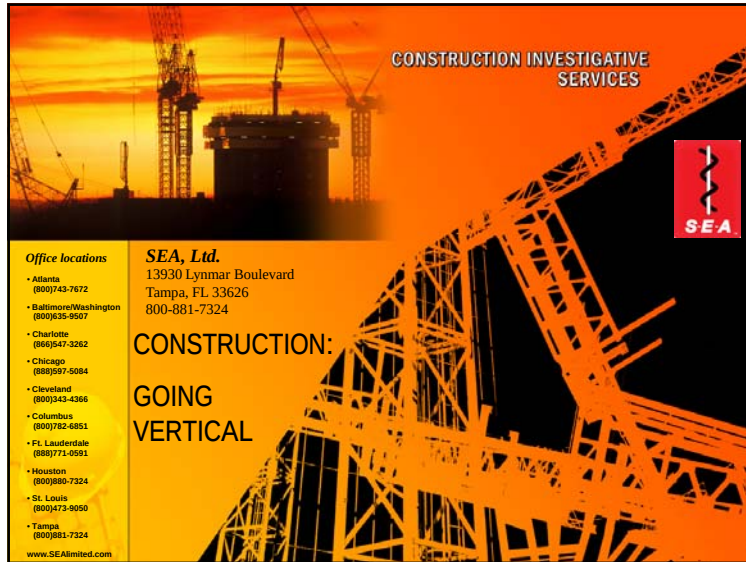




CONSTRUCTION INVESTIGATIVE SERVICES

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- Baltimore/Washington (800)635-9507
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- Chicago (888)597-5084
- Cleveland (800)343-4366
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- Houston (800)880-7324
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Construction Management

- Work Product
- Risks
- Expectations

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Overview of Permits:

Demolition
Grading
Building
Certificate of Occupancy

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Overview of Inspections:



Underground
Rough-In Trades
Special Inspections
Finish Trades
Final



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Introductory Material



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Planning Phase

“Gettin’ Ready to Get Ready”



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Planning Process Group

- Project Management Plan
- Scope
- Work Breakdown Structure
- Define and Sequence Activities
- Estimate Activity Resources / Duration
- Schedule Development
- Cost Estimating and Budgeting (Cash Flow)
- Risk Mitigation Plan



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Contractual Relationships

- Design ==> Bid ==> Build
- Design/Build
- Independent Construction Manager



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Value Engineering

- Portfolio Construction
- Construction for Re-sale
- Occupancy Classification



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Scheduling

- Activities vs. Milestones
- Critical Path
- Gantt Chart



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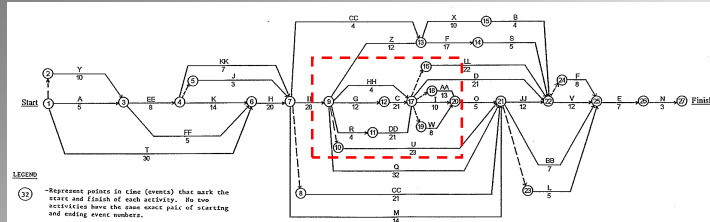
Activity List

Activity	Network Symbol	Activity	Network Symbol
Award of Contract Procedures	A	Final Inspection	N
Bituminous Paving	B	Finish Flooring & Moulding	O
Block Masonry	C	Hardware & Fixtures	P
Ceiling Installation	D	Heating Ventilating & Air Conditioning Installation	Q
Clean-Up	E	Insulation	R
Concrete - Curb & Walks	F	Landscaping	S
Concrete - Floor Slabs	G	Materials - Ordered & Delivered	T
Concrete - Grade Beams, Pops & Elev Pits	H	Mechanical - Elevator	U
Concrete - Precast Panel Installation	I	Painting	V
Earthwork - Backfill	J	Partition & Drywall Installation	W
Earthwork - Excavation	K	Paving, Subgrade & Base Course	X
Electrical - Finish	L	Permit (application Time)	Y
Electrical - Rough-in	M		



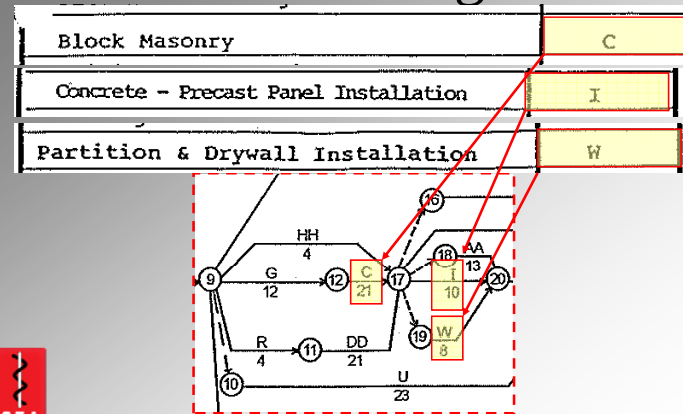
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Network Diagram



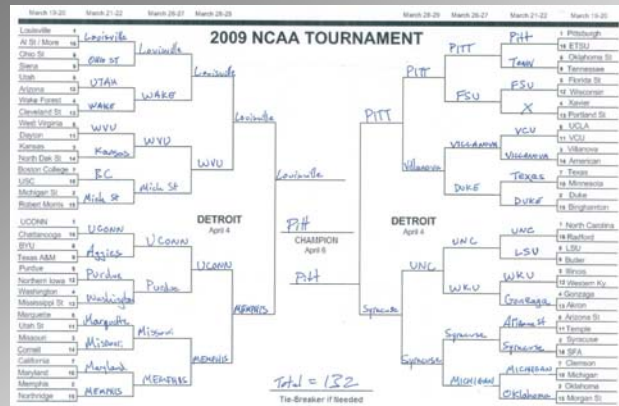
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Network Diagram



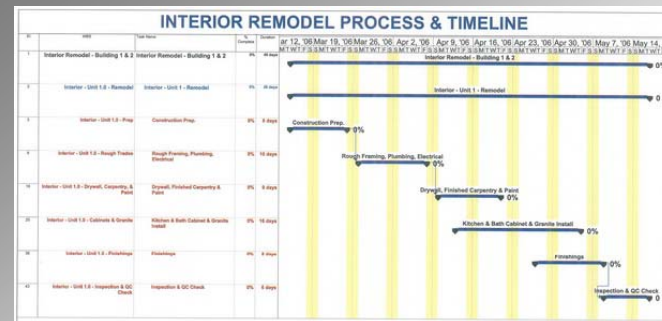
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Gantt Chart



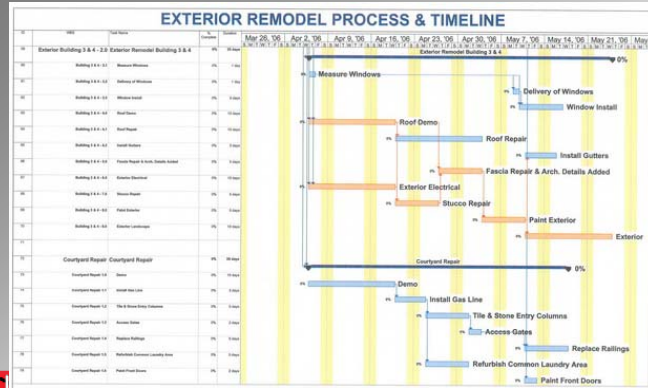
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Gantt Chart



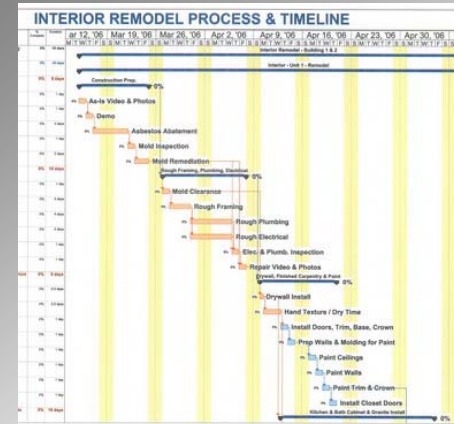
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Scheduling

- Resource Allocation
 - Manpower/Tools/Machinery
- Time
- Money
- Fund Control

Cash **FLOW** is King.



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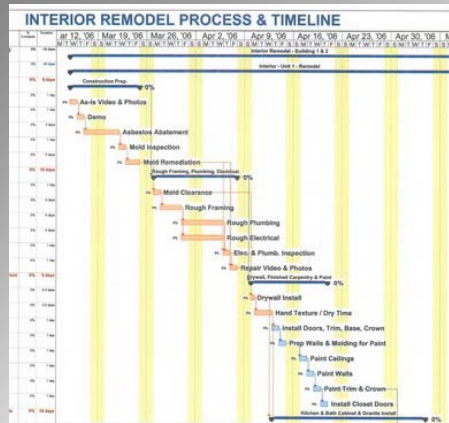
Cost Appropriation

- Manpower/Resource Leveling
 - Highly Skilled (\$\$\$ = less time)
 - Skilled (\$) = more time)
- Schedule Compression
 - Crashing
 - Fast Tracking



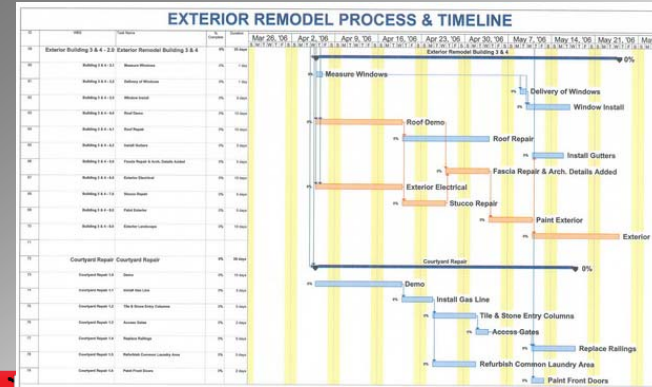
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Gantt Chart



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Risk Mitigation

- Increased probability of errors.
- Cost of potential errors must be weighed against potential cost/time savings.
- What is the cost of preventing higher probability of errors?



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Let's Go Vertical



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Building Materials

- Natural Wood
- Engineered Wood
- Masonry
- Concrete
- Steel Framing
- Light Gauge Metal Framing
- Composites/Chemicals



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Construction Sequence



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Good Project Management Makes Everyone Happy



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Demolition



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Grading



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Foundations: Form Footings



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Underground: Inspection

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	UNDERGROUND INSPECTIONS	
	TYPE	DATE
PLUMBING	BUILDING DRAINS	*
	WATER PIPING	*
	WATER SERVICE PIPING	*
	BUILDING SEWER	*
	SEWER CONNECTION	
MECHANICAL	REFRIGERANT PIPING	
	BRINE/HOT WATER PIPING	
	DUCTS/PLENUMS	

ELECTRICAL	CONDUITS AND/OR CABLE	
	GROUNDING AND/OR BONDING	
	FLOOR DUCTS/RACEWAYS	
	SERVICE CONDUIT	*
	TEMPORARY TOWERPOLE	
BUILDING	LOCATION, SET-BACKS, EASEMENTS	*
	SOILS REPORT REQUIREMENTS	*
	FOOTINGS & REINFORCING	*
	FLOOR SLAB	*
	FOUND WALLS	
	GRADE BEAMS	
	PILES	



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Foundations: Retaining Walls



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Install Structural Reinforcing



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Special: Inspection

- Reinforcing/Cage Inspection
- Structural Steel
 - Field Welds
 - Tension bolts
- High Strength Concrete
 - Slump tests
 - Cylinder breaks



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Foundations: Install Utilities



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Foundations: Inspection

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UNDERGROUND INSPECTIONS		CONDUITS AND/OR CABLE	
TYPE	DATE		
BUILDING DRAINS	*	GROUNDING AND/OR BONDING	
WATER PIPING	*	FLOOR DUCTS	
WATER SERVICE PIPING	*	RACEWAYS	
BUILDING SEWER	*	SERVICE CONDUIT	*
SEWER CONNECTION		TEMPORARY POWERPOLE	
REFRIGERANT PIPING		LOCATION, SET-BACKS, EASEMENTS	*
BRINE/HOT WATER PIPING		SOILS REPORT REQUIREMENTS	*
DUCTS/PLENUMS		FOOTINGS & REINFORCING	*
		FLOOR SLAB	*
		FIND WALLS	
		GRADE BEAMS	
		PILES	



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Pour Slab



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Pour Piers



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Install Shoring



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Install Top Slab Reinforcing and Utilities



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A diagram of a vertical pile foundation. The pile is shown in cross-section, with a central core and an outer shell. The core is labeled 'A' and the shell is labeled 'B'. The pile is shown driving into the ground, with the ground surface labeled 'C'. The pile is shown with a pile cap labeled 'D' and a pile head labeled 'E'.



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- Architect?
- General Contractor?
- Special Inspector?
- Concrete Subcontractor?
- Structural Steel Subcontractor?



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UNDERGROUND INSPECTIONS		CONDUITS AND/OR CABLE	
TYPE		DATE	
PLUMBING	BUILDING DRAINS	*	
	WATER PIPING	*	
	WATER SERVICE PIPING	*	
	BUILDING SEWER	*	
	SEWER CONNECTION		
MECHANICAL	REFRIGERANT PIPING		
	BRINE/HOT WATER PIPING		
	DUCTS/SPLINUMS		
ELECTRICAL	GROUNDING AND/OR BONDING		
	FLOOR DUCTS RACEWAYS		
	SERVICE CONDUIT	*	
	TEMPORARY "POWERPOLE"		
BUILDING	LOCATION, SET-BACKS, EASEMENTS	*	
	SOILS REPORT REQUIREMENTS	*	
	FOOTINGS & REINFORCING	*	
	FLOOR SLAB	*	
	FINISH WALLS		
	GRADE BEAMS		
	PILES		



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- Rough Framing
- Rough Plumbing
- Rough Electrical
- Rough Mechanical
- Utilities



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Rough Framing

- 1st Floor Walls/Sheathing
- 2nd Floor Framing/Sheathing
- 2nd Floor Walls/Sheathing
- 3rd Floor Framing/Sheathing
- Etc., etc., etc.
- Roof Framing/Sheathing



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1st Floor Walls/Sheathing



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2nd Floor Framing/Sheathing



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2nd Floor Framing/Sheathing



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2nd Floor Walls/Sheathing



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3rd Floor Framing/Sheathing



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Roof Framing/Sheathing



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Roof Framing/Sheathing



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Rough Framing: Inspection

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EXTERIOR WALL CONSTRUCTION	*	ROOF COVERING	*
GLULAM BEAMS PRIOR TO ERECT'N		ROOF DRAINAGE	*
INSULATION ☐ THERMAL ☐ NOISE		EXTERIOR LATH	*
INTERIOR WALL CONSTRUCTION	*	☐ INTERIOR LATH ☐ WALL BOARD	*
COLUMNS & SUPPORTS		AREA SEPARATION WALLS	
FLOOR SYSTEM(S)		FIREPLACE CHIMNEY	
ROOF SYSTEM	*	SPECIAL INSPECTOR REPORTS REC'D	

* INDICATES THOSE INSPECTIONS NORMALLY REQ'D FOR A DWELLING



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Water Proofing: Building Wrap



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Waterproofing: Peel and Stick



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Waterproofing: Roof Finish/Windows/Doors



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Communication



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Coordination of Trades



- Responsibility of Inspection
- Compatibility of Work Product



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Rough Plumbing



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ROUGH-IN INSPECTIONS					
TYPE	DATE	BY	TYPE	DATE	BY
DRAINAGE, WASTE & VENT PIPING	*		INTERCEPTOR OR GREASE TRAP		
WATER PIPING	*		INDIRECT WASTE/ CONDENSATE LINES		
LOW PRESSURE GAS PIPING	*		WATER SOFTENER		
TUB AND/OR SHOWER TEST	*		PRIVATE SEWAGE DISPOSAL SYSTEM		
MEDIUM PRESSURE GAS PIPING					



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Rough Mechanical



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REFRIGERANT PIPING		CHIMNEY(S)	
BRINE/HOT WATER PIPING		FIRE DAMPERS	
DUCTS/PLENUMS	*	☐ RADIANT HTR(S) ☐ UNIT HTR(S)	
DUCT INSULATION	*	☐ DUCT FURNACE(S) ☐ POOL HEATER	
COMBUSTION PRODUCTS VENTS	*	VENTILATION ☐ SUPPLY ☐ EXHST	



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Fire/Life Safety



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Fire/Life Safety



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Fire Life Safety: Inspection

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GLU-LAM BEAMS PRIOR TO ERECT'N		ROOF DRAINAGE	*
INSULATION ☐ THERMAL ☐ NOISE		EXTERIOR LATH	*
INTERIOR WALL CONSTRUCTION	*	☐ INTERIOR LATH ☐ WALL BOARD	*
COLUMNS & SUPPORTS		AREA SEPARATION WALLS	
FLOOR SYSTEM(S)		FIREPLACE CHIMNEY	
ROOF SYSTEM	*	SPECIAL INSPECTOR REPORTS REC'D	

* INDICATES THOSE INSPECTIONS NORMALLY REQ'D FOR A DWELLING



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Rough Electrical



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Rough Electrical



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CONDUITS/CABLES		☐ RANGE	
		☐ DRYER	
ROUGH WIRING	*	☐ GENERATOR(S)	
		☐ MOTORS	
SERVICE PANEL	*	☐ WATER HEATER	
SWITCHBOARD		☐ WELDER	
BUSWAYS		☐ HEATERS	
DUCTS		☐ HEAT CABLE	
SUBPANELS		☐ DUCT HEATER(S)	
		☐ FURNACE(S)	



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Rough Framing Inspection Prep



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Rough Building: Inspection

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EXTERIOR WALL CONSTRUCTION	*	ROOF COVERING	*
GLU-LAM BEAMS PRIOR TO ERECT'N		ROOF DRAINAGE	
INSULATION ☐ THERMAL ☐ NOISE		EXTERIOR LATH	*
INTERIOR WALL CONSTRUCTION	*	☐ INTERIOR LATH ☐ WALL BOARD	*
COLUMNS & SUPPORTS		AREA SEPARATION WALLS	
FLOOR SYSTEM(S)		FIREPLACE CHIMNEY	
ROOF SYSTEM	*	SPECIAL INSPECTOR REPORTS REC'D	

* INDICATES THOSE INSPECTIONS NORMALLY REQ'D FOR A DWELLING



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Insulation



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Sound Mitigation



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Sound Mitigation



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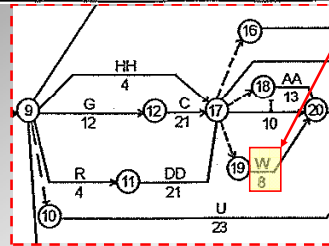
Ready for Drywall



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Network Diagram

Block Masonry	C
Concrete - Precast Panel Installation	I
Partition & Drywall Installation	W



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Drywall Install



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Crown/Base/Trim

Interior Doors



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Paint



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Cabinet Install



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Granite Install



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Interior Finish Trades

- Plumbing Fixtures
- Door Fixtures
- Electrical Fixtures
- Mechanical Fixtures
- Appliance Installation



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Exterior Finish Trades

- Siding/Stucco



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Exterior Finish Trades

- Siding/Stucco



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Exterior Finish Trades

- Balcony Landings/Railings



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Exterior Finish Trades

- Balcony Landings/Railings



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Exterior Finish Trades

- Balcony Landings/Railings



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Exterior Finish Trades

- Landscape



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Exterior Finish Trades

- Parking



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Exterior Finish Trades

- Parking



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Exterior Finish Trades

- Electrical Fixtures
- Mechanical Fixtures
- Paint
- Mailboxes
- Common Areas



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Activation

- Electrical Meters
- Gas Service
- Cable and Telephone
- Municipal Services



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Internal Quality Control “Punchout”



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Final Inspection: Plumbing

INSPECTION RECORD

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FINAL INSPECTIONS		
TYPE	DATE	BY
PRESSURE REGULATOR	*	
BACKFLOW PREVENTION		
WATER HEATER	*	
GAS METER CLEARANCE		
FINAL APPROVAL	*	
GREASE EXHAUST		



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Final Inspection: Mechanical

INSPECTION RECORD

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GREASE EXHAUST SYSTEM		
AIR CONDITIONING UNIT(S)		
REFRIGERATION EQUIPMENT		
FURNACE(S)	*	
FINAL APPROVAL	*	



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Final Inspection: Electrical

INSPECTION RECORD

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TEMP. SERVICE		
TEMP. LIGHTING		
FIXTURES		
LAMP HOLDERS		
SIGNS		
ELECTRIC METER CLEARANCE		
FINAL APPROVAL	*	



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Final Inspection: Building

INSPECTION RECORD

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INSUL./CONST. CERT. RECEIVED	*	
PAVING		
PLANNING DEPT. APPROVAL		
PUBLIC WORKS DEPT. APPROVAL		
FIRE DEPT. APPROVAL		
FINAL APPROVAL BLDG. DEPT.	*	
CERTIFICATE OF OCCUPANCY ISSUED		



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Certificate of Occupancy



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Project Close-out

- Retainage
- Lien Releases
- As-Builts
- Warranty Documents
- Certifications



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5 Phases of Construction

1. Initial Excitement
2. Reality
3. Disenchantment
4. Blame the guilty
5. Blame the innocent



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Construction Management

- Work Product
- Risks
- Expectations



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QUESTIONS

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