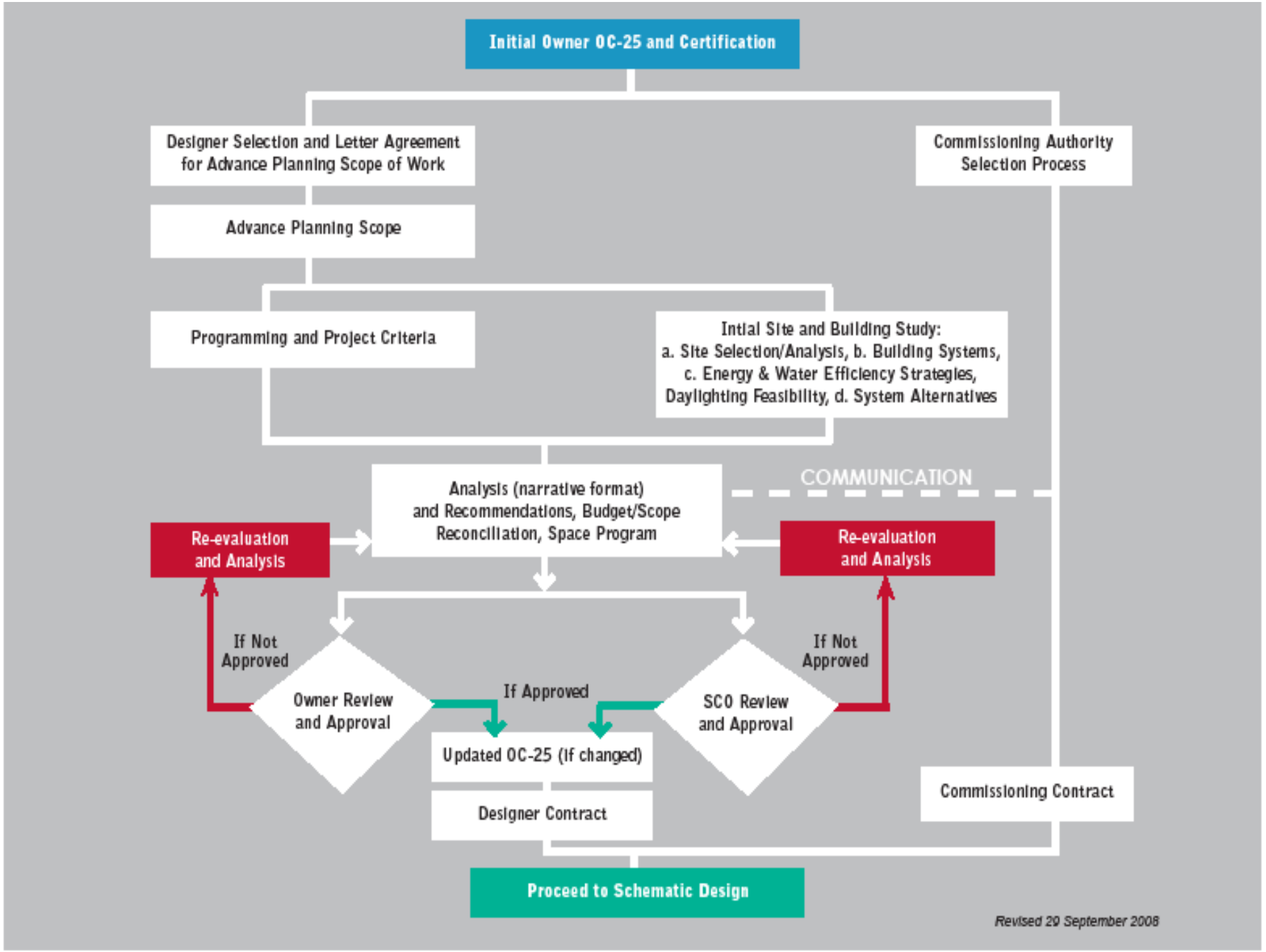
STAKEHOLDER COMPLIANCE AND IMPACTS

OWNING AGENCIES

- DESIGN PROCESS
- COMMISSIONING
- PERFORMANCE VERIFICATION

DESIGN PROCESS

- ALL MAJOR BUILDINGS MUST GO THROUGH ADVANCE PLANNING.
- THE ENTIRE DESIGN TEAM MUST BE ASSEMBLED AND WORK TOGETHER DURING ADVANCE PLANNING…*THE OWNER IS A TEAM MEMBER!*
- COMMISSIONING AGENT MUST PARTICIPATE IN THE DESIGN PROCESS.
- 0-15% INCREASED DESIGN FEES ANTICIPATED (1% OR LESS OF CONSTRUCTION COST).

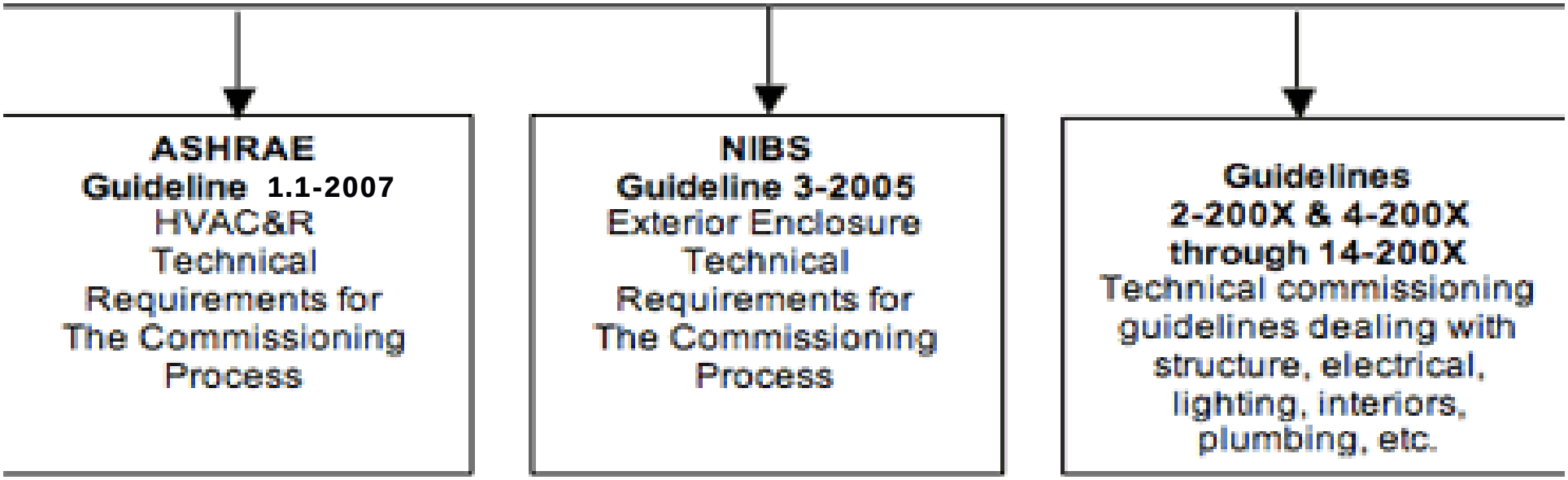

Initial Owner OC-25 and Certification
Designer Selection and Letter Agreement for Advance Planning Scope of Work
Commissioning Authority Selection Process
Advance Planning Scope
Programming and Project Criteria
Intial Site and Building Study: a. Site Selection/Analysis, b. Building Systems, c. Energy & Water Efficiency Strategies, Daylighting Feasibility, d. System Alternatives
COMMUNICATION
Analysis (narrative format) and Recommendations, Budget/Scope Reconciliation, Space Program
Re-evaluation and Analysis
Re-evaluation and Analysis
If Not Approved
If Not Approved
Owner Review and Approval
If Approved
SCO Review and Approval
Updated OC-25 (if changed)
Designer Contract
Commissioning Contract
Proceed to Schematic Design
Revised 29 September 2008

COMMISSIONING REQUIREMENTS

- Public agency, designer, and SCO must determine what level of commissioning is appropriate.
- Start no later than the schematic design phase of the project.
- Continue through the initial operations of the building.

COMMISSIONING GUIDELINES

ASHRAE/NIBS Guideline 0-2005: The Commissioning Process
(Used as the foundation of ASHRAE Guideline 1, NIBS Guideline 3, and other Total Building Commissioning Process technical guidelines)



OPTION 1: DESIGNER-LED COMMISSIONING

- APPROPRIATE FOR SMALLER, LESS COMPLEX BUILDINGS.
- DESIGNER WRITES A “BASIS OF DESIGN” AND DEVELOPS COMMISSIONING SPECIFICATIONS, INCLUDING START-UP AND FUNCTIONAL PERFORMANCE TESTS.
- DESIGNER PARTICIPATES IN AND VERIFIES TAB, START-UP, AND FUNCTIONAL TESTING.

OPTION 2: INDEPENDENT, 3RD PARTY COMMISSIONING

- Third party commissioning authority (CxA) necessary on larger, more complex projects.
- The CxA is independent of the design team and construction contractors.
- CxA is an agent of the owner.

OWNER'S RESPONSIBILITIES DURING COMMISSIONING

- Representative of the owner responsible for O&M of the building must be involved in the entire Cx process.

- Owner's assigned project planning and Capital Project Coordinator(s) must also participate in all Cx phases

OWNER'S RESPONSIBILITIES DURING PERFORMANCE VERIFICATION

- Collect and validate utility metering, sub-metering, and BMS data for a period of 12 months.
- If water or energy use exceeds model projections by 15%, investigate and resolve any issues found, or recommend future corrections or modifications.
- Provide performance report to SCO and State Energy Office.

STAKEHOLDER COMPLIANCE AND IMPACTS

DESIGNERS

- DESIGN PROCESS
- COMMISSIONING
- PERFORMANCE VERIFICATION

DESIGN PROCESS CHANGES

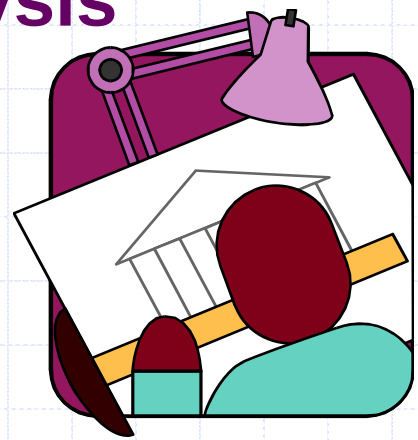
Appendix A of Committee Report: Identifies changes to the State Construction Manual (green text):

- Advance Planning
- Integrated Design Process
- Analysis of Design Alternatives

ADVANCE PLANNING

- Evaluate building geometry, daylighting depth, and site development implications for north and south exposure.

- Identify and review potential energy and water conservation strategies for the building type and location for analysis during Schematic Design phase



INTEGRATED DESIGN

- **What Is INTEGRATED DESIGN?**
  - Integrated team approach.
  - Project delivery approach that uses the best skills and knowledge of all the stakeholders.
  - Encourage and promote multi-lateral sharing.
  - Team members are involved in the process.
  - Risks are collectively managed and appropriately shared.

INTEGRATED DESIGN

- Who Is on The Integrated Design Team?

INTEGRATED DESIGN

- Key Principles of Integrated Design
  - Collaboration
  - Communication
  - Informed decision making earlier
  - Team approach process
  - Life-cycle cost-based decision making

INTEGRATED DESIGN

- How Is Integrated Design Implemented?
  - Team meets and sets clearly defined project goals.
  - Team establishes strategies to be employed.
  - Assignments of responsibilities are made.
  - Tools, deliverables, timelines are agreed upon.
  - Regular meetings to make decisions, evaluate progress, and make adjustments as needed.

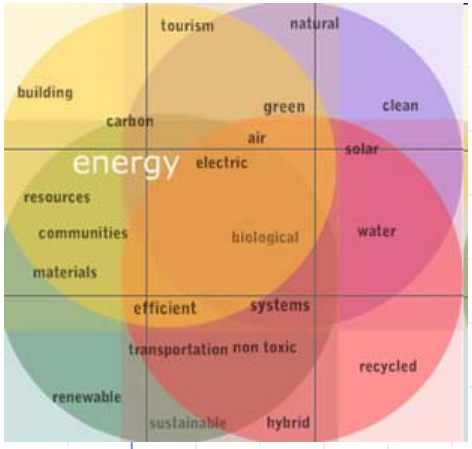
ANALYSIS OF DESIGN ALTERNATIVES

APPLY LIFE-CYCLE COSTING TO ALL SIGNIFICANT DESIGN DECISIONS.

PROJECT _____ ***ID NO.*** _____

Component	Alternatives to Analyzed	Y/N
Predesign	Maintain status quo (do nothing)	
	New acquisition or construction	
	Leasing	
	Renovation, upgrade, or revitalization of an exiting facility	
	Use of other State facilities	
Site and Program	Building shape and orientation on the planned site (including impact on adjacent buildings)	
	Alternative site(s)	
Architecture	Substructure ☐ Foundations ☐ Slab on grade ☐ Basement excavation ☐ Basement and retaining walls ☐	
	Superstructure ☐ Floor construction ☐ Roof construction ☐ Stair construction ☐	
	Wall construction ☐ Increased insulation levels, insulation placement, etc. ☐ Mass (passive solar thermal storage) ☐ Daylighting ☐ Building envelope (exterior closure) type ☐	
	Fenestration ☐ Type, amount, and location/orientation of glass ☐ Indoor/outdoor shading devices ☐ Daylighting ☐	
	Interior space plan ☐ Space arrangement ☐ Circulation ☐ Finishes and colors ☐ Ceiling heights ☐	
	Roof construction ☐ Increased insulation levels, type of insulation ☐ Roof membrane type and color ☐ Daylighting ☐	

	Conveyances ☐ Selection of elevators and dumbwaiters ☐ Escalators ☐	
HVAC	Secondary HVAC system(s) ☐ System(s) type(s) and zoning ☐ Economizer cycle(s) ☐ Heat recovery (exhaust air, internal source, etc.) ☐	
	Primary HVAC system(s) ☐ System(s) type(s) and energy sources ☐ Pumping/piping configuration ☐ Heat recovery, waterside economizer cycle, etc. ☐ Thermal storage (electrical demand shifting) ☐	
Plumbing	Plumbing system(s) ☐ Domestic hot water generation (method and energy source) ☐	
Electrical	Lighting ☐ Artificial lighting levels, methods, and control, including general lighting and task lighting. ☐ Daylighting ☐	
	Power ☐ Voltage selection (building and large equipment) ☐ Transformers (quantity, locations, efficiencies) ☐	



ENERGY MODELING IS THE KEY TO LCCA!

- Calculation methodology of ASHRAE 90.1-2004 Appendix G must be used to establish percentage improvement of proposed building over a baseline ASHRAE 90.1-2004-compliant building.

- Pre-approved modeling software: DOE-2, Blast, EnergyPlus, eQUEST, EnergyPro, Carrier Hourly Analysis Program (HAP), and Trane Trace.

ENERGY MODELING

- Energy modeling reports must be submitted beginning in the schematic design phase and be completed no later than the Design Development Phase.
- The design energy model shall be updated, if necessary, and re-submitted in the Construction Document Phase.
- Energy strategies shall be utilized for variable building elements, as applicable for each project. Each of the following categories shall be evaluated, and decisions on which items will be pursued shall be summarized in Energy Model summary:
  - Building Envelope
  - Lighting control and lighting design
  - HVAC system design and control
  - Service water heating systems

ENERGY MODELING CONDITIONS & CONSTRAINTS

- **Same energy simulation software program shall be used for each phase (SD,DD,CD) of the project submittal, as well as for each energy conservation strategy. (Exceptions may be allowed by SCO.)**
- ***An unlimited number of options may be modeled for each building, but design team must use judgment to determine options resulting in best energy savings and lower first costs, which will be compared in the resultant life cycle cost analysis to provide an overall lowest building cost for the long term.***

CxA RESPONSIBILITIES DURING DESIGN

- Helps the owner to develop and maintain the Owner's Project Requirements (OPR).
- Reviews SD, DD and CD documents.
- Provides design team draft commissioning specifications.
- Helps inform contractors of typical assistance required.

DESIGNER RESPONSIBILITIES DURING COMMISSIONING

- Participates in the Cx process.
- Maintains and updates the “Basis of Design” document throughout the project.
- Provides “Basis of Design” document training to facility personnel at completion of the project.

DESIGNER RESPONSIBILITIES FOR PERFORMANCE VERIFICATION

- Ensures all energy and water metering, sub-metering, and BAS monitoring requirements are met.
- Assists owner in validating metered data.
- Assists in evaluation and recommends solutions if energy or water consumption exceeds goals.

STAKEHOLDER COMPLIANCE AND IMPACTS

CONTRACTORS

- SUSTAINABLE DESIGN ELEMENTS
- COMMISSIONING
- PERFORMANCE VERIFICATION

SUSTAINABLE DESIGN ELEMENTS

- USE OF NEW MATERIALS.
- USE OF OLD MATERIALS IN NEW WAYS.
- MORE INTEGRATED BUILDING SYSTEMS.
- *BETTER QUALITY OF CONSTRUCTION OF CONSTRUCTION REQUIRED.*

CxA RESPONSIBILITIES DURING CONSTRUCTION

- Review materials, equipment, and systems submittals .
- Review contactor's start up tests.
- Verify TAB effort.
- Conduct functional testing of building systems and components.
- Review contractor's O&M manuals, as-built documentation, and training agendas.

CONTRACTOR RESPONSIBILITIES FOR PERFORMANCE VERIFICATION

- Assist owner in validating metered data.
- Assist in evaluation and recommend solutions if energy or water consumption goals are not met.

END RESULT?

BUILDINGS THAT MEET PROGRAM PERFORMANCE GOALS FOR SUSTAINABILITY, ENERGY AND WATER EFFICIENCY, AND

THAT WORK!

ADDITIONAL INFORMATION

http://www.nc-sco.com/

- MANUAL
  - *STATE CONSTRUCTION MANUAL*
- GUIDELINES
  - "SUSTAINABLE, ENERGY EFFICIENT BUILDINGS ADVISORY COMMITTEE REPORT"
  - "LIFE CYCLE COST ANALYSIS"
  - "ENERGY AND WATER EFFICIENT BUILDING DELIVERABLES CHECKLIST"
  - "WATER CONSERVATION"
- FORMS
  - WATER CONSUMPTION PERFORMANCE
  - FINAL REPORT CHECKLIST

Energy Efficient Buildings

OC-25 Cost Estimates

Michael Hughes
State Construction Office
www.nc-sco.com

§ 143-341. Powers and duties of Department.

The Department of Administration has the following powers and duties:

(1) Repealed by Session Laws 1979, 2nd Session, c. 1137, s. 38.

(2) Purchase and Contract:

a. To exercise those powers and perform those duties which were, at the time of the ratification of this Article, conferred by statute upon the former Division of Purchase and Contract.

(3) Architecture and Engineering:

a. To examine and approve all plans and specifications for the construction or renovation of:

1. All State buildings or buildings located on State lands, except those buildings over which a local building code inspection department has and exercises jurisdiction; and

2. All community college buildings requiring the estimated expenditure for construction or repair work for which public bidding is required under G.S. 143-129 prior to the awarding of a contract for such work; and to examine and approve all changes in those plans and specifications made after the contract for such work has been awarded.

a1. To organize and schedule, within three weeks of designer selection and before the design contract is let, a meeting of the stakeholders for each State capital improvement project to discuss plan review requirements and to define the terms of the memorandum of understanding developed by the State Building Commission pursuant to G.S. 143-135.26(2). The stakeholders shall include the funded agency, each State agency having plan review responsibilities for the project, and the selected designer. Notwithstanding the foregoing, the meeting need not be scheduled if the funded agency so requests.

b. To assist, as necessary, all agencies in the preparation of requests for appropriations for the construction or renovation of all State buildings.

b1. To certify that a statement of needs pursuant to G.S. 143C-3-3 is feasible. For purposes of this sub-subdivision, "feasible" means that the proposed project is sufficiently defined in overall scope; building program; site development; detailed design, construction, and equipment budgets; and comprehensive project scheduling so as to reasonably ensure that it may be completed with the amount of funds requested. At the discretion of the General Assembly, advanced planning funds may be appropriated in support of this certification. This sub-subdivision shall not apply to requests for appropriations of less than one hundred thousand dollars ($100,000).

c. To supervise the letting of all contracts for the design, construction or renovation of all State buildings and all community college buildings whose plans and specifications must be examined and approved under a.2. of this subdivision.

d. To supervise and inspect all work done and materials used in the construction or renovation of all State buildings and all community college buildings whose plans and specifications must be examined and approved under a.2. of this subdivision; and no such work may be accepted by the State or by any State agency until it has been approved by the Department.

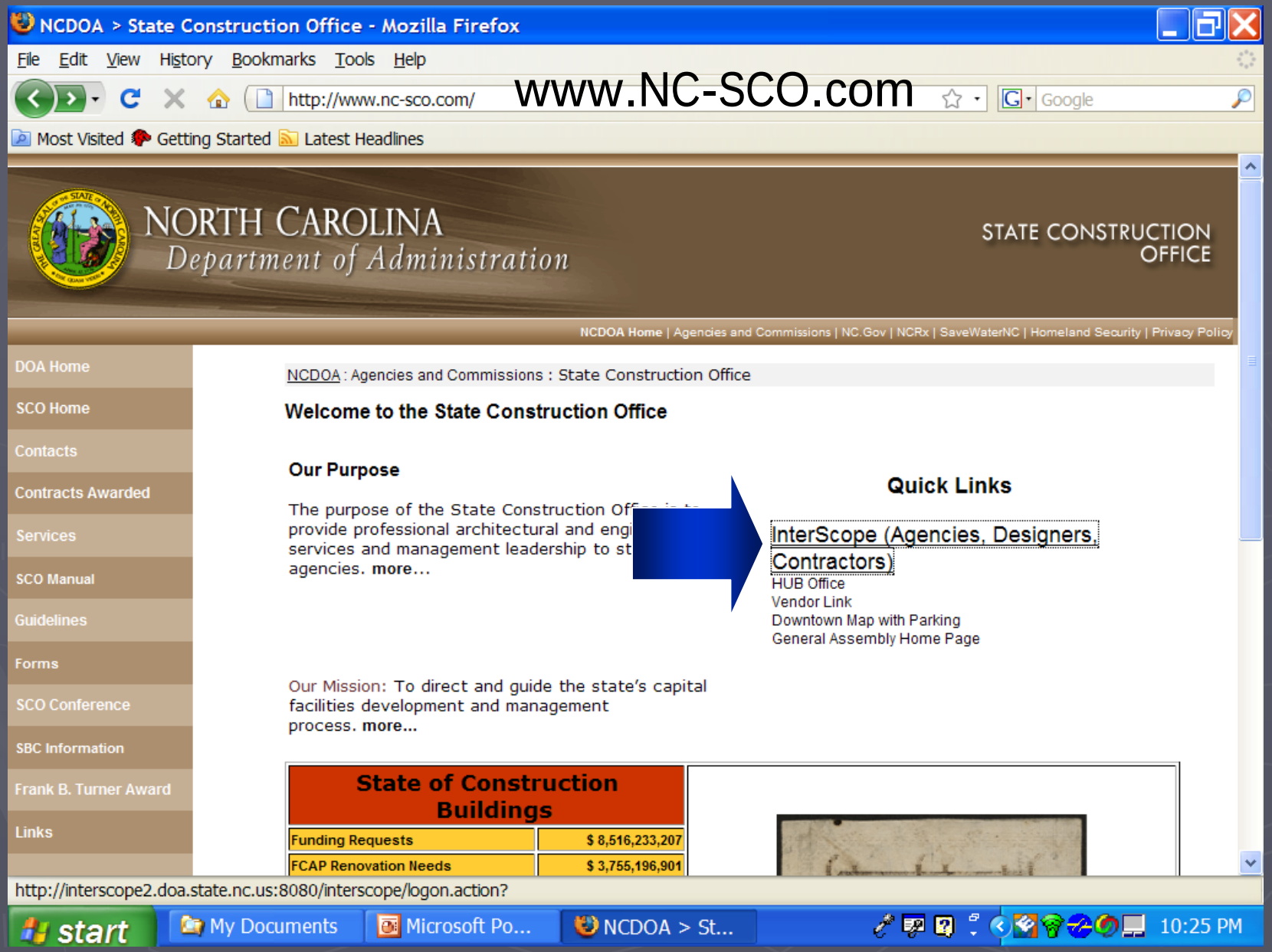
e. To require all State agencies to use existing plans and specificiations for construction projects, where feasible. Prior to designing a project, State agencies shall consult with the Department of Administration on the availability of appropriate existing plans and specifications and the feasibility of using them for a project.

Except for sub-subdivisions b., b1., and e. of this subdivision, this subdivision does not apply to the design, construction, or renovation of projects by The University of North Carolina pursuant to G.S. 116-31.11.

(4) Real Property Control:

a. To prepare and keep current a complete and accurate inventory of all land owned or leased by the State or by any State agency. This inventory shall show the location, acreage, description, source of title and current use of all land (including swamplands or marshlands) owned by the State or by any State agency, and the agency to which each tract is currently allocated. Surveys may be made where necessary to obtain information for the purposes of this inventory. Accurate plats or maps of all such land may be prepared, or copies obtained where such maps or plats are available.

b. To prepare and keep current a complete and accurate inventory of all buildings owned or leased (in whole or in part) by the State or by any State agency. This inventory shall show the location, amount of floor space and floor plans of every building owned or leased by the State or by any State agency, and the agency to which each building, or space therein, is currently allocated. Floor plans of every such building shall be prepared or copies obtained where such floor plans are available, where needed for use in the allocation of space therein.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Contacts
Contracts Awarded
Services
SCO Manual
Guidelines
Forms
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SBC Information
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Our Purpose
The purpose of the State Construction Office is to provide professional architectural and engi services and management leadership to st agencies. more...
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HUB Office
Vendor Link
Downtown Map with Parking
General Assembly Home Page
Our Mission: To direct and guide the state's capital facilities development and management process. more...
State of Construction Buildings
Funding Requests $ 8,516,233,207
FCAP Renovation Needs $ 3,755,196,901
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SCO GOES ELECTRONIC

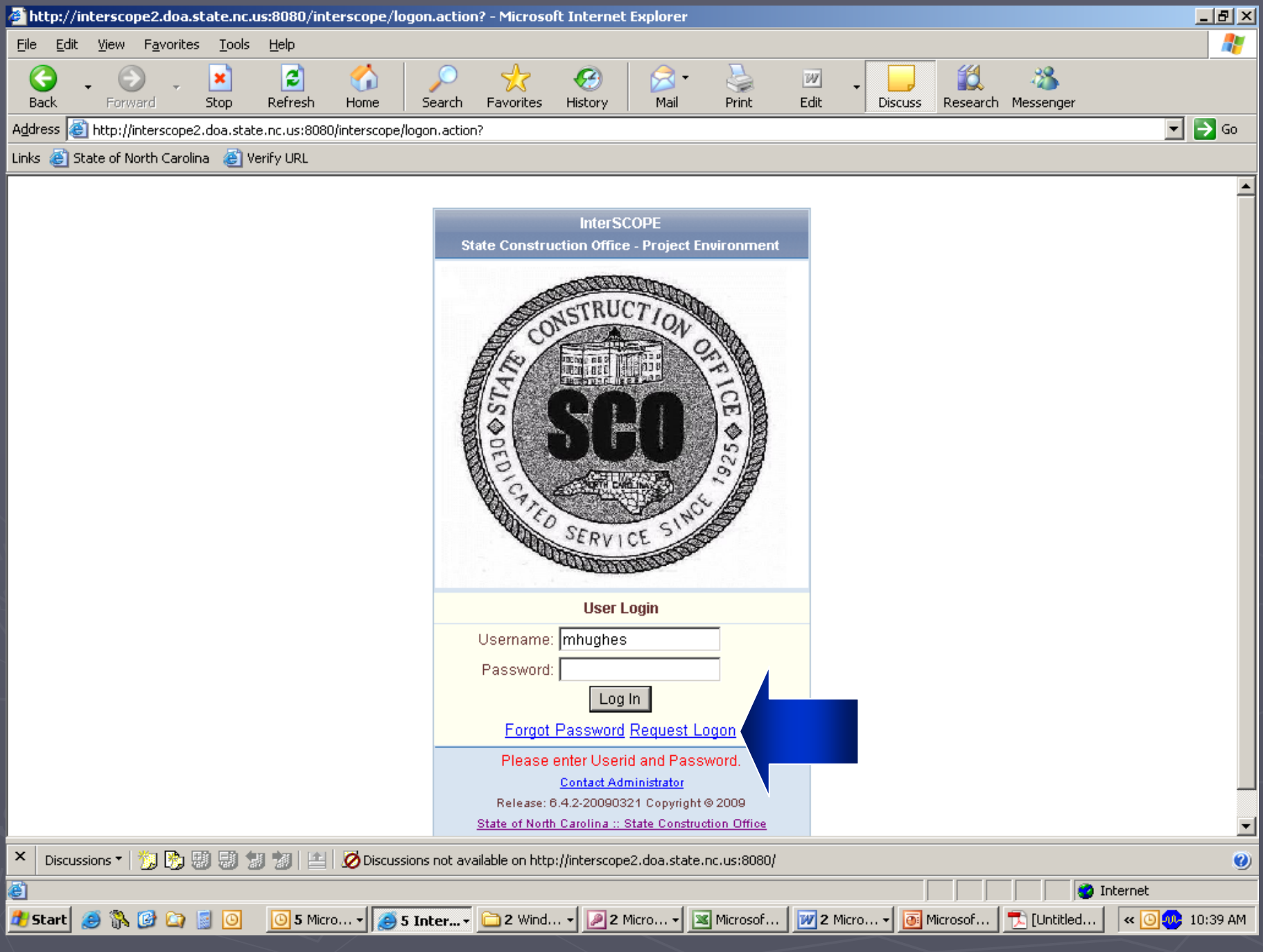
Contractor Evaluations
Designer Evaluations
OC-25 Cost Estimates

Coming Soon: Electronic Change Orders

View your project data on-line.

Go to
http://www.nc-sco.com
(InterScope Quick Link)

Demonstrations and help with initial SCO Logins ROOM 9
McKimmon Center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State Construction Office - Project Environment
STATE CONSTRUCTION OFFICE
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Password:
Log In
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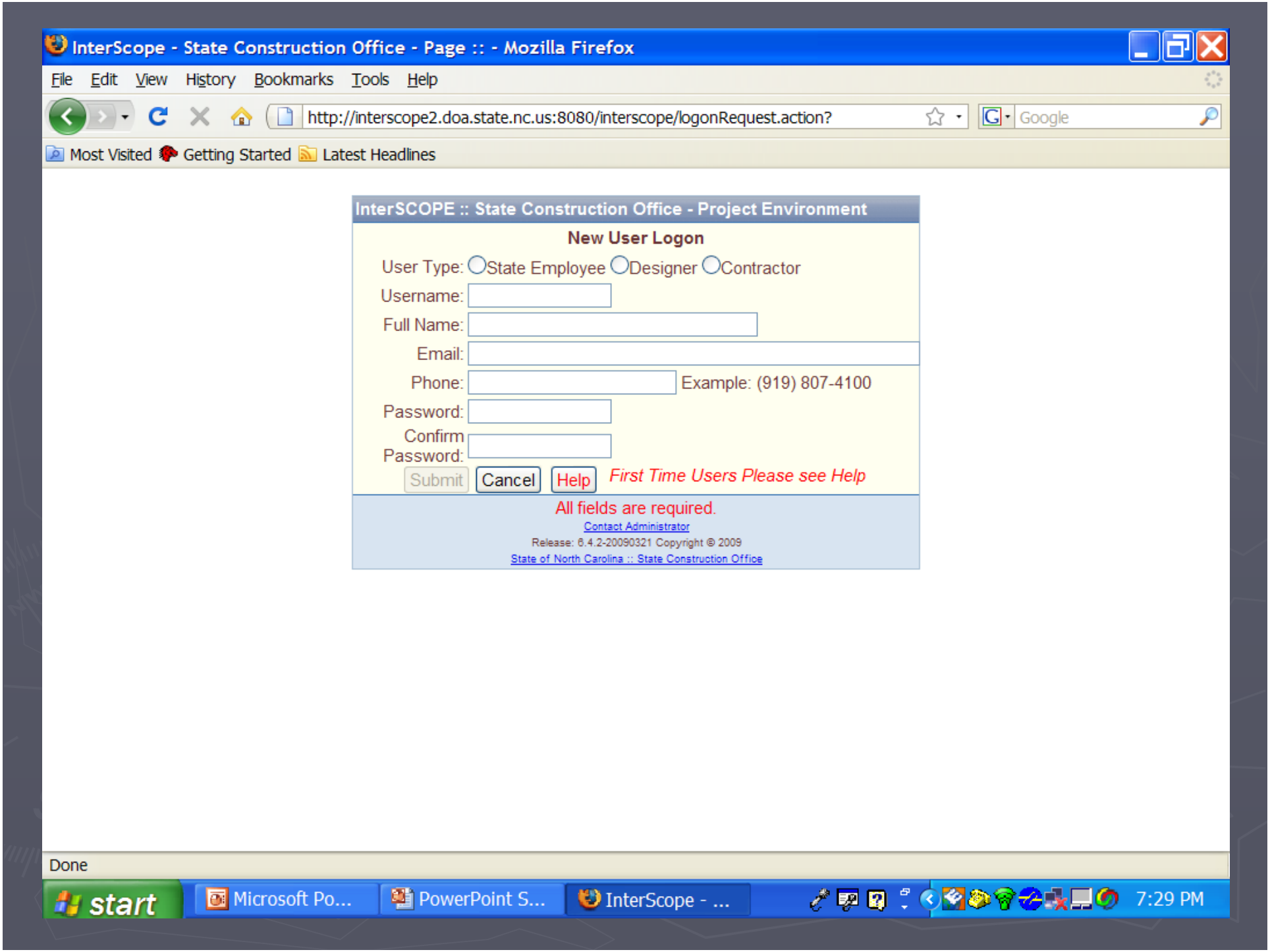
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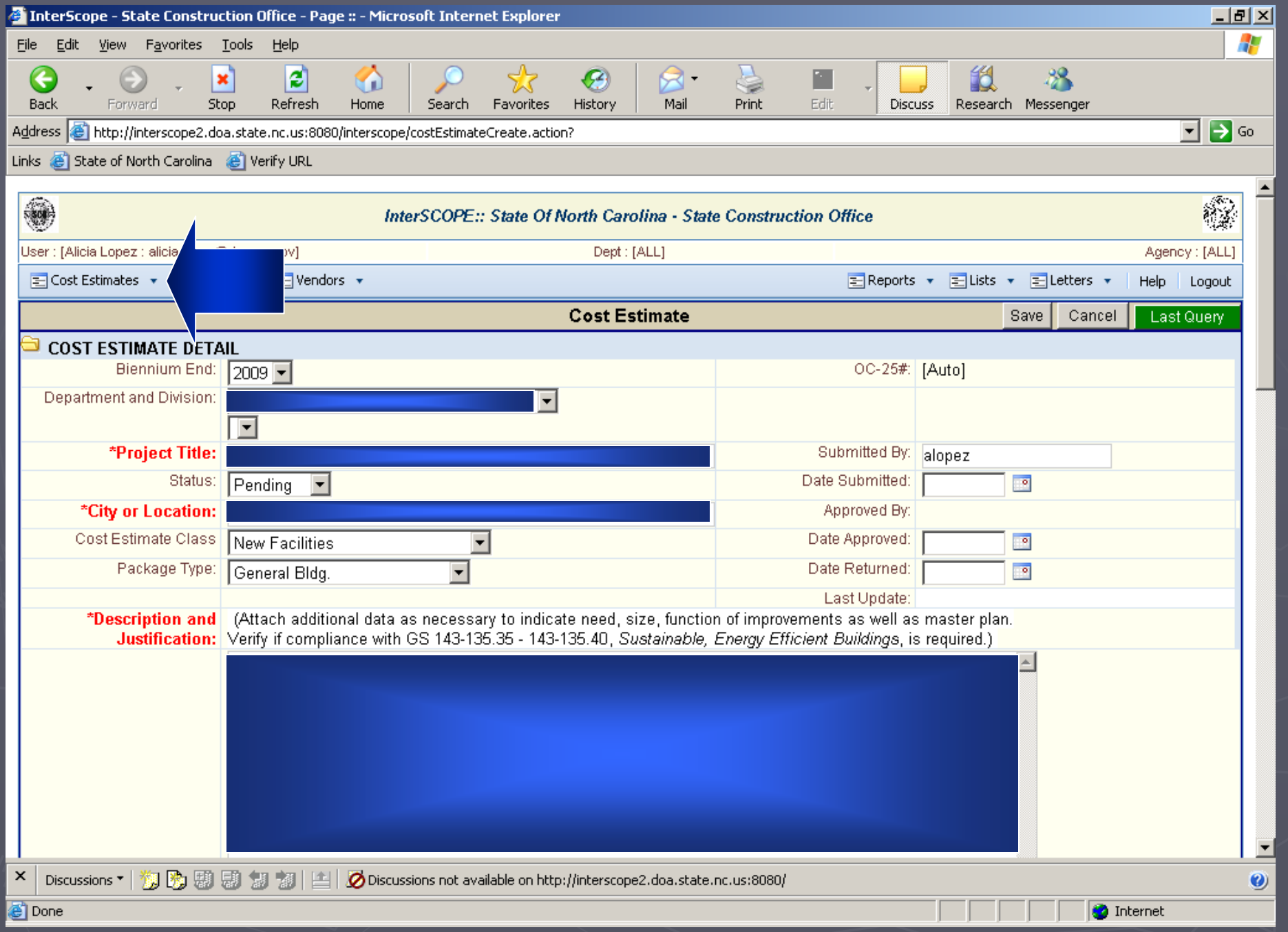
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New Facilities
Date Approved:
Package Type:
General Bldg.
Date Returned:
Last Update:
*Description and Justification:
(Attach additional data as necessary to indicate need, size, function of improvements as well as master plan.
Verify if compliance with GS 143-135.35 - 143-135.40, Sustainable, Energy Efficient Buildings, is required.)
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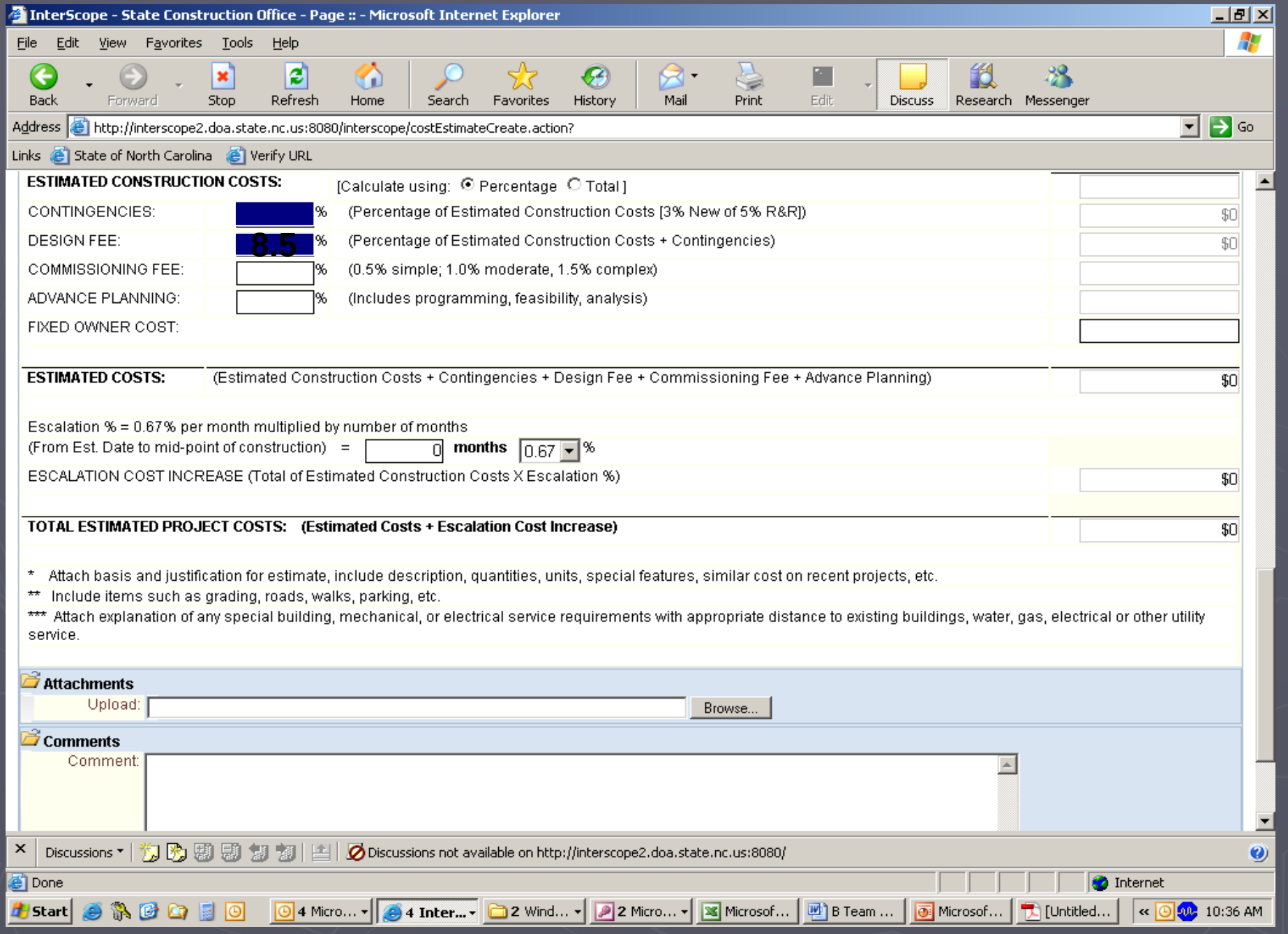
CURRENT ESTIMATED CONSTRUCTION COST* (breakdowns)

SECTION		DESCRIPTION	QUANTITY	UNIT OF MEASURE	COST PER UNIT	TOTAL
A.	Land	Land Requirement	0	Lump Sum	0	$0
B.	Site	Site Demolition	0	Lump Sum	0	$0
B.	Site	Site Work	0	Lump Sum	0	$0
C.	Construction	Utility Services	0	Lump Sum	+2% 0	$0
C.	Construction	Building Demolition	0	Square Feet	0	$0
C.	Construction	Building Construction	0	Square Feet	153.0 150	$0
					15.3 15	$0
					30.6 30	$0
						$0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Links State of North Carolina Verify URL
ESTIMATED CONSTRUCTION COSTS:
[Calculate using: Percentage Total]
CONTINGENCIES: % (Percentage of Estimated Construction Costs [3% New of 5% R&R]) $0
DESIGN FEE: 8.5 % (Percentage of Estimated Construction Costs + Contingencies) $0
COMMISSIONING FEE: % (0.5% simple; 1.0% moderate, 1.5% complex)
ADVANCE PLANNING: % (Includes programming, feasibility, analysis)
FIXED OWNER COST:
ESTIMATED COSTS: (Estimated Construction Costs + Contingencies + Design Fee + Commissioning Fee + Advance Planning) $0
Escalation % = 0.67% per month multiplied by number of months
(From Est. Date to mid-point of construction) = 0 months 0.67 %
ESCALATION COST INCREASE (Total of Estimated Construction Costs X Escalation %) $0
TOTAL ESTIMATED PROJECT COSTS: (Estimated Costs + Escalation Cost Increase) $0
* Attach basis and justification for estimate, include description, quantities, units, special features, similar cost on recent projects, etc.
** Include items such as grading, roads, walks, parking, etc.
*** Attach explanation of any special building, mechanical, or electrical service requirements with appropriate distance to existing buildings, water, gas, electrical or other utility service.
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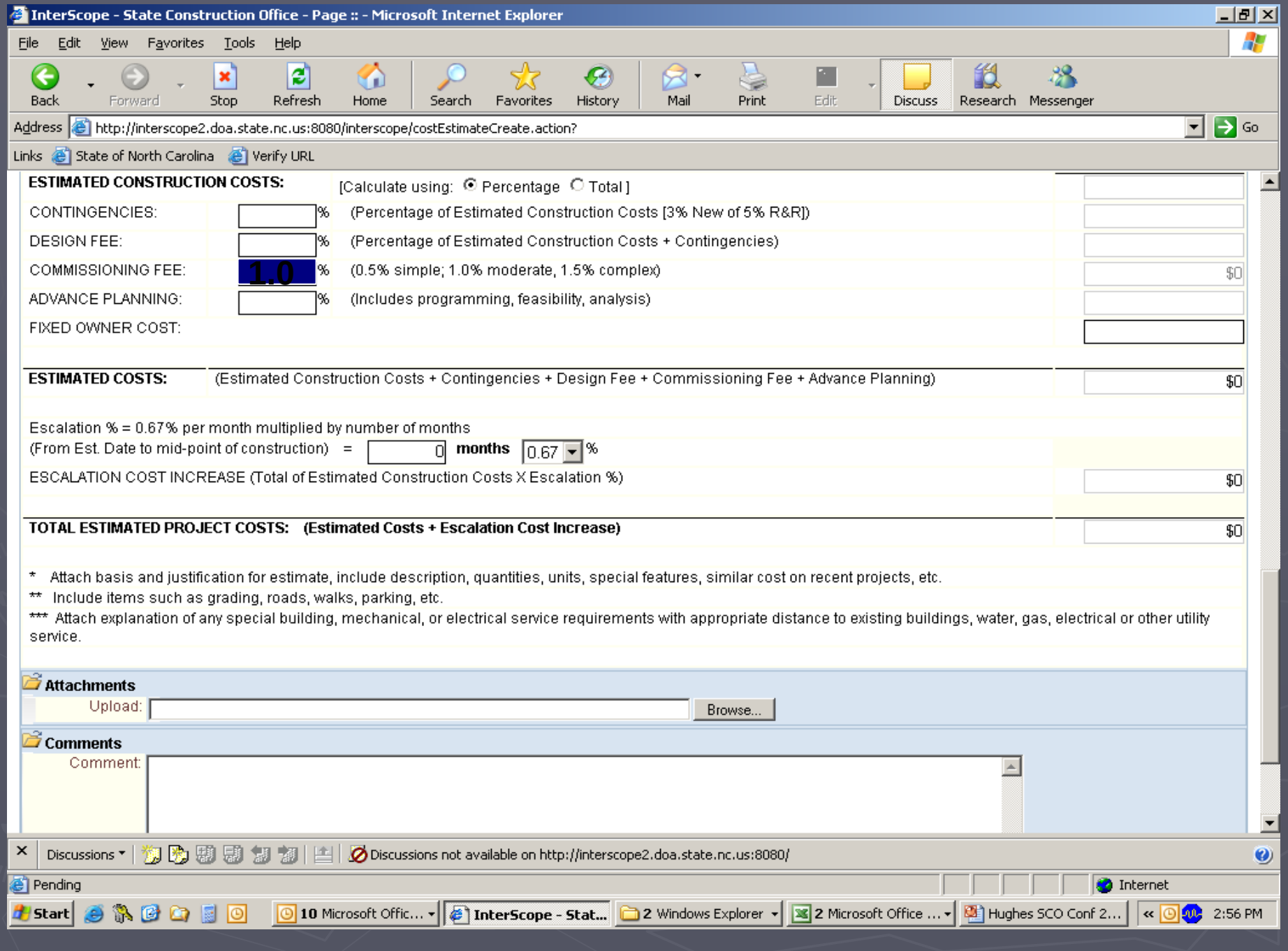
ENERGY PERFORMANCE MODELING AND REPORTING

by the

Sustainable, Energy Efficient Buildings Advisory Committee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ESTIMATED CONSTRUCTION COSTS:
[Calculate using: Percentage Total]
CONTINGENCIES: % (Percentage of Estimated Construction Costs [3% New of 5% R&R])
DESIGN FEE: % (Percentage of Estimated Construction Costs + Contingencies)
COMMISSIONING FEE: 1.0 % (0.5% simple; 1.0% moderate, 1.5% complex) $0
ADVANCE PLANNING: % (Includes programming, feasibility, analysis)
FIXED OWNER COST:
ESTIMATED COSTS: (Estimated Construction Costs + Contingencies + Design Fee + Commissioning Fee + Advance Planning) $0
Escalation % = 0.67% per month multiplied by number of months
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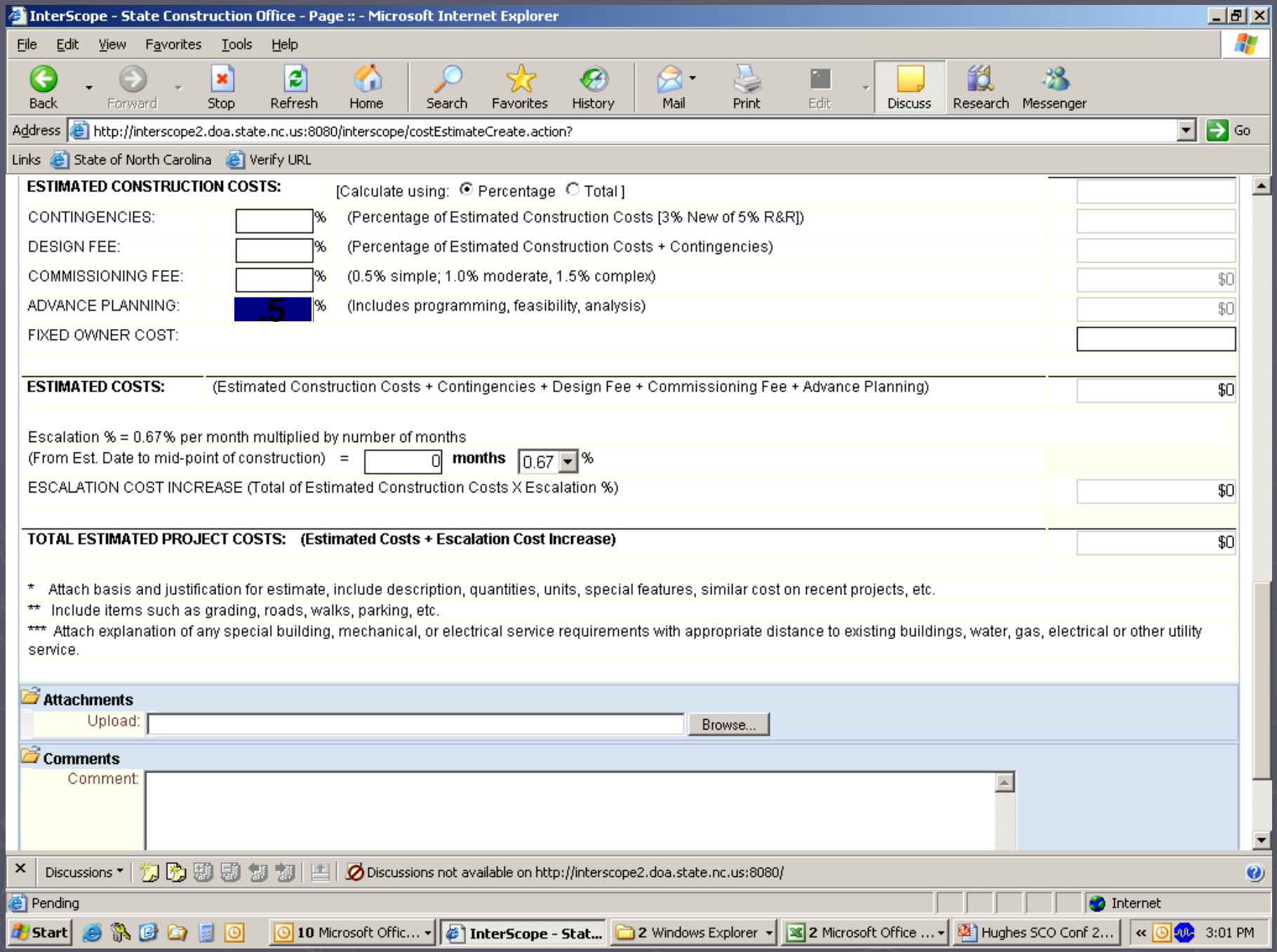
BUILDING COMMISSIONING

by the

Sustainable, Energy Efficient Buildings Advisory Committee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ADVANCE PLANNING: .5 % (Includes programming, feasibility, analysis) $0
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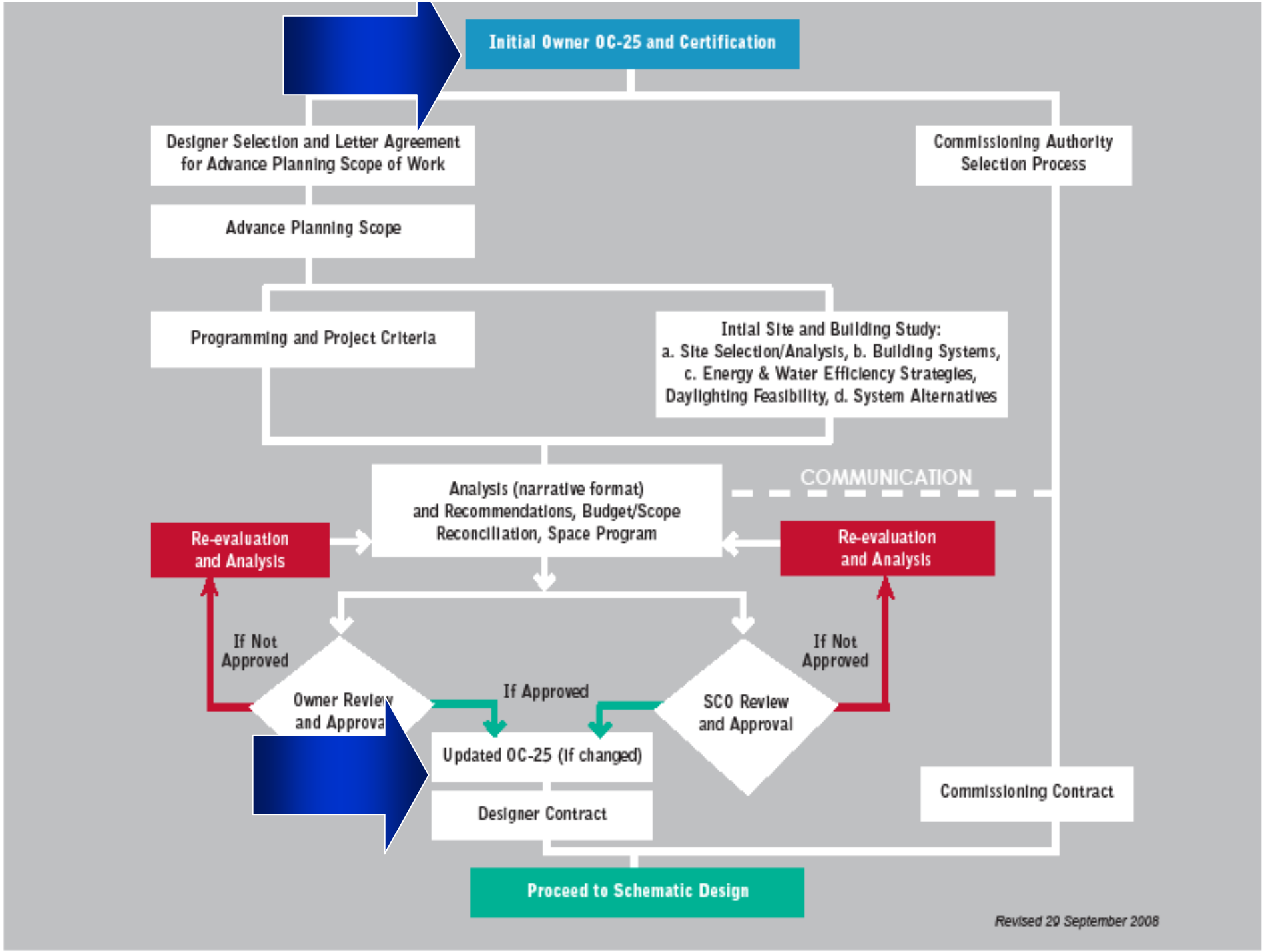
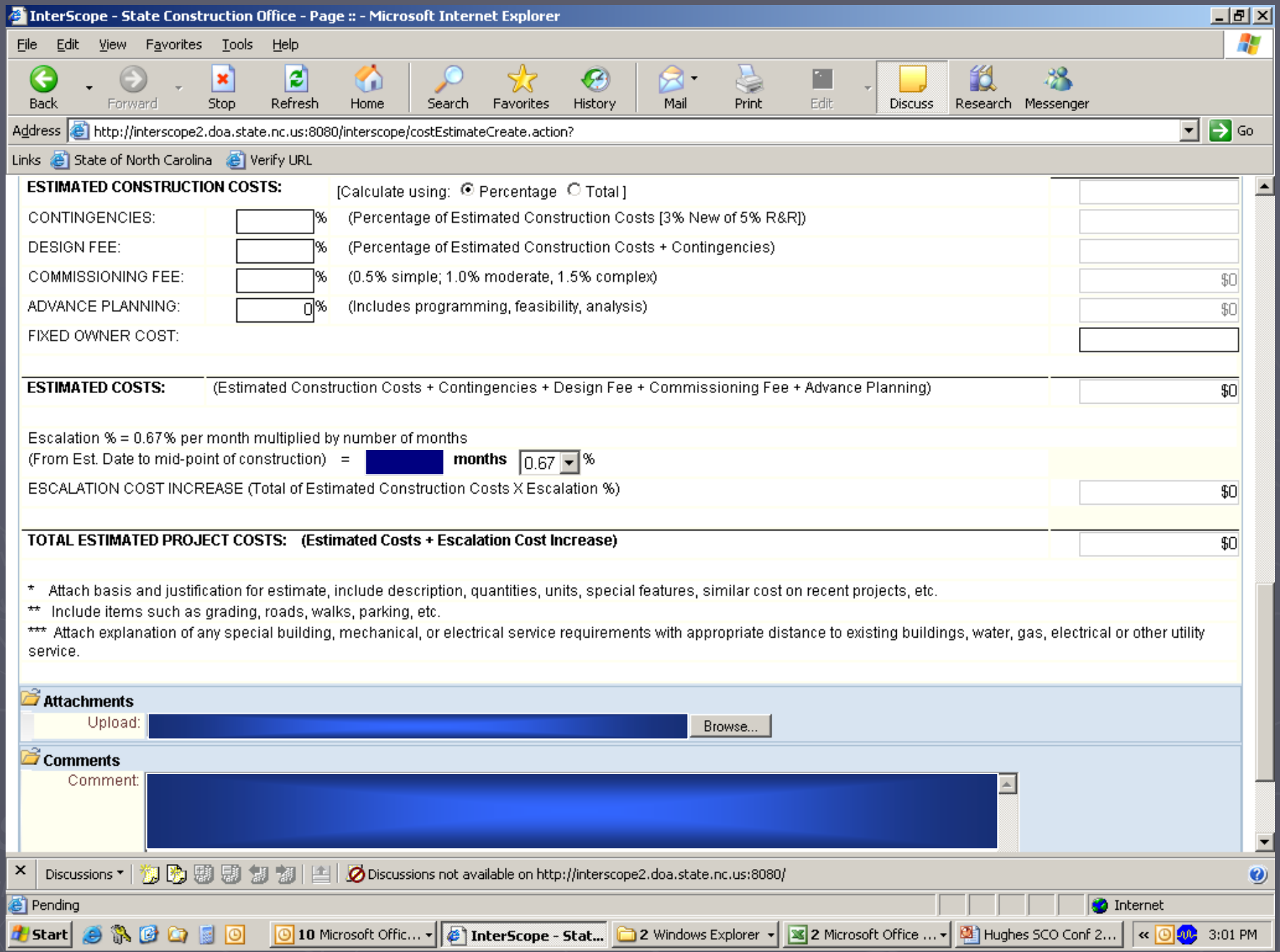

Initial Owner OC-25 and Certification
Designer Selection and Letter Agreement for Advance Planning Scope of Work
Commissioning Authority Selection Process
Advance Planning Scope
Programming and Project Criteria
Intial Site and Building Study:
a. Site Selection/Analysis, b. Building Systems,
c. Energy & Water Efficiency Strategies,
Daylighting Feasibility, d. System Alternatives
COMMUNICATION
Analysis (narrative format)
and Recommendations, Budget/Scope
Reconciliation, Space Program
Re-evaluation and Analysis
Re-evaluation and Analysis
If Not Approved
If Not Approved
Owner Review and Approval
If Approved
SCO Review and Approval
Updated OC-25 (if changed)
Designer Contract
Commissioning Contract
Proceed to Schematic Design
Revised 29 September 2008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