

A low-angle, upward-looking photograph of several modern skyscrapers with glass facades. The sun is shining brightly from the top center, creating a lens flare effect. The sky is blue with scattered white clouds. The buildings are arranged in a way that they appear to converge towards the top of the frame.

COMMERCIAL BUILDINGS FIELD STUDY

CLIMATE ZONE 5A

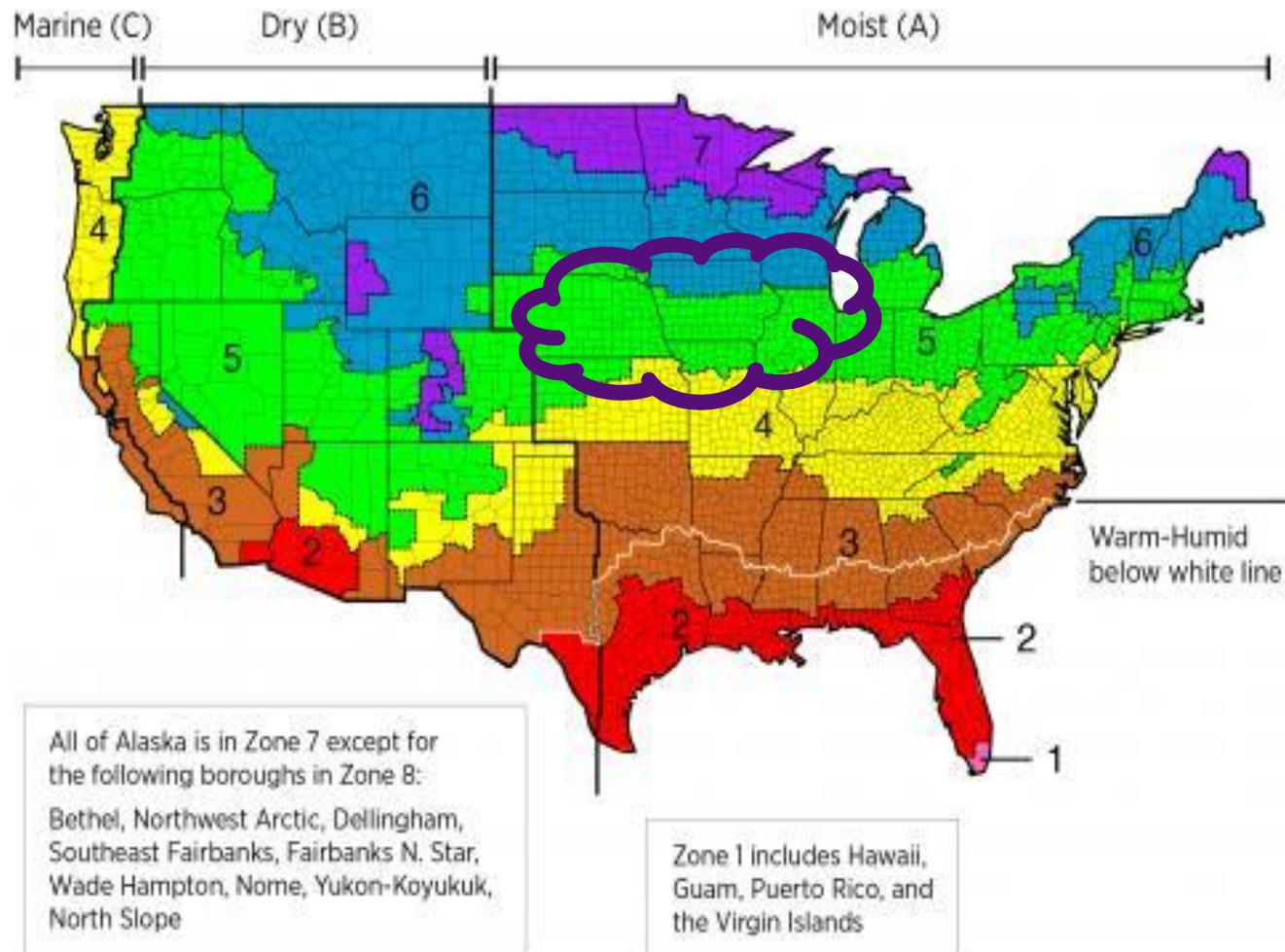
THE MOZINGO CODE GROUP

PROJECT SYNOPSIS

- ❖ Measure the impact of energy codes on commercial buildings and identify opportunities for savings through increased compliance
- ❖ Climate Zones 5A (NE, IA, IL) and 2A (FL)
- ❖ Survey 108 new office and retail buildings in each CZ

- Study began in 2017
- Will wrap up March 2020
- Both climate zones on same timeline
- We are only discussing CZ 5A work today

WHERE? - CLIMATE ZONE 5A: NEBRASKA, IOWA, ILLINOIS...



WHO? - THE TEAM

- DOE – Project Funder
- IMT – Contract Manager

Subcontractor:

- Originally: Colorado Code Consulting, lead by Shaunna Mozingo
- **Currently:** The Mozingo Code Group, lead by Shaunna Mozingo

Partners

- NDEE
- UNL
- MEEA
- CADMUS
- SWEEP
- Iowa State Fire Marshal's Office
- Southface Energy Institute

WHY?

- ❖ Develop replicable methodology to measure energy and cost savings in commercial buildings
 - ❖ Test methodologies for gaining access to sites
 - ❖ Develop training and education
-
- DOE: Create methodology for states to measure impacts of commercial energy code implementation

WHAT?

Offices

Include

- Office uses, including banks, professional, government
- Mixed use where they can be evaluated separately (e.g., restaurant on ground floor and office above)

Exclude

- Buildings with medical diagnostic or treatment
- Publicly owned buildings that are not government offices

WHAT?

Retail

Include

- Stand alone retail, enclosed retail malls, and strip malls
- Mixed use where they can be evaluated separately (e.g., retail on ground floor and residential above)

Exclude

- Central plants – no complex refrigeration / HVAC
- Restaurants or grocery stores
 - Incidental use allowed (if <10% of floor area)



WHAT?

Building Size

Small/Medium: <75,000 sq ft

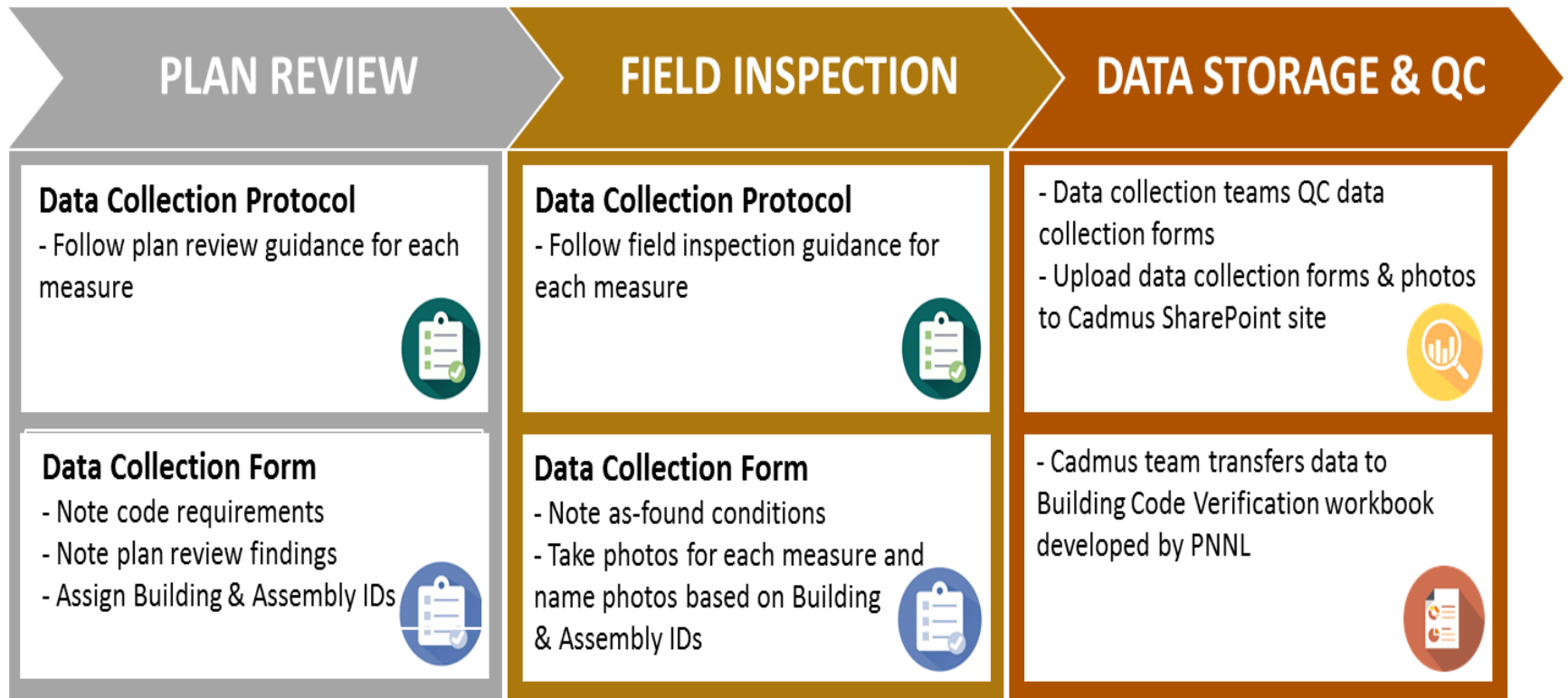
Large: \geq 75,000 sq ft

Sample Size

Small/Medium: 44 office, 46 retail

Large: 10 office, 8 retail

HOW? –DATA COLLECTION PROCESS



HOW? -RECRUITMENT

- Try at least 3 approaches, tracking time
 - Direct outreach to code officials
 - Direct outreach to designers
 - Direct outreach to building owners/builders
 - Direct outreach to ICC Chapters and State Energy Offices
 - Just show up on site!



HOW? -PLAN REVIEW & FIELD SURVEY

Plan Review

- Contact building department
 - Request necessary documents
- Review documentation
- Complete data collection form



Field Survey

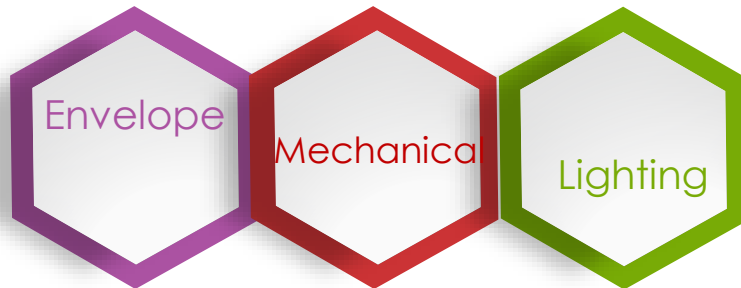
- Schedule onsite visit
- Note as-found condition
- Take supporting photographs





HOW? - FIELD INSPECTION: PHOTOGRAPHS

- Photograph all products, labels, and observed conditions for each measure

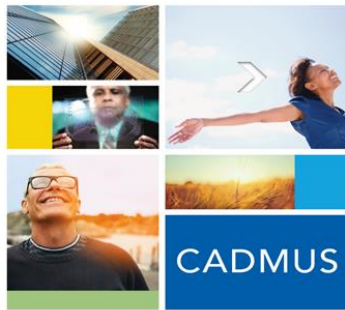


HOW? -STUDENT INTERNS

- UNL College of Architecture and Construction Management
- 5 students initially participated
- Two days of data collection training (73-point checklist)
- One day of energy code training
- Weekly webinar options



GETTING STARTED



COMMERCIAL BUILDINGS
ENERGY CODE FIELD STUDY

DATA COLLECTION FORM

Building Identifier	<input type="text"/>
Plan Reviewer Name	<input type="text"/>
Field Inspector Name	<input type="text"/>

*Surveys are conducted in collaboration with
Pacific Northwest National Laboratory*

*Prepared for
U.S. Department of Energy and
Institute for Market Transformation*



DATA COLLECTION FORM

Building Identifier	NE01
Plan Reviewer Name	John Reviewer
Field Inspector Name	Jane Inspector

Building Identifier
[State Abbreviation][Double Digit Number]
Example: Nebraska



PNNL FORM – TABLET BASED

Building Code Verification Record

Copy row: Select any cell on row, then hit this button. Copy rows when measures apply differently to parts of building.

Code Required Factors or conditions must match actual code, option path chosen, or performance baseline.

Information

18,304 sq ft Initialize applicability after Equip, CZ or Bldg type is changed

Office

5A

1 Discrete code indicators (see comment):

Full Bldg IECC: ^ 2009; * 2012; ** 2015

NA-90.1 90.1: - 2007; + 2010; ++ 2013

Prescriptive

Building Identifier: NE_Grls_SM_O_038

City/St: Grand Island NE

Actual code: 2009 IECC

HVAC System Type: DX cool/Furnace; Packaged (incl VRF or V

Occupancy: Office 100%

Occ'pcy 2:

Occ'pcy 3: 0%

Building comments:

interior lighting plans not at building department only able to confirm controls, was able to verify mechanical and some insulation.

			Code or Performance Requirement		Plan Takeoff Condition		As Found Condition				
Measure #	Measure name (see requirements tab for items included)	Apply to Bldg	Factor	Discrete Condition	Factor	Discrete Condition or Quality	Verif Lvl	Factor	Discrete Condition or Quality	Affected quantity	Appl
9009	Automatic time switch control	Y		(^ *) Automatic time controls ; Control zones ≤25k ft2/1 floor; and override limited to 5000 sf & 2 hours		(^ *) Automatic time controls ; Control zones ≤25k ft2/1 floor; and override limited to 5000 sf & 2 hours	ver		No automatic controls	11,462	ft2 flc affect
9011	Occupancy sensor control	Y		(^ *** - +++) Occupancy sensors ; Auto on 100%; time off ≤ req'd		(^ *** - +++) Occupancy sensors ; Auto on 100%; time off ≤ req'd	ver		(^ *** - +++) Occupancy sensors ; Auto on 100%; time off ≤ req'd	6,842	ft2 flc require occup
9014A	Daylighting control	N		Select Condition		Select Condition			Select Condition		ft2 of where req'd

Requirements
BldgInstructions
BldgReport

STATUS UPDATE

- Small Office Completed: 41
- Small Retail Completed: 44
- Large Office Completed: 5
- Large Retail Completed: 4

- ✓ **108 buildings needed**
- ✓ **94 completed**
- ✓ **14 to go by March 2020**

FIELD TRENDS AND IMPRESSIONS

- ❖ Success gaining access by showing up on site, particularly as a “student doing research”
- ❖ Take photos on site; do plan review and fill in forms later
- ❖ Use city website and check latest inspection to gauge construction progress

FIELD TRENDS AND IMPRESSIONS

- ❖ Exterior lighting and interior LPD generally compliant
- ❖ Approximately 50% of lighting controls non-compliant
- ❖ Windows difficult to verify
- ❖ COMcheck submittals difficult to field verify; some did not match plans.
- ❖ Thermostat defaults often not set correctly

QUESTIONS?

THANK YOU!

Shaunna Mozingo

sdmozingo@shaunnamozingo.com