

CHOOSY MOTHERS

CHOOSE  #1 CHOICE

SPEC WRITING 101

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Fundamental Concepts For  
Writing Effective  
Construction Specifications for  
Highway and Bridges



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# Spec Writing 101

## An Idea Long in the Making

- Many Requests for This
- Getting Started Can Be Tough
- Bits & Pieces Gathered from Many Sources
- Many Different Kinds of Specs
- Many Different Approaches
- Confusing Terminology
- Identifying/Applying Basics
- SO ... Here's a START



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April 24, 2008  
Take Your Daughters/Sons to Work Day  
Central Office - Tallahassee

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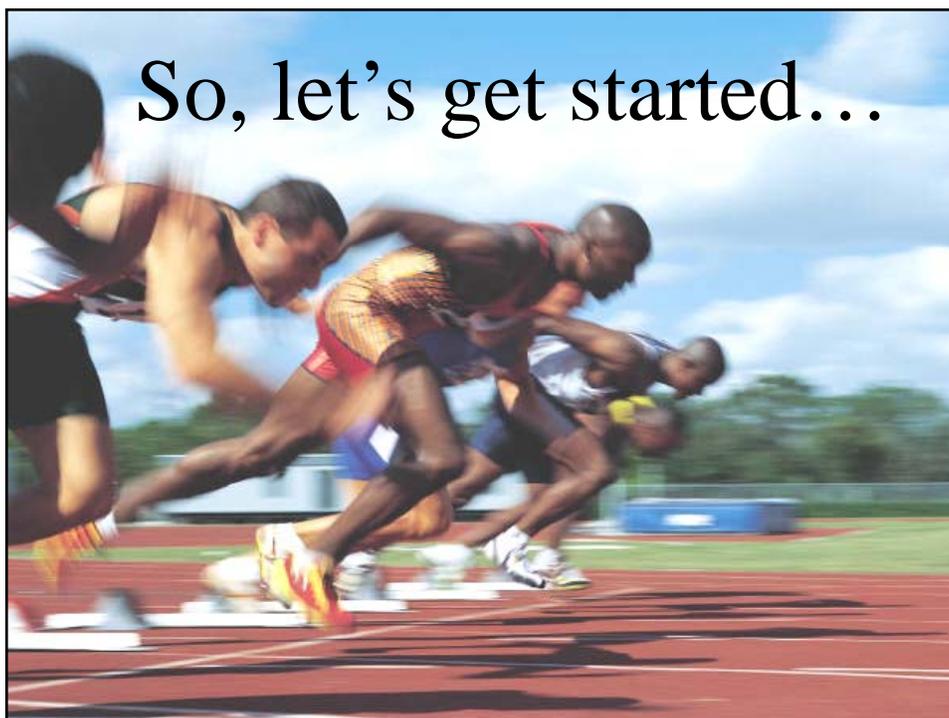
## Our Spec Writing Assignment



Write a Construction Specification for a  
Peanut Butter and Jelly Sandwich

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So, let's get started...



# Our Spec Writing Assignment

READY .....

SET .....

WHERE DO  
WE START?



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# The Restaurant Analogy

- What Do We Want?
- How Do We Order It?
- How Do We Know If We Got What We Ordered?
- What Happens If We Didn't Get What We Ordered?
- How Do We Pay For What We Got?



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## The Triple Constraint

Performance ..... “Good”

Time ..... “Fast”

Cost ..... “Cheap”

Can Get Any 2 Out of 3

Look for Flexibility in 3rd



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## Hammurabi's Code of Laws Babylon (1795 – 1750 B.C.)



If a builder build a house for some one, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death.

Liquidated Damages??

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## Hammurabi's Code of Laws Babylon (1795 – 1750 B.C.)



If it kill the son of the owner, the  
son of that builder shall be put  
to death.

Risk Management??

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## Hammurabi's Code of Laws Babylon (1795 – 1750 B.C.)



If it kill a slave of the owner,  
then he shall pay slave for slave  
to the owner of the house.

Asset Management??

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## Hammurabi's Code of Laws Babylon (1795 – 1750 B.C.)



If it ruins goods, he shall make compensation for all that has been ruined, and inasmuch as he did not construct properly this house which he built and it fell, he shall re-erect this house from his own means.

Liability Insurance??

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## Hammurabi's Code of Laws Babylon (1795 – 1750 B.C.)



If a builder build a house for some one, even though he has not yet completed it, if then the walls seem toppling, the builder must make the walls solid from his own means.

Final Acceptance??

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## AASHTO Specification Format

- Description
- Materials
- Construction Requirements
- Method of Measurement
- Basis of Payment



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## AASHTO Specification Format

### Description:

1. Think of this as “Scope of Work” or “Work Included”
2. Should be Short & Concise
3. Provide Relationships to Plans or Other Work Items
4. Do NOT Specify Scope in Detail (Redundant, Can be Dangerous, Lengthens the Spec)
5. Do NOT Duplicate or Elaborate on Plans
6. Do NOT Attempt Non-Specific Catch-alls, e.g., “The Contractor shall furnish and include everything necessary for the work whether shown or not”

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## Description

### 123-1 Description

Make and deliver peanut butter and jelly sandwiches in the quantities indicated in the Contract Documents.



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## AASHTO Specification Format

### Materials:

1. Prominently Provide Specific References to Other Specification Sections that Apply to the Work
2. Cross References Will Primarily be to Materials Sections (Division III)
3. Cross References May Also be to Other Construction Requirement Sections (Division II)
4. Where No Division III Specs Apply, May Include Full Applicable Material Requirements
5. Do NOT Repeat Plan Details or Other Specs

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## Materials

### 123-2 Materials

**123-2.1 Bread:** Use pre-packaged, pre-sliced bread of the following types: White, Wheat or Whole Grain.

**123-2.2 Peanut Butter:** Use pre-packaged, homogenized peanut butter of the following types: Creamy, Chunky or Extra Chunky. The Engineer will not accept All Natural varieties.

**123-2.3 Jelly:** Use pre-packaged jelly of the following types: Grape, Strawberry or Apple.



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## AASHTO Specification Format

### Construction Requirements:

1. The "How To" of Highway Specifications, Whether Prescriptive or End Result
2. The "Real Meat" of Any Division II Spec, (or in this case, the "Peanut Butter and Jelly")
3. Can Be as Simple as a Single Paragraph or as Complex as Many, Many Pages
4. May Include Sequence of Operations, End Product Desired, Required Testing (All Phases), Acceptance Criteria, QC/QA/Inspection Requirements

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## Construction Requirements

Ensure the area used to make the sandwich is clean. Place the bread on a paper towel or plate. Place and spread the peanut butter and jelly on the bread as shown in the plans using a spoon or dull knife. Do not mix the peanut butter and jelly together prior to placing and spreading on the bread. Do not use the same spoon or dull knife to place and spread the peanut butter and jelly. Cover the peanut butter and jelly with another slice of bread or fold the same slice of bread as shown in the plans. Do not mix bread types. Place all unused bread into package and seal. Tighten all lids on peanut butter and jelly jars. Remove all crumbs, excess peanut butter and jelly from the area used to make the sandwich. Deliver to project site whole and without damage, in sanitary containers.

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## AASHTO Specification Format

### Method of Measurement:

1. In Short, Must Provide a Clear Cut Method and Mechanism for Measurement of Pay Quantities
2. May Reflect Plan Quantity Method, if Applicable

### Basis of Payment:

1. Usually Begins with "Price and Payment will be Full Compensation for ....."
2. Provides Cross Reference to Pay Items

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## Method of Measurement

### 123-4 Method of Measurement

The quantity to be paid for will be per sandwich, completed, delivered, and accepted. The quantity to be paid for will be per sandwich, completed, delivered, and accepted.



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## Basis of Payment

### 123-5 Basis of Payment

Price and payment will be full compensation for all work to make and deliver a peanut butter and jelly sandwich including all cleaning products, paper towels, plates, spoons, dull knives, and other items used.

Payment will be made under:

Item No. 123- 1- Peanut Butter and Jelly Sandwich  
– per each



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## Passive Voice vs. Active Voice

- **Passive Voice:** The subject of a sentence receives the action. *"The concrete shall be placed by the contractor."*
- **Active Voice:** The subject of a sentence performs the action. *"The Contractor shall place the concrete."*
- **Active Voice – Imperative Mood:** The subject of a sentence is understood. *"Place the concrete."*



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## Passive Voice vs. Active Voice

### Division I (Sections 1-9)

General Requirements and  
Covenants ("Legalese",  
"Boiler Plate")

Contract Provisions

Written Primarily to ...

Lawyers ...

Contract Administrators ...

Courts (???)

**Passive Voice Works Best  
for Contract Purposes**



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## Passive Voice vs. Active Voice

### Division III (Sections 900-999)

Materials Specifications  
 Highly Technical Content  
 Written Primarily to ...  
 Scientists, Chemists ...  
 Laboratory Personnel ...  
 Testing Technicians



Passive Voice Works Best  
 for Materials, but Some  
 Active Voice May Appear

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## Active Voice – Focus on Div. II

### Division II (Sections 100-799)

General Construction Operations  
 The Bulk of Our Specs  
 “How To” Requirements  
 The Restaurant Analogy  
 Written Primarily to ...  
 Contractors, Foremen ...  
 Inspectors



Know Your Readers ...

Aim for Reading Level ????

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## Active Voice – Focus on Div. II

### Active Voice – Imperative Mood:

Specs are Written to the Contractor or Bidder; but NEVER to FDOT or the CEI

“Shall” is almost a Four Letter Word

Use of “the Engineer will” or “the Engineer may” is very acceptable when Contractor’s work or price “will or may” be affected by a potential action by the Department



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## Active Voice – Focus on Div. II

### Active Voice Language Must Be:

Clear – No Ambiguity

Correct – Technically Accurate

Concise – No Excess Verbiage

Precise – Easy to Enforce

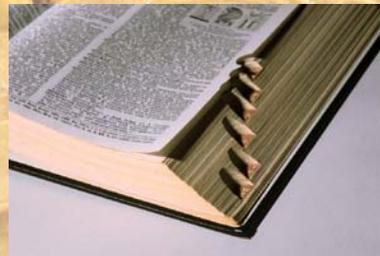
Quality Must Be Measurable

Simple Words

Short Sentences

Short Paragraphs

Aim for 8<sup>th</sup> Grade Reading Level



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## How Many Types of Specs??

### Materials & Methods Specifications:

Also called **method specs, recipe specs or prescriptive specs**, they direct the Contractor to use specified materials in definite proportions and specific types of equipment and methods to place the material. Each step is witnessed or inspected by the owner.

The owner should get exactly what he ordered.

Tends to obligate the owner to accept the completed work, regardless of quality.

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## How Many Types of Specs??

### End Result Specifications:

Specs that require the Contractor to take the entire responsibility for a product or item of work. The owner is obligated to accept or reject the work based only on the end result.

Sometimes include price adjustments related to degree of quality.

Contractor has great flexibility and can innovate.

The owner may get something very different from what he envisioned.

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## How Many Types of Specs??

### Statistically Based Specifications:

Also called ***statistical specs or statistically oriented specs***, they are based on random sampling in which properties of the desired product or construction are described in terms of appropriate, measurable statistical parameters.

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## How Many Types of Specs??

### Adjustable Payment Specifications:

Also called ***incentive-disincentive specs***, these specs make provisions for positive and/or negative pay adjustments which reflect changes in the worth of the product resulting from departures in the level of quality acceptance measurements.

Contractors normally work very hard to earn Incentives.

Example - FDOT pavement smoothness specs.

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## How Many Types of Specs??

### Performance Specifications:

Specs that describe how the finished product should perform over time, typically described in terms of physical condition of the product in relation to a definition of failure.

Warranty specs are a form of performance specs.

Developing measurable acceptance criteria truly indicative of long term performance is tough.

In my opinion, can be the hardest specs to write.

Must sometimes specify what is NOT acceptable.

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## How Many Types of Specs??

### Performance Modeled Specifications:

Specs based on attributes related to performance of the finished product through quantitative relationships, or models, that have been validated for specific materials and climactic conditions anticipated.

Heavily dependent on computer prediction model.

Inflexible for changes such as variability in available material sources.

Must be calibrated to differing conditions.

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## How Many Types of Specs??

### Performance Based Specifications:

Specs that describe desired levels of fundamental engineering properties (e.g., modulus, creep, fatigue) that are predictors of performance and appear in primary prediction performance relationships that can be modeled to predict performance over time.

For the most part, such properties are not amenable to timely acceptance testing.

These specs are very model dependent as well.

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## How Many Types of Specs??

### Performance Related Specifications:

Specs describe desired levels of materials and construction factors correlated to fundamental engineering properties (e.g., modulus, creep, fatigue) that are predictors of performance.

Aimed to field measure properties that are more amenable to timely acceptance testing.

Often tied to payment adjustments for individual parameters.

These specs are very model dependent as well.

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## Classifying Highway Construction Specs

Who is Primarily Responsible for Quality?

Method (Owner); End Result (Contractor)

What Type of Sampling?

100% Sampling; Representative (Statistics, Models, Predicted Performance)

What is Relationship Between Quality Criteria and Constructed Performance?

Method (Intuitive); End Result (Predicted Performance)

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## Method Specs vs. End Results

- Historically, FDOT Has Used Method Specs
- Contractor Quality Control (CQC) Specs Were a Move Toward End Results
- Warranty Specs Have Been an Additional Move in that Direction



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## Method Specs vs. End Results

### INTERPERTATION OF SPECERFERCATIONS

The PLANS AND SPECERFERCATIONS are to be takin tergether. Anythin showed on the plans and not mentioned in the specerfercations, and anythin mentioned in the specerfercations and not showed on the plans, is to be considered as both showed and specerfied: and anything wanted by the engeneer or any of his frends, or by anybody else (except the kontrakter) shall be pervided by the kontrakter without no expense to nobody but hisself.

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## Method Specs vs. End Results

If the work has been done without no expense to the kontrakter, the work shall be takin down and done over agin until the expense is satisfaktory to the engeneer.

Anything that is rite in the plans shall be considered rite; and anything that is rong in the plans shall be diskuvered by the kontrakter and shall be made rite without telling the engeneer or indercatin it in the bills.

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## Method Specs vs. End Results

Anything that is forgotten or left out of the plans or specifications but which is necessary for the conveyance of the owner, shall be provided without no extra expense to nobody except the contractor.

The engineer reserves the right to change his mind about what is best.

Any evidence of satisfaction on the part of the owner shall be considered just cause for withholding final payment.

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## Method Specs vs. End Results

- Use End Result Specs Whenever Possible
- Don't Try to Tell the Contractor "How" to Perform the Work
- Designers are Responsible for Specifying "What" is to be Built (Their Strength); Let the Contractors use their Knowledge and Resources to Decide "How" to Build It (Their Strength)

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## Checklist for End Result Specs

1. Can you adequately describe product or service performance?
2. Is the performance requirement objective or subjective?
3. Is the performance requirement measurable?
4. Can tolerances be applied to the performance requirement?
5. Is the value of performance quantifiable, for I/D clauses?
6. Are the factors contributing to performance within the control of the Contractor?
7. Clear performance measures? Who? When? Where? How?
8. Provisions for contractor quality management systems?
9. Are there provisions to resolve disputes clearly and concisely?
10. Method spec clauses removed to maximum practical extent?

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## Checklist for Eliminating Method Specs

1. Is it essential to safety?
2. Is it mandated by statutes, laws, ordinances or regulations?
3. Is it essential for convenience to the public?
4. Is providing the instruction essential to get the desired result?
5. Is it essential for quality assurance?
6. Is it essential for certification or permanent documentation?
7. Is the desired result measurable in the finished product?
8. Will elimination lead to much higher inspection & testing costs?
9. Is the ultimate desired result clear to the Contractor?
10. Is it required to match existing work or for a functional system interface?

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## Back to Our Spec Assignment



Write a Construction Specification for a  
Peanut Butter and Jelly Sandwich

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**In Case You Thought I Forgot ...**

CHOOSY MOTHERS

CHOOSE



***No Proprietary Products, Please!!!***

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THANKS!! QUESTIONS??



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