



Gordian/RSMMeans DOE 2023 CAIS Meeting

Joe Kelble, Principal Engineer (Gordian)



Data Operations

Research Team

- MLE Price Collection
- CCI, MP Research

Engineering Team

- MLE QA/QC
- Crews
- Task/Unit Cost
- Assemblies
- Square Foot Models

CTC Data Team

- Development of CTCs
- DMAP Enhancements

Cost Modeling Team

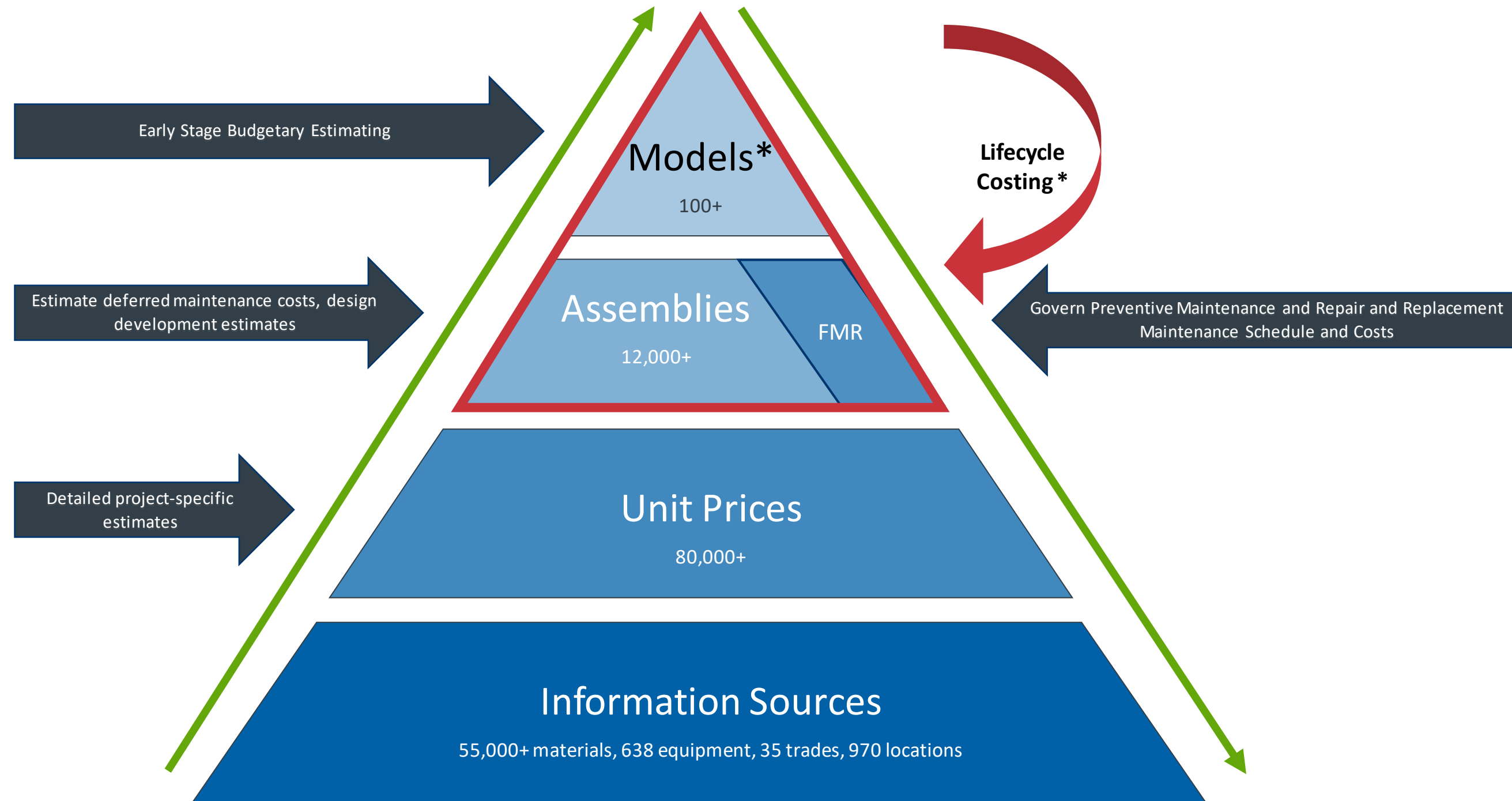
- Custom Modeling Projects
- Special Projects

Estimating Data

Construction Formats

- MasterFormat[®] 2022
 - The current industry-standard fifty divisional format for construction specifications
- UniFormat II (ASTM E-1557-9)
 - Originally set up by the General Services Administration and the American Institute of Architects
 - Utilized by RS Means to format assembly pricing

Review of RS Means Database Structure



Unit Prices

- All costs are based upon the Unit of Measure



Estimating Research Methodology



- Material Prices
- Annual Update
- Enhancements

- National Average

- Union Wages
- Davis – Bacon Prevailing Wages
- Local Requirements

- National Average

- Rental Equipment Costs

- National Average

Costs - Materials

- Average of all sources
- Includes:
 - Quantity sufficient for commercial construction project
 - Delivery to the job-site
 - Fasteners for a normal installation
- Does not include:
 - Sales tax

Costs - Labor

- Combination of wages and daily output
- Includes:
 - Union wages (30 major cities average)
 - Fringe benefits

Daily Output

- How many units of work the crew can install/perform in one eight-hour day
 - Based upon actual working conditions
 - Developed over an extended period to eliminate abnormal variations
- Includes time spent during a normal workday on tasks other than actual installation, such as.....

Costs - Equipment

- Combination of rental rate, hourly operating cost and daily output
- Includes:
 - Equipment rental, fuel, lubrication, maintenance
- Does not include:
 - Operator
 - Mobilization/demobilization

Costs – Including O&P

- Combination of bare costs plus burdens and mark-ups
- Includes:
 - Installing contractor's overhead and profit
- Does not include:
 - General Conditions
 - General Contractor's overhead and profit
 - Permits, Fees (architectural, engineering)

Types of Costs in RS Means Data

- **Direct Costs:**

- Materials
- Labor (Fringes)
- Equipment

- **Indirect Costs:**

- Workers Compensation
- FUTA, SUTA, FICA
- Insurances
- Office Overhead
- Profit

Office Overhead

- Owner
- Principals/Manager
- Estimator(s)
- Clerks/Administrators
- Bookkeeper
- Office (Rent and Utilities)
- Accountant Fees
- Legal Fees
- Medical & Workers' Compensation
- Advertising
- Auto/Truck Expenses
- Association Dues
- Training and Travel
- Entertainment
- Bad Debts

Markups

- Material + 10%
- Labor Direct Costs + Indirect Costs (50% or more)
- Equipment + 10%

Assemblies

- UniFormat II Organization Structure
- 8 Elements
 - A Substructure
 - B Shell
 - C Interiors
 - D Services
 - E Equipment & Furnishings
 - F Special Construction & Demolition
 - G Building Sitework
 - H Waterfront Structures

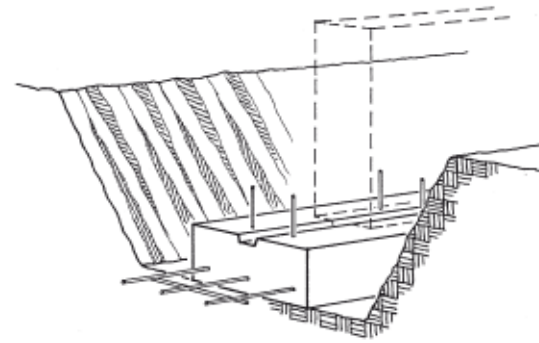
Assemblies

- Groups of Unit Cost Lines that make up major components of a structure
- Composed of:
 - Unit Cost Line
 - Quantity
- Based on a convenient unit of measure

Assemblies

A10 Foundations

A1010 Standard Foundations



The Strip Footing System includes: excavation; hand trim; all forms needed for footing placement; forms for 2" x 6" keyway (four uses); dowels; and 3,000 p.s.i. concrete.

The footing size required varies for different soils. Soil bearing capacities are listed for 3 KSF and 6 KSF. Depths of the system range from 8" and deeper. Widths range from 16" and wider. Smaller strip footings may not require reinforcement.

Please see the reference section for further design and cost information.

System Components	QUANTITY	UNIT	COST PER L.F.		
			MAT.	INST.	TOTAL
SYSTEM A1010 110 2500					
STRIP FOOTING, LOAD 5.1 KLF, SOIL CAP. 3 KSF, 24" WIDE X 12" DEEP, REINF.					
Trench excavation	.148	C.Y.		1.60	1.60
Hand trim	2.000	S.F.		2.40	2.40
Compacted backfill	.074	C.Y.		.33	.33
Formwork, 4 uses	2.000	S.F.	5.64	10.50	16.14
Keyway form, 4 uses	1.000	L.F.	.53	1.34	1.87
Reinforcing, fy = 60000 psi	3.000	Lb.	2.49	2.07	4.56
Dowels	2.000	Ea.	2.34	6.04	8.38
Concrete, f'c = 3000 psi	.074	C.Y.	12.95		12.95
Place concrete, direct chute	.074	C.Y.		2.11	2.11
Screed finish	2.000	S.F.		.90	.90
TOTAL			23.95	27.29	51.24

Assemblies

- Included:
 - All burdens and mark-ups
 - Items selected by RS Means engineers
 - Quantities selected by RS Means engineers
- Not included:
 - General Conditions
 - General Contractor's Overhead and Profit

Models

- UNIFORMAT II Organization Structure
- Groups of Assemblies
 - Components of the specific building type
 - Quantified by mathematical algorithms
- Included:
 - All costs and all mark-ups except Sitework
- Not Included For DOE:
 - Contingencies
 - Architectural Fees
 - Engineering Fees
 - Contractor Fees

Models

- What does E and N reference in the Model Description
 - E (DOE E01) are called Existing Models and are based on RSMMeans Standard Commercial Models
 - N (DOE N01) are New Models developed specifically for DOE
- Based on the DOE /FIMS Usage Codes
- Prior to 2015 – 76 Building Models
- 2018 to 2023 – 365 Building Models

Model Scaling

Exterior Wall Type and Structural System	SF Area	500	2500	5000	8000	12500	15000	18500	21000	25000
Brick Veneer/CMU	\$ Per SF	\$638.00	\$276.00	\$219.00	\$186.00	\$166.00	\$158.00	\$152.50	\$149.00	\$145.50
Precast Concrete Panel	\$ Per SF	\$439.00	\$228.00	\$195.00	\$176.00	\$164.50	\$160.50	\$157.00	\$151.50	\$147.50

City Cost Index / Area Cost Factor

- Geographical Adjustment Factor
- The City Cost Index is a measurement of the differences in the cost of construction in a specific location as measured from a baseline (National Average)
- The City Cost Index contains the average construction cost for 731 U.S. and Canadian cities covering over 930 three-digit zip code locations
- The baseline does not change during a **given year**; it is based on January 1st.

City Cost Index / Area Cost Factor

- The index is based on the material and installation cost from the 30 major city average
- Exceptions:
 - An example would be Lawrence Livermore Labs. The three-digit zip code is based in Oakland. However, for Livermore, we use San Jose which is economically equivalent to Livermore

City Cost Index

STATE/ZIP	CITY	MAT.	INST.	TOTAL
CALIFORNIA (CONT'D)				
951	San Jose	102.2	153.9	121.3
952	Stockton	100.5	131.6	111.9
953	Modesto	100.3	130.8	111.5
954	Santa Rosa	100.0	145.9	116.9
955	Eureka	101.7	134.0	113.6
959	Marysville	101.1	131.6	112.3
960	Redding	103.9	131.4	114.0
961	Susanville	102.0	132.1	113.1
COLORADO				
800-802	Denver	102.2	75.1	92.3
803	Boulder	94.9	76.0	87.9
804	Golden	96.4	71.2	87.1
805	Fort Collins	98.5	73.7	89.4
806	Greeley	96.4	73.7	88.0

Factors, Adders, and Modifiers

- Factors, Adders, and Modifiers are adjustments added to the cost for particular job requirements
 - Job Conditions
 - Security
 - Precautions

Factors, Adders and Modifiers

01 21 53.50 Factors

0010	FACTORS Cost adjustments	R012153-10						
0100	Add to construction costs for particular job requirements							
0500	Cut & patch to match existing construction, add, minimum			Costs		2%	3%	
0550	Maximum					5%	9%	
0800	Dust protection, add, minimum					1%	2%	
0850	Maximum					4%	11%	
1100	Equipment usage curtailment, add, minimum					1%	1%	
1150	Maximum					3%	10%	
1400	Material handling & storage limitation, add, minimum					1%	1%	
1450	Maximum					6%	7%	
1700	Protection of existing work, add, minimum					2%	2%	

Factors, Addders and Modifiers

22 01 02.20 Labor Adjustment Factors

0010	LABOR ADJUSTMENT FACTORS (For Div. 21, 22 and 23)	R220102-20						
0100	Labor factors: The below are reasonable suggestions, but							
0110	each project must be evaluated for its own peculiarities, and							
0120	the adjustments be increased or decreased depending on the							
0130	severity of the special conditions.							
1000	Add to labor for elevated installation (Above floor level)							
1080	10' to 14.5' high	R221113-70					10%	
1100	15' to 19.5' high						20%	
1120	20' to 24.5' high						25%	
1140	25' to 29.5' high						35%	
1160	30' to 34.5' high						40%	
1180	35' to 39.5' high						50%	
1200	40' and higher						55%	
2000	Add to labor for crawl space							
2100	3' high						40%	
2140	4' high						30%	

RPV Factor

- Security
- Infectious Disease Precautions
- Job Site Factors
- Job Conditions including:
 - Economic Conditions
 - Hoisting conditions
 - General Contractor Management
 - Labor Availability
 - Material Storage
 - Subcontractor Availability
 - Workspace

QA/QC

- Core Data research is built in an agile data workflow, with dedicated QA/QC throughout the research cycle. Material, labor, and equipment prices are validated at the point of entry into our research database by experienced engineers.
- After the data is input, machine learning models and statistical algorithms are used to identify outliers and anomalies, which are returned to the senior engineers and managers for validation.
 - No research prices that are flagged are used in our final database without validation from a qualified cost engineer
- Tasks (unit costs) and Assemblies receive a further set of QA/QC at the point of release, where engineers review all published cost exceptions (variance over time) and all cost progressions (trending relationships with similar costs).
Included in the point of release QA/QC is a review of UOM changes and supplier changes since the last release
- After the database is deployed to customers, our engineering team monitors a feedback loop that flows through our professional services team, our retail CS/CS team, and our sales team. If defects are uncovered, these are delivered to an internal change control board and assigned to our engineers with the greatest experience in that division to fix

QA/QC

- Core data research is built in an Agile data workflow, with dedicated QA/QC throughout the research cycle.
 - Material, labor and equipment input prices are validated at the point of entry into our research databases by experienced engineers.
- Once the data is input, machine learning models and statistical algorithms are used to identify outliers and anomalies, which are returned to senior engineers for validation.
 - No flagged research prices are used in our final database without validation from a qualified cost engineer.
- Tasks (unit costs) and Assemblies receive additional QA/QC at the point of release, where engineers review all published cost exceptions (variance over time) and all cost progressions (trending relationships with similar costs). Also included is a review of UoM changes and supplier changes since the last release.
- Once a dataset is deployed to customers, our engineering team monitors a feedback loop that flows through our professional services team, our retail CS/CX team, and our sales teams.
 - If defects are uncovered, these are delivered to an internal change control board and assigned to experienced divisional engineers to review and correct an issue.

Feedback Loop

- Regional Trends
 - Labor Availability
 - Material Shortage
- Need for additional material selections
 - The database has a line 2" and 4" black iron pipe, I need a 2-1/2"
- Questions on pricing
 - Low
 - High
 - Progression
- Questions on what is included or not in a task (unit cost) or assembly

Questions?



THANK YOU!!!