

# Common Plan Errors: Construction Perspective

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ALDOT Construction Bureau



# What do these have in common?





# What do these have in common?

- What a construction guy feels like
- Talking to designers about their errors
- But as Mr. Cooper said, somebody has to wear the black hat



# Overview

- Disclaimer
- Flashbacks to 2016 & 2017 Precon
- GDCP
- Common Plan Errors
- Letting Changes
- Impacts
- How do we improve



# Disclaimer

This is to discuss:

- Common plan errors
- Impacts to projects/funding

# Disclaimer

This is NOT to specify:

- Project/County
- Bureau/Region/Area
- Consultant

*I am not (intentionally) calling you out!*



# 2016 Precon Conference

## *Design Errors/Omissions Found in Field*

- H. O. C.
- 7 types of design reviews
- 958 design change orders in 15 years
- Examples
- Cost/Time impacts

# 2017 Precon Conference

## *Common Plan Errors: CN Perspective*

- Box Sheets  $\neq$  SOQ
- Using Inactive/Obsolete Pay Items
- Quantity calculations/errors
- Not using Material & Foundation Reports
- MSE Retaining Walls
- Aggregate Foundations



# GDCP

## *Guide for Developing Construction Plans*

- Revised March 19, 2018
- Step 95 – Construction
- No changes, but reminder needed

# GDCP

- Submittal 12 weeks before letting
- Need complete set; not still changing
- Need estimate with plans / review disposition
- Additional set if bridge
- Additional set if disturb > 20 acres
- RR Agreements, if applicable
- Utility Certificates, if applicable



# GDCP

- Sure everyone has seen this
- CN is full of
  - Schedules
  - Deadlines
  - OT
- Help us by
- Finishing plans
- To meet these

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# GDCP

- Unfinished and incomplete plans difficult to review
- Understand letting deadlines
- Should not compromise quality of plans because designer missed deadline
- Hurts us in field as you will see
- If trend continues, our only choice is return plans to designer until they are ready



# Common Plan Errors

## Top 10 List

1. Pecking Order
2. Project Notes
3. Standard Dwgs
4. Material Recommendations
5. Rushed plans
6. Earthwork
7. Pavement Preservation
8. RAP
9. TCP
10. Trooper vs Uniform Police Officers

# Common Plan Errors

## Pecking Order

- Subarticle 105.04(a) of Specs
  - Standard Specifications
  - Plans
  - Special Provisions
- Can't put Project Note to override a spec if there is a Special Provision



# Common Plan Errors

## Project Notes

- GFO 3-4
- Reminder to review different types
- Confusion on 200 vs 300 series
  - 200 = Typical sections
  - 300 = Summary of Quantities
  - Unless 200 requires subsidiary obligation of pay item

# Common Plan Errors

## Project Notes

- Don't repeat specs
  - Spec already outlines requirements
  - Use to clarify or to add restrictions
- Reference to wrong sheets
  - Double check, especially if you revise/delete sheets



# Common Plan Errors

## Standard Drawings

- Reference to wrong sheets
  - Double check, especially if you revise/delete sheets
- Special Project Details
  - If Standard Dwg has changed to a detail
  - Change reference in notes, box sheets, etc. to detail

# Common Plan Errors

## Material Recommendation (*Repeat 2017*)

- Materials Report
- Slope Study
- Foundation Report
- *Key investigations not making it to or not agreeing with plans*



# Common Plan Errors

## Material Recommendation (*Repeat 2017*)

- Undercutting unsuitable soil
- Culvert foundations
- Special project notes

*What is point if left out of plans?*

# Common Plan Errors

## Rushed Plans

- Incomplete
- Missing Sheets, such as bridge
- Bridge Sheets not signed
- Outdated info and items
- No Materials Report addendum
- RR and Utilities not final



# Common Plan Errors

## Rushed Plans

- Flashback to GDCP Step 95
- Remember, we need final plans
- If still changing,
  - Difficult to review
  - Assign Special Provisions
  - Determine Contract Time
  - Calculate DBE Goal

# Common Plan Errors

## Earthwork (*repeat 2017*)

- Cut & Fill volumes not on x-sections
- Unsuitable material not on x-sections
- No tabulations in EW Summary
- If grading is phased, need to phase qtys
  - Difference in stockpiling, borrow, or waste



# Common Plan Errors

## Earthwork (*repeat 2017*)

- Use this to determine:
  - Constructability
  - Accuracy of quantities
  - Borrow need
  - Disturbed Acreage after we do Mass Haul Diagram analysis
- So, don't add PNote for added acreage without direction from Construction

# Common Plan Errors

## Earthwork

- *GFO 3-11*
- For us, this is not a guideline
- **REQUIRED**, not optional



# Common Plan Errors

## Pavement Preservation Policy

- Mark Waits presentation yesterday
- Limitations on non-paving work
- Depends on scope of work (i.e. PM1, PM2, etc.)
- Lots of scope creep the last few years
- Means many overruns \$\$\$
- New review procedure between Mark & us

# Common Plan Errors

## Recycled Asphalt Pavement (RAP)

- GFO 4-4
- Area may retain 75 CY per project
- About 4 truckloads
- Location of stockpile must be noted
- Needs to be reasonable distance from job



# Common Plan Errors

## TCP

- Temporary vs post mounted warning signs
  - Inconsistency in details
  - Need better clarification

# Common Plan Errors

## TCP

- Lack of sign details
  - Industry feedback
  - Interstates at interchanges
- Dealing with
  - speed reduction
  - lane closures
  - other warning conditions



# Common Plan Errors

## TCP

- Changeable Message Signs
  - Started on Interstates
  - Then, on 4 lane divided
  - Now, seemingly every project including 2 lanes
  - Message is same as warning signs
  - If that is the case, you don't need them

# Common Plan Errors

## State Troopers vs Uniform Police Officers

- Troopers used via agreement with ALEA
- Normal use:
  - Rural interstates
  - 4-lane US and SR
- Can be in cities
- Due to agreement, ALDOT coordinates and schedules



# Common Plan Errors

## State Troopers vs Uniform Police Officers (UPO)

- UPO based on Section 745
- Normally for traffic control
- Like intersection work and traffic phase shifts
- Used more recently in cities in lieu of Troopers
- Hard to use them in rural areas
  - Most small towns and county sheriffs don't have staff

# Common Plan Errors

Of course, I would be remiss if I left out:

Quantities/Overruns/Design Errors-Omissions

- Overall, this one is getting worse
- CN Bureau created a chart/database
- Tracking all GFO 4-3 request
- Will establish a monthly/quarterly report to Design and Regions



# Common Plan Errors

Translation:

*"I am growing weary of approving overruns because the plans were not done right."*

-John Cooper,  
Transportation Director

FROM:

Skip Powe, PE

State Construction Engineer

RE:

Construction – Additional Work to Remove/Raise Cor  
Height Requirements from Cross Slope Corrections

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*I am growing weary of  
approving overruns  
because the plans were  
not done right.*



# Letting Changes

## GFO 3-5 Plan Revisions

- Instructions on flagged sheets
- Applies to both:
  - Prior to letting
  - Post letting



# GFO 3-5

### SUBJECT: PLAN REVISIONS

- 1) After all comments from the Construction Bureau and FHWA have been addressed, the plans shall be transmitted to the Bureau of Office Engineer a minimum of eight weeks in advance of the scheduled letting date (10 weeks for January).
- 2) After plans are submitted to the Bureau of Office Engineer, flagging will not be required prior to the letting authorization date (four weeks prior to the scheduled letting date). The full-size prints of each revised sheet during this phase shall be furnished to the Bureau of Office Engineer for inclusion in the plan assembly, and the originals of these sheets shall be replaced and discarded. **Note: If revisions are made after construction review and prior to or after the Bureau of Office Engineer submittal, the lead should make Construction Bureau aware of these changes as soon as possible to enable them to accurately determine if any changes need to be made to work time, required special provisions, DBE goals, etc.**
- 3) After the authorization date, the LEAD will contact the Bureau of Office Engineer, Plans & Proposals Section, prior to submitting any revisions. **All bureaus, regions, etc., involved with providing flagged revisions, shall contact the lead on the project to ensure proper coordination of the submittal and the correct flag number within a change. Any incomplete or incorrect submittals will be rejected for proper correction.**




# Letting Changes

## GFO 3-5 Plan Revisions

- Emphasis on #2

be replaced and discarded. Note: If revisions are made after construction review and prior to or after the Bureau of Office Engineer submittal, the lead should make Construction Bureau aware of these changes as soon as possible to enable them to accurately determine if any changes need to be made to work time, required special provisions, DBE goals, etc.



- Not being advised on “after”
- Impacts Contract Time and DBE Goal



# Letting Changes

- Number of changes after advertising is rising
- Many of them in last week
- Unfairly stretches OE
- Significantly affects bid
- When changes happen late with many sheets
  - bidders guess and guess HIGH!

# Letting Changes

<u>Year:</u>	<u>Changes</u>	<u>Jobs pulled</u>	<u>Lettings</u>
•2015:	146	17	12
•2016:	142	16	13
•2017:	172	26	11
•2018:	75	6	3, so far



# Letting Changes

<u>Year:</u>	<u>Changes</u>	<u>Avg</u>	<u>Pulled</u>	<u>Avg</u>
•2015:	146	12	17	1.4
•2016:	142	11	16	1.2
•2017:	172	16	26	2.4
•2018:	75	<u>25</u>	6	2.0

*Note: on track for 275 changes in 2018*

# Letting Changes

- Dangerous trend
- Indicative of plans not ready to let
  - Either reviews not thoroughly done
  - Hurried to meet letting schedule
  - *Both???*



# Letting Changes

Results are:

- Higher bids
- Cost overruns and change orders
- More field problems
- Construction delays and time extensions

# Letting Changes

Translates to:

H. O. C.



# Impacts

So, all this H.O.C. leads to:

(a) Change Orders

(b) Overruns

(c) Time Extensions

(d) Impact to the Traveling Public

*(e) All of the above*

# Impacts

- Problem discovered; how to fix
- Contractor delayed
- Fix figured; now to price it
- Then, negotiate
- Meanwhile, more delays
- Finalize price, which is 10-25% higher than bid



# Impacts

So,

- We pay more
- Project lasts longer
- Potential safety risks to Contractor, Inspector, and traveling public
  - Which includes you, your spouse, your children

# Impacts

2010 - 2017:

- 2081 Change Orders = \$94.1 Million
- 297 per year for \$13.4 million avg
- 3361 days of Time Extensions
- Equates to extra 19 years of Work Zone



# Impacts

## Major Overruns / Changes

≥ \$100,000 per GFO 4-3

Period	#	Total Costs	Avg.
April '16-Mar '17	17	\$9.6 million	\$561,000
April '17-Mar '18	41	\$13.3 million	\$323,000
	+141%	+38.5%	-42.4%

# Impacts' Disclaimer

- Don't cost a higher unit price
- Items already bid
- Prolong project life
- Affect budgets
- Which delays other project lettings



# Impacts

So, we spend approx. \$26 Million in change orders and major overruns

What about regular overruns?

# Impacts

## CAMMS Report (2017):

- Pay Item Overruns by % (382 Active Projects)
- $\geq 15\%$  - 403 pages  $\approx$  9600 items
- $\geq 50\%$  - 253 pages  $\approx$  6000 items
- $\geq 100\%$  - 173 pages  $\approx$  4000 items
- $\geq 500\%$  - 42 pages  $\approx$  1000 items
- $\geq 1000$  - 20 pages  $\approx$  500 items



# Impacts

- Pay Item Overruns by % (382 Active Projects)

• <u>%</u>	<u>2017 (pages/items)</u>	<u>2018</u>
• $\geq 15\%$	403 $\approx$ 9600	367 $\approx$ 9200
• $\geq 50\%$	253 $\approx$ 6000	229 $\approx$ 5700
• $\geq 100\%$	173 $\approx$ 4000	154 $\approx$ 3850
• $\geq 500\%$	42 $\approx$ 1000	36 $\approx$ 900
• $\geq 1000$	20 $\approx$ 500	25 $\approx$ 450

# Impacts

Seen some minor improvement,  
But still a lot of H. O. C.  
Makes planning projects difficult



How do we improve?

\$64,000 Question!!!

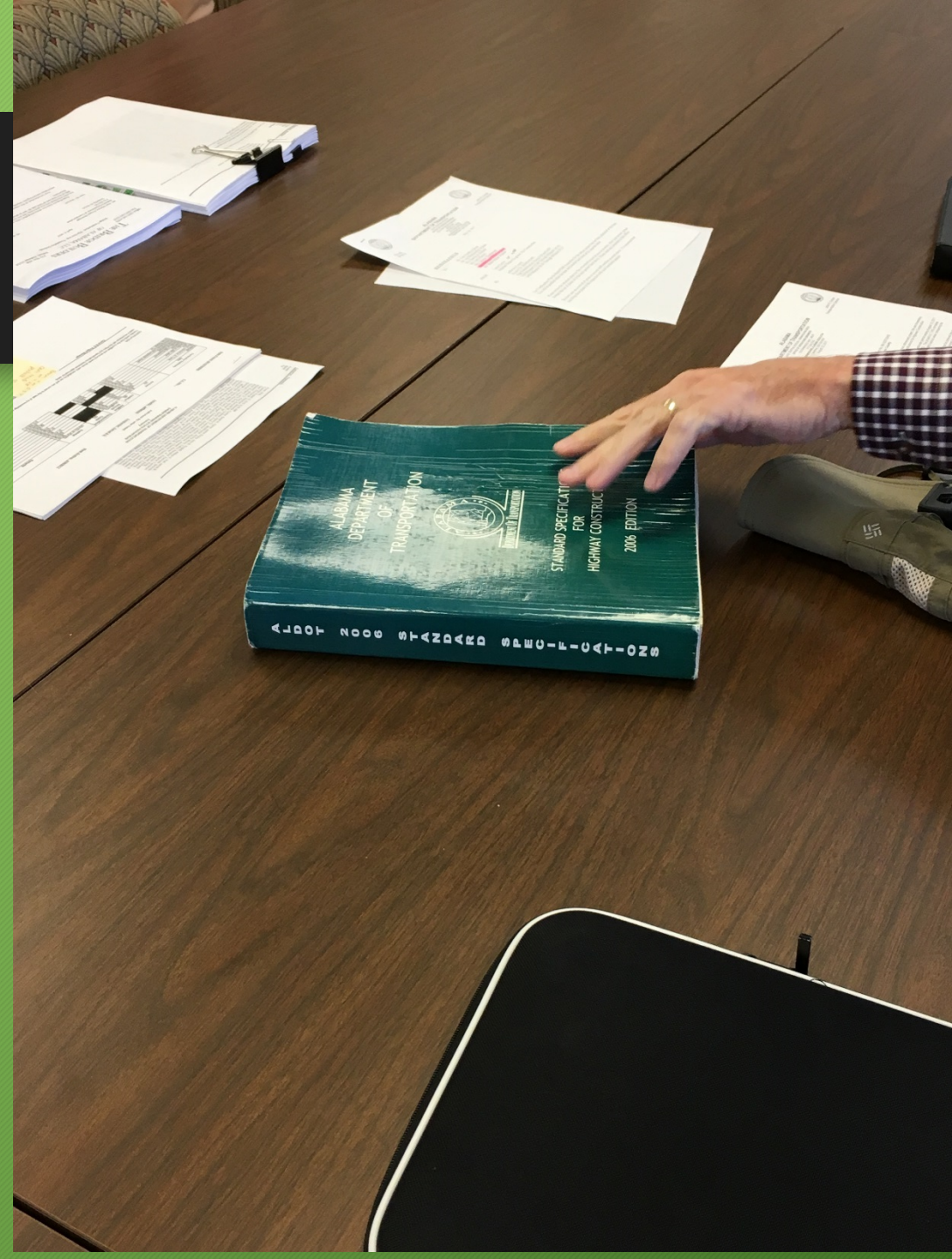
# How do we improve?

- Study Specifications
- Review GFOs
- Plan Reviews
- Prioritize plan development and emphasize deadlines
- Communication
- Post Construction Review update



# Specifications

- From a Fall 2017 meeting at an Area
- In Precon Conference Room
- That is the 2006 book
- Not the 2008 or 2012
- Is this what they are designing with???





# Specifications

## 2018 Standard Specifications

- Effective – January 2018
- Please read
- It is not just for Construction
- To design for CN, need to know what is required

ALABAMA  
DEPARTMENT OF TRANSPORTATION



STANDARD SPECIFICATIONS  
FOR HIGHWAY CONSTRUCTION

2018 EDITION



# GFOs

- Design, 3-series
- Currently, 75
- Covers many issues in plans
- Several are issues presented

# Plan Reviews

## At Region Level

- Plan-in-Hand
- PS&E
- Supplemental PS&E
- Of course, internal checks

## At Central Office

- Quality Control
- Construction
- Office Engineer

*Give them their proper focus*



# Prioritize Plan Development and Deadlines

- Remember this
- If your deadline is approaching
- Your plans are not done
- Then, work extra to finish
- Or move lettings

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# Communication

- Construction is developing performance measures to better track
  - Major Changes per GFO 4-3
  - Overruns
- And communicate that back to Design/Region
- Designers have to know what is going wrong/changing



# Post Construction Review Update

- Discussed at last 2 Precons
- FHWA Peer Exchange with Kentucky in October
- Learned from their process
- Will do our first soon on I-59 in Tuscaloosa
- Will use lessons learned to determine next steps
- Policy or GFO to define our process

Again, if Designers don't know the field problems, how will they change???

# In Closing

- Still struggling with variety of issues
- Need to focus on GDCP, specs, and GFOs
  - Build a foundation
- Plan Reviews have a purpose
- Emphasize deadlines and plan work to meet them
- Bad trend on changes for letting
- Keep Construction in loop on letting changes



# In Closing

- Impacts
  - Plan errors costs:
    1. Time
    2. Money
    3. More H.O.C.
- Future:
  - Performance measures
  - Better of communication
  - Post-construction reviews



Questions  
???

