

تحت رعاية صاحب السمو الملكي الأمير خالد الفيصل
مستشار خادم الحرمين الشريفين، أمير منطقة مكة المكرمة



المؤتمر الدولي الثاني والعشرون لإدارة الأصول والمرافق
The 22nd International Conference on Asset, Facilities & Maintenance
Management Conference

رقمنة - تميز - استدامة

أساسيات رقمنة منهجية تكاليف دورة حياة المشروع
تقديم الدكتور / عصام بن علي قباني

26-28 يناير 2025
فندق ريتز كارلتون جدة - المملكة العربية السعودية

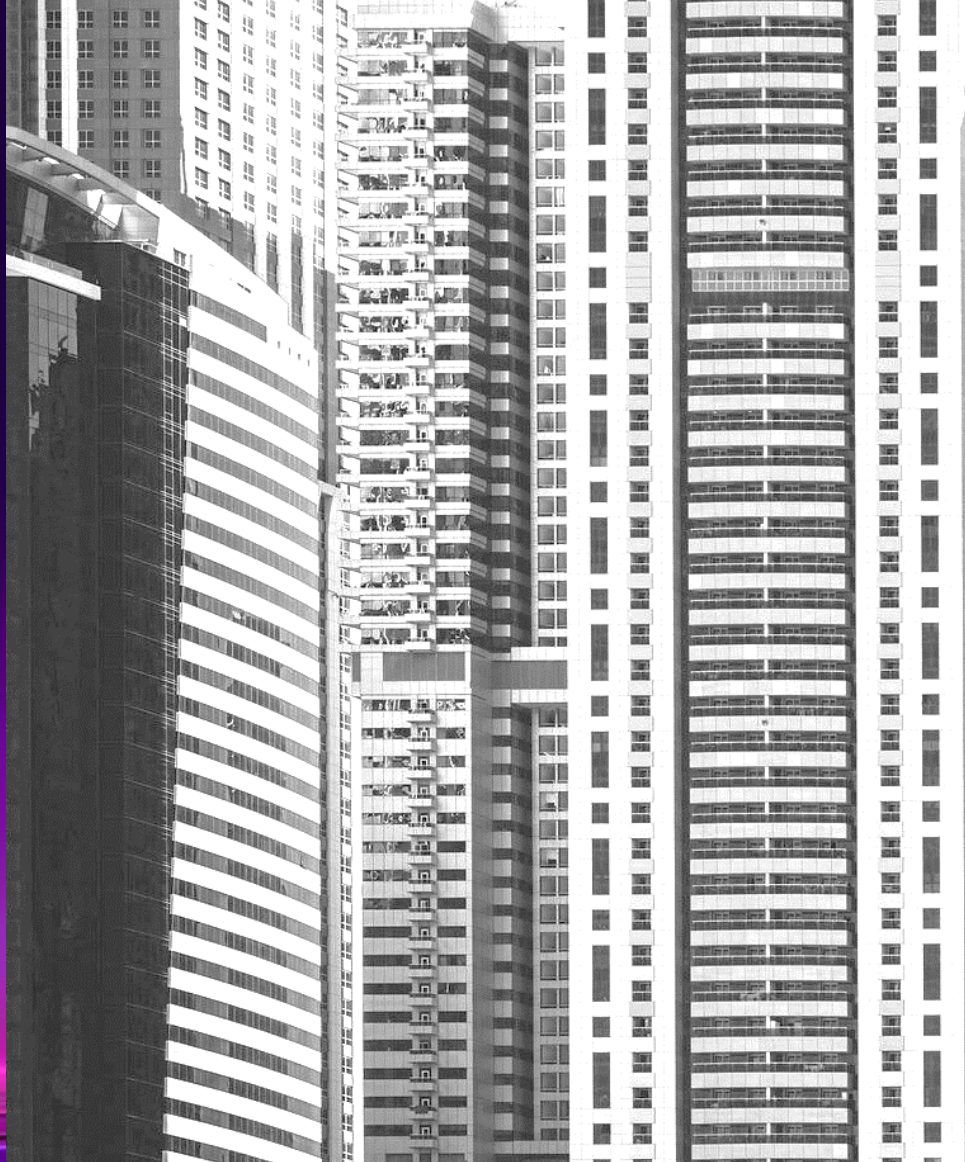
تنظيم

مبادرة من

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Arab Asset, Facility and Maintenance Management Council

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عناصر ورشة العمل:

- مقدمة
- عناصر التكاليف
- إقتصاديات التكاليف
- منهجية ومبادئ ترميز ورقمنة تكاليف دورة حياة المشروع
- النظام المساند لتحليل دورة حياة المشروع

“ المنشآت / المرافق ليست مقصودة لذاتها وإنما
بما تحققة من الأداء الوظيفي ”



ما مدى رضانا عن هذه المنشآت والمرافق

أ- هل تحقق الغاية التي بنيت من أجلها ؟

ب- هل نحن قادرين على تحمل تبعه امتلاكنا لهذه المنشآت؟

ج- على أي أساس تم تشييدها بوضعها الحالي ؟



المنشآت والمرافق ليست صورة ثابتة وجامدة كما تتصورها بل هي تمر بمرادف مختلفة مثل الكائن الحي

مرادف دورة حياة المشروع

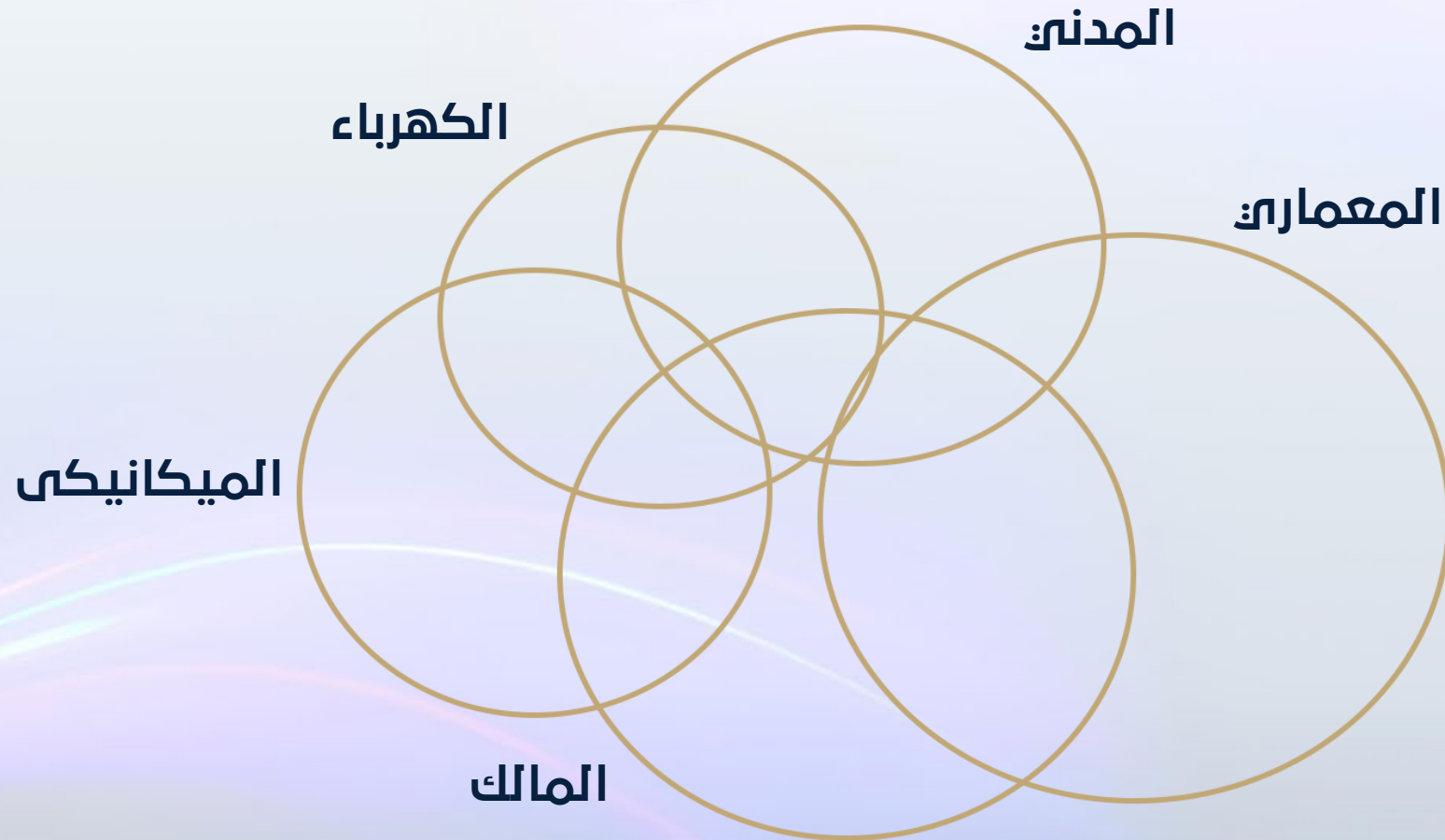
➤ مرحلة التطوير ← نشأة فكرة المشروع تعتبر أهم مرحلة من دورة حياة المشروع , فمن هذه المرحلة تصاغ معالم المشروع والتي تؤثر على باقي المراحل.



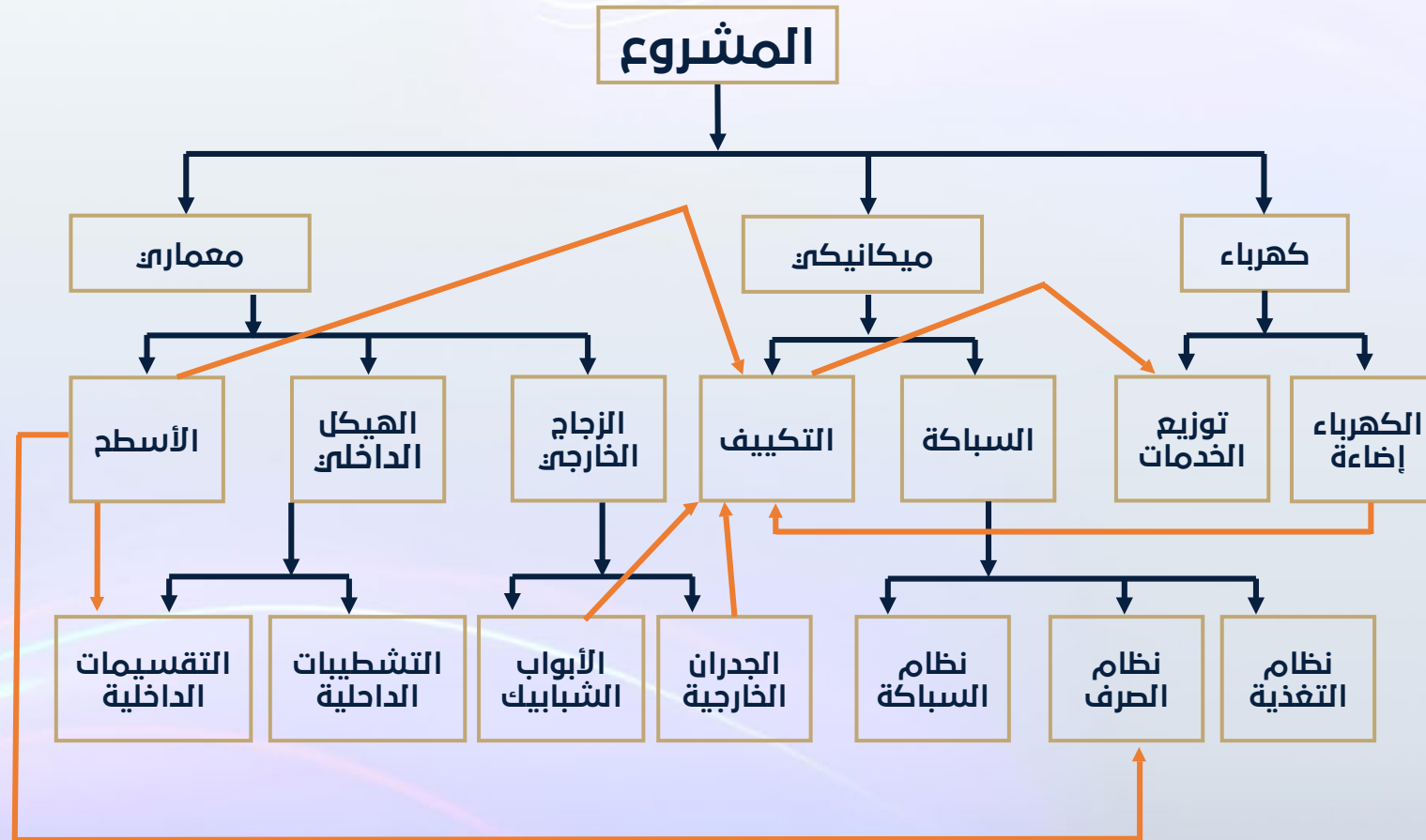
"الظل في الأداء الوظيفي للمرفق سوف ينعكس سلبياً على أداء الأنشطة الأساسية لاجهة المستفيدة"

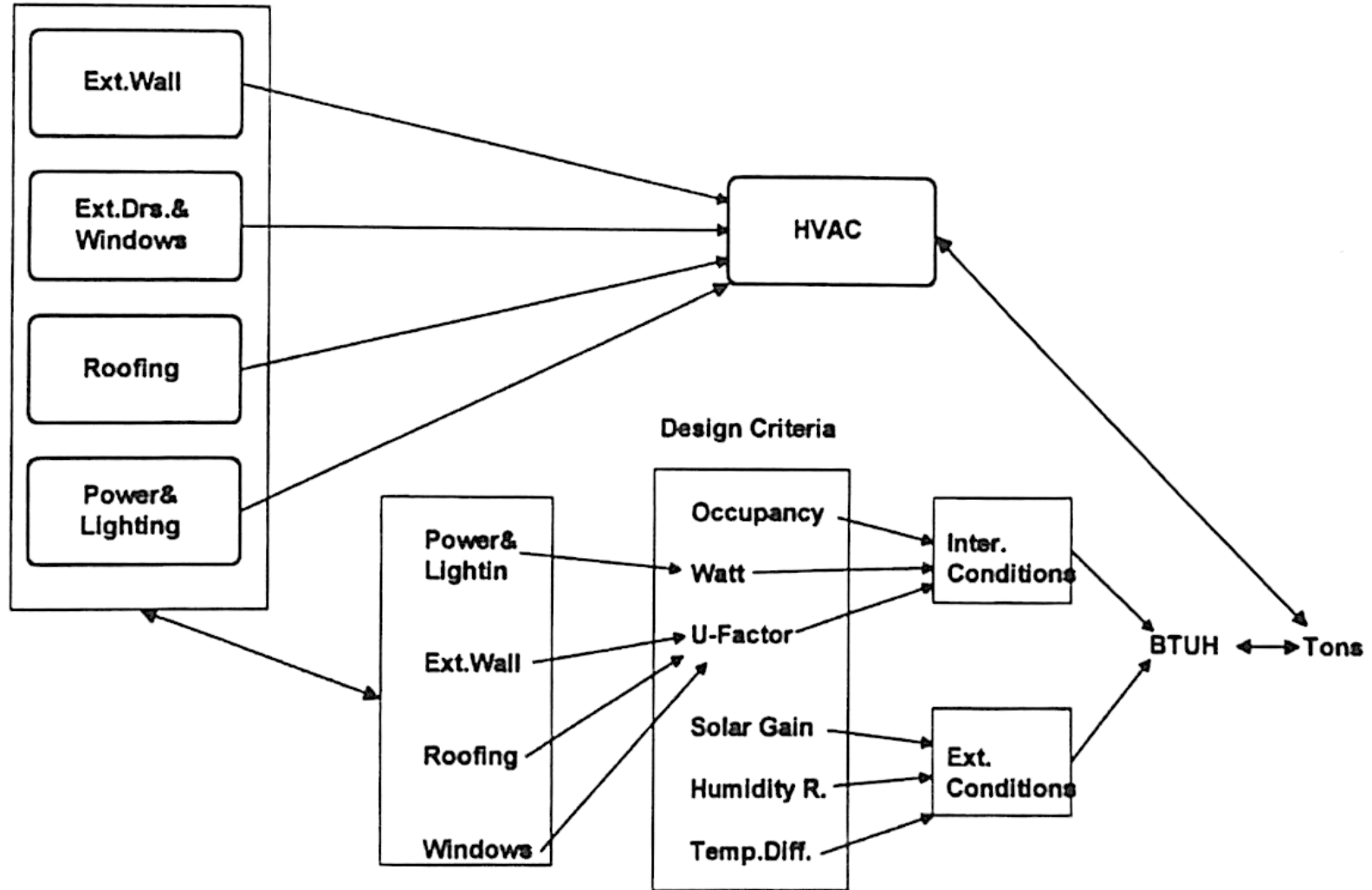
- مرحلة التخطيط
- مرحلة تخطيط الفكرة الأولية
- مرحلة التخطيط الابتدائية
- مرحلة التخطيط النهائية
- مرحلة التشييد
- مرحلة التشغيل والصيانة
- مرحلة الاستبدال
- نهاية دورة المشروع

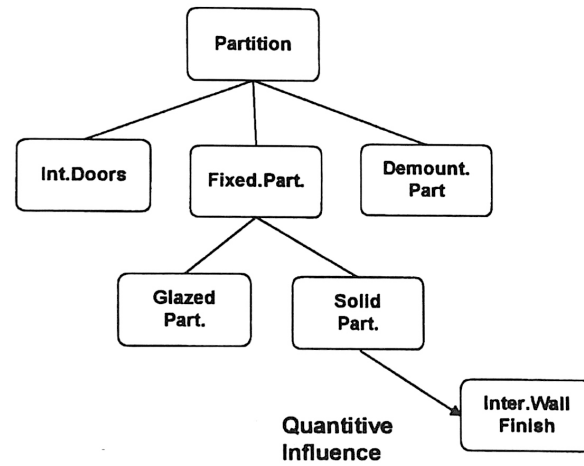
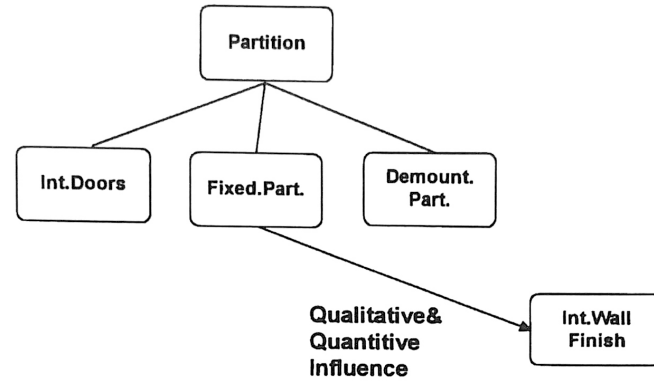
من الذي يؤثر في إتخاذ القرارات التخطيطية



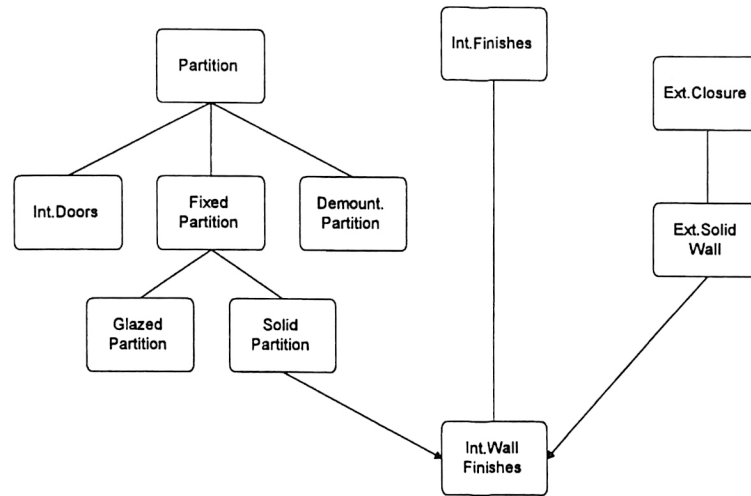
العلاقة بين الأنظمة المختلفة





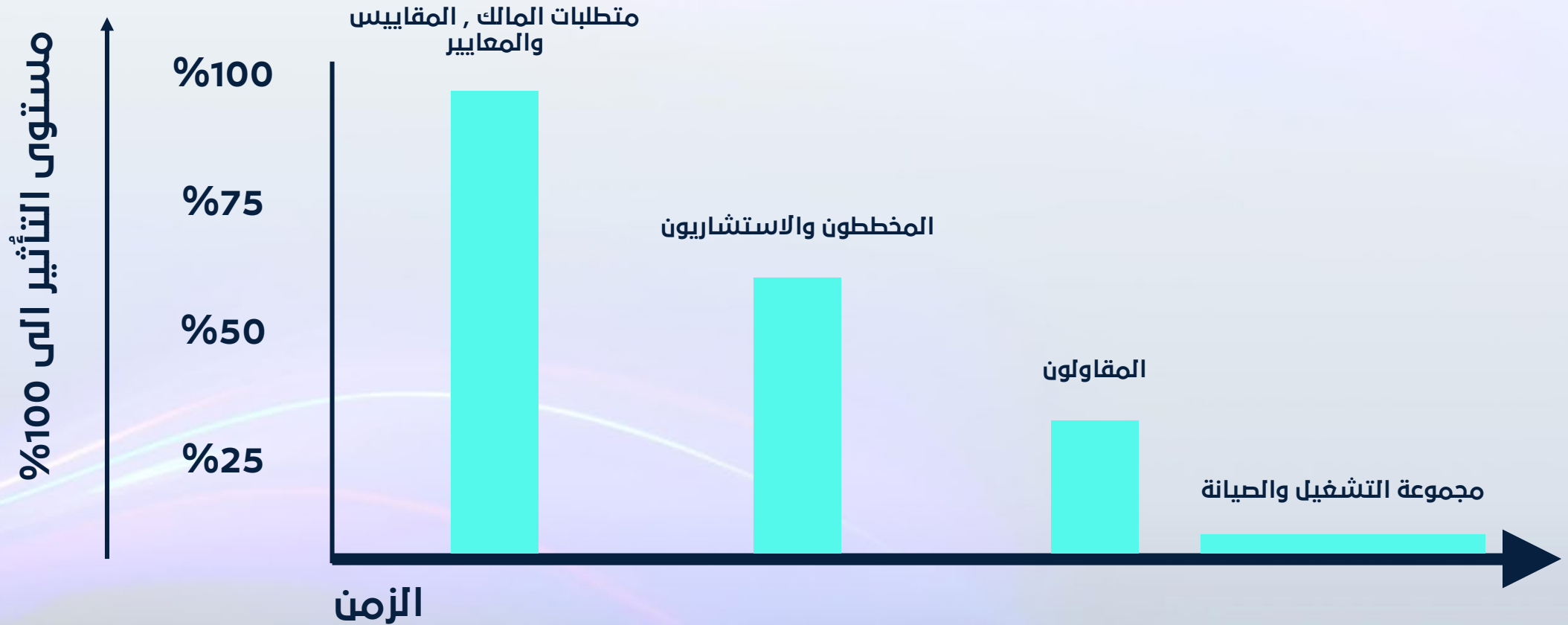


The Autonomous Object

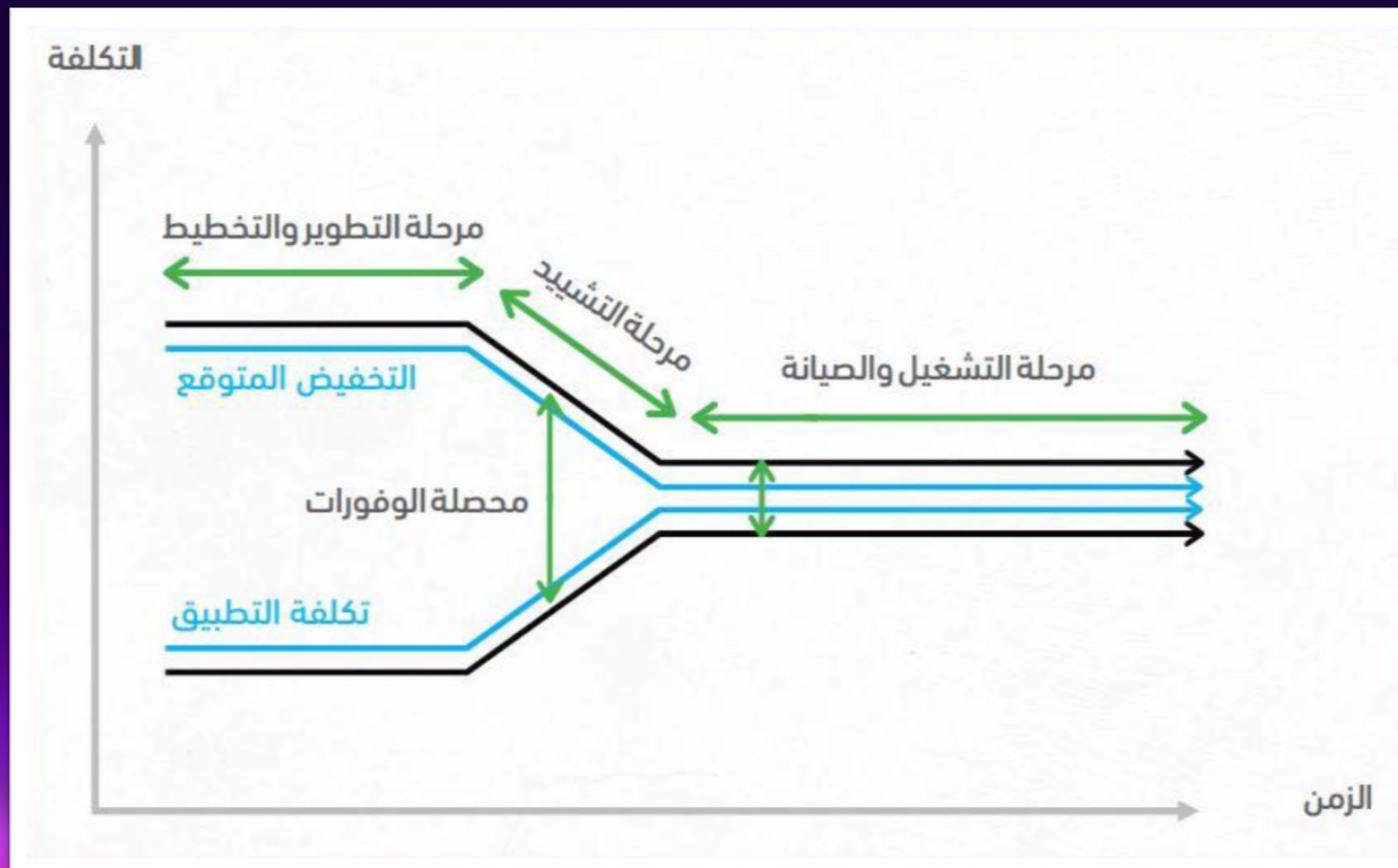


Trinary Relationship between Object

تأثير اتخاذ القرار الرئيسي على تكاليف المنشأة



العلاقة ما بين الوفر ومرحلة دراسة تكاليف دورة حياة المشروع



فمن مجال مهنة التخطيط الهندسي: تعرف تكاليف دورة حياة المشروع على أنها :

تقويم اقتصادي لبدائل تخطيطية متنافسة مأخوذ من الاعتبار تكاليف الملكية المؤثرة خلال العمر الاقتصادي لكل بديل ويعبر عنه بوحدة نقدية متعادلة. "ديلاسولا 1981 م"

نظرة عامة

ما هو المرفق الاقتصادي؟

هو المرفق الذي يحقق الغاية الذي بنى من أجله وذلك بأقل تكاليف الملكية الكلية خلال فترة امتلاك المرافق

القاعدة التي تبنى عليها تقنية تحليل دورة حياة المشروع

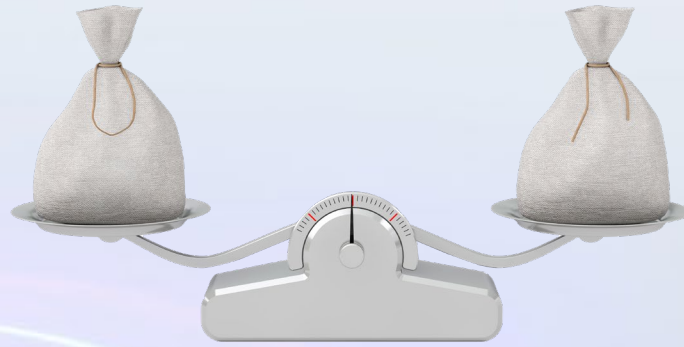
بالنسبة للمستثمر

جميع التكاليف سواء حاضرة ام آجلة ذو أهمية فمن اتخاذ القرار الاستثماري:



الفائدة المرجوة

تحقق التوازن بين التكاليف الحالية والتكاليف الآجلة



أهمية تطبيق تقنية تكاليف دورة حياة المشروع



وضوح الرؤية

تقدير عناصر تكاليف دورة حياة المشروع

مفاهيم عامة

ما هي عناصر تكاليف الملكية الكلية (دورة حياة المشروع)

تعرف عناصر تكاليف الملكية الكلية (دورة حياة المشروع) على أنها جميع التكاليف التي تبدأ من فترة تحديد متطلبات المشروع وحتى مرحلة خروج المرفق من يد المالك.

تقدير عناصر تكاليف دورة حياة المشروع

مفهوم التكاليف الكلية

قيمة إعادة
البيع

تكلفة
الاستبدال

تكلفة الصيانة

تكلفة
التشغيل

التكلفة الأولية

تقدير عناصر تكاليف دورة حياة المشروع

العوامل التي تؤخذ في الاعتبار عند جمع معلومات التكلفة

- يجب أن تكون الطريقة دقيقة بدرجة كافية
- يجب أن تكون المعلومات في مستوى من التفصيل يتوافق مع مستوى التخطيط
- يوفر قاعدة مناسبة للمفاضلة بين البدائل
- نظام القالب الموحد Unifomat
- وحدة القياس (المعايير المعلمية , Parameter Estimate)
- تكون التذبذبات في سعر الوحدة في أقل الحدود
- يكون تطويره مستنداً الى تعريف او خاصية من خصائص النظام المستخدم



LEVEL 2	LEVEL 3	LEVEL 4
01 FOUNDATIONS	011 STANDARD FOUNDATIONS	0111 Wall Foundations 0112 Col. Foundations & Pile Caps 0121 Pile Foundations 0122 Caissons 0123 Underpinning 0124 Dewatering 0125 Raft Foundations 0126 Other Spec Foundation Cond
	012 SPEC FOUNDATION COND	
02 SUBSTRUCTURE	021 SLAB ON GRADE	0211 Standard Slab on Grade 0212 Structural Slab on Grade 0213 Inclined slabs on Grade 0214 Trenches, Pits & Bases 0215 Foundation Drainage
	022 BASEMENT EXCAVATION	0221 Excavation for Basements 0222 Structure Fill & Compact 0223 Shoring
	023 BASEMENT WALLS	0231 Basement Wall Construction 0232 Moisture Protection 0233 Basement Wall Insulation
03 SUPERSTRUCTURE	031 FLOOR CONSTRUCTION	0311 Susp Basement Floor Const 0312 Upper Floors Construction 0313 Balcony Construction 0314 Ramps 0315 Special Floor Construction
	032 ROOF CONSTRUCTION	0321 Flat Roof Construction 0322 Pitched Roof Construction 0323 Canopies 0324 Special Roof Systems
	033 STAIR CONSTRUCTION	0331 Stair Structure
04 EXT CLOSURE	041 EXTERIOR WALLS	0411 Exterior Wall Construction 0412 Exterior Louvers & Screens 0413 Sun Control Devices (Ext) 0414 Balcony Walls & Handrails 0415 Exterior Soffits
	042 EXT DOORS & WINDOWS	0421 Windows 0422 Curtain Walls 0423 Exterior Doors 0424 Storefronts
05 ROOFING		0501 Roof Coverings 0502 Tral Topng & Paving Membr 0503 Roof Insulation & Fill 0504 Flashing & Trim 0505 Roof Openings
06 INT CONST	061 PARTITIONS	0611 Fixed Partitions 0612 Demountable Partitions 0613 Retractable Partitions 0614 Compartments & Cubicles 0615 Int Balustrades & Screens 0616 Interior Doors & Frames 0617 Interior Storefronts
	062 INTERIOR FINISHES	0621 Wall Finishes 0622 Floor 0623 Ceiling Finishes
	063 SPECIALTIES	0631 General Specialties 0632 Built-in Fittings
07 CONVEYING SYS		0701 Elevators 0702 Moving Stair & Walks 0703 Dumbwaiters 0704 Pneumatic Tube Systems 0705 Other Conveying Systems 0706 General Construction Items
08 MECHANICAL	081 PLUMBING	0811 Domestic Water Supply Sys 0812 Sanitary Waste & Vent Sys 0813 Rainwater Drainage Sys 0814 Plumbing Fixtures
	082 H V A C	0821 Energy Supply 0822 Heat Generating System 0823 Cooling Generating System 0824 Distribution Systems 0825 Terminal & Package Units 0826 Controls & Instrumentation 0827 Systems Testing & Balancing
	083 FIRE PROTECTION	0831 Water Supply (Fire Protect) 0832 Sprinklers 0833 Standpipe Systems 0834 Fire Extinguishers

LEVEL 2	LEVEL 3	LEVEL 4
	084 SPEC MECHANICAL SYST	0841 Special Plumbing Systems 0842 Spec. Fire Protection Sys 0843 Misc. Spec. Sys & Devices 0844 Gen Const Items (Mech)
09 ELECTRICAL	091 SERVICE & DISTRIBUT	0911 High Tension Service & Dist 0912 Low Tension Service & Dist
	092 LIGHTING AND POWER	0921 Branch Wiring 0922 Lighting Equipment 0923 Communications & Alarm Sys 0924 Grounding Systems 0925 Emergency Light & Power 0926 Electric Heating
	093 SPEC ELECTRICAL SYST	0935 Floor Raceway Systems 0936 Other Spec Sys & Devices 0937 General Construction Items
10 GEN COND OH&P		1001 Mobilization & Init Expenses 1002 Site Overheads 1003 Demobilization 1004 Main O/H Expense & Profit
11 EQUIPMENT	111 FIXED & MOVABLE EQUIP	1111 Built-in Maintenance Equip 1112 Checkroom Equipment 1113 Food Service Equipment 1114 Vending Equipment 1115 Waste Handling Equipment 1116 Loading Dock Equipment 1117 Parking Equipment 1118 Detention Equipment 1119 Postal Equipment 1120 Other Specialized Equipment
	112 FURNISHINGS	1121 Artwork 1122 Window Treatment 1123 Seating 1124 Furniture 1125 Rugs, Mats & Furn Acces 1131 Vaults 1132 Interior Swimming Pools 1133 Modular Prefab Assemblies 1134 Special Purpose Rooms 1135 Other Special Construction
	113 SPECIAL CONSTRUCTION	
12 SITE WORK	121 SITE PREPARATION	1211 Clearing 1212 Demolition 1213 Site Earthwork
	122 SITE IMPROVEMENTS	1221 Parking Lots 1222 Roads, Walks, Terraces 1223 Site Development 1224 Landscaping
	123 SITE UTILITIES	1231 Water Supply & Dist Sys 1232 Drainage & Sewage Systems 1233 Heating & Cooling Dist Sys 1234 Elec Dist & Lighting Sys 1235 Snow Melting Systems 1236 Service Tunnels
	124 OFF-SITE WORK	1241 Railroad Work 1242 Marine Work 1243 Tunneling 1244 Other Off-Site Work



UINFORMAT ELEMENT/ITEM

UNIFORMAT ELEMENT/ITEM

<p>01 Foundations</p> <p>011 Standard Foundations</p> <p>0011 Wall Foundations 01111 Wall Footings 01112 Foundation Walls & Pilasters 01113 Excavating & Backfilling</p> <p>0112 Column Foundations & Pile Caps 01121 Column Footings 01122 Pile Caps 01123 Column Piers & Base Plates 01124 Excavating & Backfilling</p> <p>012 Special Foundation Conditions</p> <p>0121 Pile Foundations 01211 Mobilization/Demobilization 01212 Pile Tects 01213 Piles</p> <p>0122 Caissons 01221 Open Caissons 01222 Caisson Accessories 01223 Special Caissons</p> <p>0123 Underpinning 01231 Temporary Shoring to Structure 01232 Excavating 01233 Sheeting & Shoring to Excavation 01234 Backfilling 01235 Concreting 01236 Formwork 01237 Steel Bar Reinforcing 01238 Cutoff Projecting Footings 01239 Grouting & Dry Packing</p> <p>0124 Dewatering 01241 Pumping 01242 Well-Point 01243 Gravity Drainage</p> <p>0125 Raft Foundations 01251 Slab Construction 01252 Base Courses 01253 Moisture Protection</p> <p>0126 Other Special Foundation Conditions 01261 Removal of Old Foundations 01262 Rock Grouting 01263 Tunneling 01264 Shoring Existing Buildings</p>	<p>02 Substructure</p> <p>021 Slab on Grade</p> <p>0211 Standard Slab on Grade 02111 Slab Construction 02112 Base Courses 02113 Moisture Protection</p> <p>0212 Structural Slab on Grade 02121 Slab Construction 02122 Grade Beams 02123 Base Courses 02124 Moisture Protection</p> <p>0213 Inclined Slab on Grade 02131 Ramps 02132 Inclined Floor Slabs 02133 Stepped Slabs on Grade 02134 Steps</p> <p>0214 Trenches, Pits, & Bases 02141 Trenches & Depression in Slabs 02142 Pits 02143 Equipment & Machine Bases</p> <p>0215 Foundation Drainage J2151 Perimeter Drains 02152 Under Slab Drains</p> <p>022 Basement Excavation</p> <p>0221 Excavation for Basements 02211 Excavating 02212 Waste Material Disposal</p> <p>0222 Structure Backfill & Compaction 02221 Structure Backfill with Excavated Material 02222 Borrow Backfill</p> <p>0223 Shoring 02231 Sheeting and Shoring 02232 Tiebacks & Anchors 02233 Slurry Walls</p> <p>023 Basement Walls</p> <p>0231 Basement Wall Construction 02311 Basement Walls 02312 Pilasters 02313 Expansion & Construction Joints</p> <p>0232 Moisture Protection 02321 Dampproofing 02322 Waterproofing</p> <p>0233 Basement Wall Insulation</p>
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UNIFORMAT ELEMENT/ITEM

UNIFORMAT ELEMENT/ITEM

03 Superstructure	04 Exterior Closure
031 Floor Construction	041 Exterior Walls
0311 Suspended Basement Floor Construction	0411 Exterior Wall Construction
03111 Structural Frame	04111 Exterior Skin
03112 Interior Structural Walls	04112 Insulation & Vapor Barriers
03113 Floor Slabs & Decks	04113 Interior Skin
03114 Inclined & Stepped Floors	04114 Parapets
03115 Expansion & Contraction Joints	04115 Dampproof Courses
0312 Upper Floors Construction	04116 Finish to Exposed Structure
03121 Structural Frame	04117 Expansion Joints
03122 Interior Structural Walls	04118 Cornerstones
03123 Floor Slabs & Decks	0412 Exterior Louvers & Screens
03124 Inclined & Stepped Floors	04121 Exterior Louvers
03125 Expansion & Contraction Joints	04122 Decorative Grilles & Screens
0313 Balcony Construction	04123 Exterior Vents
03131 Supported Balconies	0413 Sun Control Devices (Exterior)
03132 Cantilevered Balconies	04131 Projecting Sun Screens
0314 Ramps	04132 Awnings
03141 Pedestrian Ramps	04133 Exterior Shutters & Blinds
03142 Vehicle Ramps	0414 Balcony Walls & Handrails
0315 Special Floor Construction	04141 Balcony Walls
03151 Catwalks	04142 Balcony Railings
03152 Space Frames	04143 Balcony Handrails
03153 Cable-Supported Floor Systems	04144 Balcony Dividing Walls
 	0415 Exterior Soffits
032 Roof Construction	04151 Building Soffits
0321 Flat Roof Construction	04152 Balcony Soffits
03211 Structural Frame	04153 Canopy Soffits
03212 Interior Structural Walls	
03213 Roof Slabs & Decks	042 Exterior Doors & Windows
03214 Expansion & Contraction Joints	0421 Windows
0322 Pitched Roof Construction	04211 Window Units & Hardware
03221 Frame & Trusses	04212 Glazing
03222 Roof Decking & Sheathing	04213 Wall Opening Elements
0323 Canopies	04214 Protective Window Elements
03231 Supported Canopies	04215 Exterior Window Painting & Staining
03232 Cantilevered Canopies	0422 Curtain Walls
0324 Special Roof Systems	04221 Curtain Walls—Grid Systems
03241 Concrete Shells & Domes	04222 Curtain Walls—Panel Systems
03242 Hyperbolic Paraboloid Roofs	0423 Exterior Doors
03243 Space Frames	04231 Glazed Doors & Entrances
03244 Barrel Vault Roofs	04232 Solid Exterior Doors
03245 Saw Tooth Roofs	04233 Revolving Doors
03246 Cable-Supported Roofs	04234 Overhead Doors
03247 Air-Supported Structures	04235 Special Doors & Entrances
 	0424 Storefronts
033 Stair Construction	04241 Framing
0331 Stair Structure	04242 Panels & Bulkheads
03311 Regular Stairs	04243 Doors & Hardware
03312 Curved Stairs	04244 Glazing
03313 Spiral Stairs	04245 Rolling Grilles & Folding Closures
03314 Exterior Fire Escape Stairs	04246 Storefront Awnings
03315 Steps in Suspended Slabs	04247 Caulking



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05 Roofing

No Level 3

0501 Roof Coverings

- 05011 Membrane Roofing
- 05012 Shingles & Roofing Tile
- 05013 Preformed Roofing
- 05014 Sheet Metal Roofing
- 05015 Expansion Joints & Covers

0502 Traffic Toppings & Paving Membrane

- 05021 Traffic Toppings
- 05022 Waterproof Membranes Below Paving
- 05023 Slatted Roof Decks & Walkways

0503 Roof Insulation & Fill

- 05031 Roof Vapor Barriers
- 05032 Roof & Deck Insulation
- 05033 Roof Fill

0504 Flashings & Trim

- 05041 Flashings
- 05042 Gravel Stops
- 05043 Fascia & Eaves
- 05044 Gutters & Downspouts
- 05045 Miscellaneous Roofing Specialties

0505 Roof Openings

- 05051 Glazed Roof Openings
- 05052 Hatches
- 05053 Gravity Roof Ventilators

06 Interior Construction

061 Partitions

0611 Fixed Partitions

- 06111 Solid Partitions
- 06112 Glazed Partitions
- 06113 Mesh Partitions

0612 Demountable Partitions

- 06121 Full Height Demountable Partitions
- 06122 Bank Height Demountable Partitions

0613 Retractable Partitions

- 06131 Accordion Folding Partitions
- 06132 Folding Leaf Partitions
- 06133 Coiling Partitions

0614 Compartments & Cubicles

- 06141 Toilet Partitions
- 06142 Shower & Dressing Compartments
- 06143 Hospital Cubicles

0615 Interior Balustrades & Screens

- 06151 Stair Balustrades
- 06152 Balustrades At Floor Openings
- 06153 Interior Grilles & Decorative Screens

0616 Interior Doors & Frames

- 06161 Interior Doors
- 06162 Interior Door Frames
- 06163 Interior Door Hardware
- 06164 Interior Door Wall Opening Element

06165 Interior Door Sidelights & Transoms

- 06166 Interior Door Painting & Staining
- 06167 Hatches & Access Doors

0617 Interior Storefronts

- 06171 Framing
- 06172 Panels & Bulkheads
- 06173 Doors & Hardware
- 06174 Glazing
- 06175 Rolling Grilles & Folding Closures

062 Interior Finishes

0621 Wall Finishes

- 06211 Wall Finishes to Inside Exterior Wall
- 06212 Wall Finishes to Interior Walls
- 06213 Column Finishes

0622 Flooring

- 06221 Screens & Toppings
- 06222 Floor Finishes
- 06223 Bases, Curbs & Trim
- 06224 Stair Finish
- 06225 Access Flooring (Pedestal Floors)

0623 Ceiling Finishes

- 06231 Ceiling Finishes Applied to Structure
- 06232 Suspended Ceilings
- 06233 Special Ceilings
- 06234 Stair Soffits
- 06235 Expansion Joint Covers

063 Specialties

0631 General Specialties

- 06311 Chalk & Tackboards
- 06312 Identifying Devices
- 06313 Lockers
- 06314 Toilet & Bath Accessories
- 06315 Storage Shelving
- 06316 Miscellaneous Metalwork
- 06317 Miscellaneous Specialties

0632 Built-in Fittings

- 06321 Counters & Vanities
- 06322 Kitchen Cabinets
- 06323 Closets
- 06324 Miscellaneous Built-In Cabinetwork



UNIFORMAT ELEMENT/ITEM

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07 Conveying Systems

No Level 3

0701 Elevators

- 07011 Passenger Elevators
- 07012 Freight Elevators

0702 Moving Stairs & Walks

- 07021 Escalators
- 07022 Moving Walks

0703 Dumbwaiters

- 07031 Hand-Operated Dumbwaiters
- 07032 Electric-Operated Dumbwaiters

0704 Pneumatic Tube Systems

- 07041 Pneumatic Message Tube Systems
- 07042 Pneumatic Trash Tube Systems
- 07043 Pneumatic Linen Tube Systems

0705 Other Conveying Systems

- 07051 Lifts
- 07052 Hoists & Cranes
- 07053 Conveyors
- 07054 Chutes
- 07055 Turntables

0706 General Construction Items

- 07061 Hoistway Beams
- 07062 Hydraulic Elevator Shaft Drilling
- 07063 Miscellaneous Metals
- 07064 Lintels to Openings
- 07065 Concrete Work
- 07066 Masonry Work
- 07067 Painting

08 Mechanical

081 Plumbing

0811 Domestic Water Supply System

- 08111 Cold Water Service
- 08112 Hot Water Service
- 08113 Domestic Water Supply Equipment

0812 Sanitary Waste & Vent System

- 08121 Waste Piping & Fittings
- 08122 Vent Piping & Fittings
- 08123 Floor Drains
- 08124 Sanitary Waste Equipment
- 08125 Thermal Pipe Insulation

0813 Rainwater Drainage System

- 08131 Pipe & Fittings
- 08132 Roof Drains
- 08133 Rainwater Drainage Equipment
- 08134 Thermal Pipe Insulation

0814 Plumbing Fixtures

- 08141 Bath Tubs
- 08142 Bidets
- 08143 Kitchen Sinks
- 08144 Laundry Sinks & Trays
- 08145 Lavatories
- 08146 Mop Sinks
- 08147 Service Sinks
- 08148 Showers
- 08149 Urinals
- 081410 Water Closets
- 081411 Wash Fountains
- 081412 Drinking Fountains & Coolers

082 HVAC

0821 Energy Supply

- 08211 Oil Supply System
- 08212 Gas Supply System
- 08213 Coal Supply System
- 08214 Steam Supply System
- 08215 Solar Energy Supply System
- 08216 Wind Energy Supply System

0822 Heat Generating System

- 08221 Steam Boilers
- 08222 Hot Water Boilers
- 08223 Furnaces
- 08224 Boiler Room Piping & Specialties
- 08225 Auxiliary Equipment
- 08226 Equipment Thermal Insulation

0823 Cooling Generating Systems

- 08231 Chilled Water Systems
- 08232 Direct Expansion Systems

0824 Distribution Systems

- 08241 Air Distribution
- 08242 Exhaust Ventilation Systems
- 08243 Steam Distribution
- 08244 Hot & Chilled Water Distribution
- 08245 Change Over Distribution Systems
- 08246 Glycol Heating Distribution System

0825 Terminal & Package Units

- 08251 Terminal Units
- 08252 Packaged Units

0826 Controls & Instrumentation

- 08261 Air-Conditioning Systems
- 08262 Energy Supply System
- 08263 Heat-Generating System
- 08264 Cooling-Generating System
- 08265 Special Mechanical Systems
- 08266 Instrument Panels
- 08267 Instrument Air Compressor
- 08268 Gas Purging System

0827 Systems Testing & Balancing

- 08271 Water Side Testing & Balancing
- 08272 Air Side Testing & Balancing



UNIFORMAT ELEMENT/ITEM

UNIFORMAT ELEMENT/ITEM

- 083 Fire Protection
- 0831 Water Supply (Fire Protection)**
- 08311 Water Connection
- 08312 Pipe & Fittings
- 08313 Valves
- 0832 Sprinklers**
- 08321 Wet Sprinkler System
- 08322 Dry Sprinkler System
- 0833 Standpipe Systems**
- 08331 Standpipe Equipment
- 08332 Fire Hose Equipment
- 08333 Pumping Equipment
- 0834 Fire Extinguishers**
- 08341 Hand-Held Fire Extinguishers
- 08342 Wheeled Cart Fire Extinguishers
- 08343 Fire Extinguisher Cabinets

- 084 Special Mechanical Systems
- 0841 Special Plumbing Systems**
- 08411 Special Piping Systems
- 08412 Acid Waste Systems
- 08413 Interceptors
- 08414 Pool Equipment
- 08415 Special Plumbing Fixtures
- 0842 Special Fire Protection Systems**
- 08421 Carbon Dioxide Extinguishing Equipment
- 08422 Foam-Generating Equipment
- 08423 Halon System Equipment
- 08424 Hood & Duct Fire Protection
- 0843 Miscellaneous Special Systems & Devices**
- 08431 Special Cooling Systems & Devices
- 08432 Process Heating
- 08433 Storage Cells & Devices
- 08434 Dust & Fume Collectors
- 08435 Deodorizing Equipment
- 08436 Carbon Monoxide Equipment
- 08437 Sound Attenuating Equipment
- 08438 Special Waste Treatment Devices

09 Electrical

- 091 Service & Distribution
- 0911 High Tension Service & Distribution**
- 09111 High Tension System Monitoring
- 09112 High Tension System Equipment
- 09113 High Tension System Distribution
- 0912 Low Tension Service & Distribution**
- 09121 Low Tension System Monitoring
- 09122 Low Tension System Equipment
- 09123 Low Tension System Distribution

092 Lighting and Power

- 0921 Branch Wiring**
- 09211 Wiring Circuits
- 09212 Branch Wiring Devices
- 0922 Lighting Equipment**
- 09221 Fluorescent Interior Lighting Fixtures
- 09222 Incandescent Interior Lighting Fixtures
- 09223 Other Lighting Fixtures & Equipment

093 Special Electrical Systems

0931 Communications & Alarm Systems

- 09311 Public Address Systems
- 09312 Central Music Systems
- 09313 Intercommunication Systems
- 09314 Paging Systems
- 09315 Utility Telephone Systems
- 09316 Nurses' Call System
- 09317 In-Out Registers
- 09318 Bell Systems
- 09319 Television Systems
- 093110 Clock & Program Systems
- 093112 Burglar Alarm Systems
- 093113 Other Systems

0932 Grounding Systems

- 09321 Lightning Protection
- 09322 Building Ground Systems
- 09323 Special Grounding Systems

0933 Emergency Light & Power

- 09331 Emergency Generator Systems
- 09332 Emergency Battery Systems
- 09333 Other Emergency Light & Power Systems

0934 Electric Heating

- 09341 Heating Equipment
- 09342 Control Devices
- 09343 Branch Wiring
- 09344 Other Heating Systems

0935 Floor Raceway Systems

- 09351 Standard Underfloor Duct Systems
- 09352 Header (Feeder) Duct
- 09353 Industrial (square) Duct
- 09354 Trench Duct
- 09355 Wiring Devices & Accessories

0936 Other Special Systems & Devices

- 09361 Special Lighting Systems
- 09362 Special Protective Systems & Devices
- 09363 Special Electronic Controls

0937 General Construction Items

- 09371 Cutting & Patching
- 09372 Trenching & Backfill
- 09373 Painting
- 09374 Equipment Installation Items



UNIFORMAT ELEMENT/ITEM

UNIFORMAT ELEMENT/ITEM

10	General Conditions & Profit	Other Project Costs
1001	Mobilization & Initial Expenses	Construction (ECC)
10011	Mobilization	
10012	Permits & Fees	Contingencies
10013	Insurance & Bonds	Design
1002	Site Overhead	Change Order
10021	Site Supervisory & Emergency Staff	Reservations
10022	Labor On-Costs	Equipment
10023	Sales & Use Taxes	Furnishings
10024	Construction Equipment	Fine Arts
10025	Site Office Operating Costs	Cases & Seals
10026	Temporary Facilities	Site Acquisition (ESC)
10027	Site Protection Security	Land
10028	Cleanup	Legal Fees
10029	Inspection & Testing	Surveys
100210	Winter Conditions	Appraisal Fees
100211	Miscellaneous Site Overheads	Relocation Costs
1003	Demobilization	Advertising
10031	Temporary Enclosures (Removal)	Filing Fees
10032	Temporary Buildings (Removal)	Design and Review (EDRC)
10033	Temporary Services (Removal)	GSA Engineering
10034	Equipment Demobilization	GSA Administration
10035	Final Clean-up	GSA Travel
10036	Repairing Sidewalks & Streets	Special Consultants
10037	Punch List & Warranties	A/E Fees and Services
10038	Maintenance Manuals & As-built Drawings	Soil and Pre-construction Testing
10039	Staff Relocation Costs	Personal Services
100310	Opening Ceremonies	Models
1004	Main Office Expense & Profit	Invitation and Reproduction
10041	Main Office Expense	Data Processing
10042	Profit	Management and Inspection (EMIC)
		Construction Inspection
		A/E Fees and Services
		Special Consultants
		Material Testing
		GSA Engineering
		GSA Administration
		GSA Travel
		Data Processing



UNIFORMAT ELEMENT/ITEM

UNIFORMAT ELEMENT/ITEM

11	Equipment	11110	Other Specialized Equipment
111	Fixed & Movable Equipment	111101	Darkroom Equipment
1111	Built-In Maintenance Equipment	111102	Educational Equipment
11111	Window Washing Equipment	111103	Athletic Equipment
11112	Vacuum Cleaning System	111104	Laboratory Equipment
1112	Checkroom Equipment	111105	Laundry Equipment
11121	Manual Checkroom Equipment	111106	Library Equipment
11122	Automatic Storage & Retrieval Checkroom Equipment	111107	Medical Equipment
1113	Food Service Equipment	111108	Mortuary Equipment
11131	Refrigeration Cases	111109	Residential Equipment
11132	Insulated Rooms	111110	Auditorium & Stage Equipment
11133	Storage Units	111111	Miscellaneous Specialized Equipment
11134	Cooking Equipment		
11135	Food Preparation Machines	112	Furnishings
11136	Food Serving Units	1121	Artwork
11137	Washing Units & Conveyors	11211	Bases & General Contract Work for Artwork & Sculpture
1114	Vending Equipment	1122	Window Treatment
11141	Hot Drink Vending Unit	11221	Blinds
11142	Cold Drink Vending Unit	11222	Interior Shutters
11143	Hot Food Vending Unit	11223	Roll Shades
11144	Cold Food Vending Unit	11224	Curtains & Drapes
11145	Cigarette Vending Unit	1123	Seating
11146	Condiment Unit & Counter	11231	Auditorium Seating
11147	Refuse Unit	11232	Bleachers
11148	Coin Changer	113	Special Construction
11149	Microwave Oven	1131	Vaults
111410	Bases for Unit	11311	Steel Vault Linings
1115	Waste Handling Equipment	11312	Vault Doors & Frames
11151	Waste Compactors	11313	Vault Ventilation
11152	Incinerators	11314	Prefabricated Vaults
11153	Waste Storage Containers	1132	Interior Swimming Pools
11154	Pulping Machines & Systems	11321	Prefabricated Swimming Pools
1116	Loading Dock Equipment	11322	Swimming Pool Equipment
11161	Dock Levellers	1133	Modular Prefabricated Assemblies
11162	Levelling Platforms	1134	Special Purpose Rooms
11163	Dock Bumpers	11341	Audiometric Room
11164	Dock Seals & Shelters	11342	Clean Room
1117	Parking Equipment	11343	Hyperbaric Room
11171	Parking Bumpers & Guard Rails	11344	Sauna
11172	Parking Control Equipment	11345	Fallout Shelters (Interior)
1118	Detention Equipment	1135	Other Special Construction
11181	Cell & Corridor Construction	11351	Radiation Protection
11182	Cell Accessories	11352	Radio Frequency Shielding
11183	Courtroom Security Devices		
11184	Detention Screens		
1119	Postal Equipment		
11191	Mail Boxes		
11192	Post Office Equipment		



UNIFORMAT ELEMENT/ITEM

UNIFORMAT ELEMENT/ITEM

12	Site Work	123	Site Utilities
121	Site Preparation	1231	Water Supply & Distribution
1211	Clearing	12311	Potable Water Systems
12111	Clearing & Grubbing	12312	Fire Protection Systems
12112	Tree Removal	12313	Process Water Systems
12113	Selective Thinning	12314	Irrigation Systems
12114	Tree Pruning	1232	Drainage & Sewerage Systems
1212	Demolition	12321	Storm Drainage
12121	Building Demolition	12322	Sanitary Sewer
12122	Site Demolition	12323	Process & Acid Waste Systems
12123	Relocations	12324	Combined Drainage & Sewerage Systems
1213	Site Earthwork	1233	Heating & Cooling Systems
12131	Site Grading	12331	Heating System
12132	Site Excavating	12332	Cooling Systems
12133	Borrow Fill	1234	Gas Distribution Systems
12134	Soil Stabilization	12341	Natural Gas Systems
12135	Soil Treatment	12342	Other Gas Systems
12136	Site Dewatering	1235	Electric Distribution & Lighting Systems
12137	Site Shoring	12351	Overhead Power Services
122	Site Improvements	12352	Underground Services
1221	Parking Lots	12353	Exterior Yard & Road Lighting
12211	Parking Lot Paving & Surfacing	12354	Exterior Flood Lighting
12212	Curbs, Rails & Barriers	12355	Exterior Lighting Controls
12213	Parking Booths & Equipment	12356	Exterior Sign Lighting
1222	Roads, Walks, & Terraces	1236	Snow Melting Systems
12221	Roads	12361	Piped Snow Melting Systems
12222	Walks	12362	Electrical Snow Melting Systems
12223	Terraces & Plazas	1237	Service Tunnels
1223	Site Development	12371	Excavating & Backfilling
12231	Fences & Gates	12372	Constructed Service Tunnel
12232	Walls	12373	Prefabricated Service Tunnels
12233	Signs	12374	Moisture Protection
12234	Site Furnishings	12375	Insulation
12235	Fountains, Pools & Watercourses	12376	Miscellaneous Items
12236	Playing Field & Sports Facilities	124	Off-Site Work
12237	Flagpoles	1241	Railroad Work
12238	Miscellaneous Structures	1242	Marine Work
1224	Landscaping	1243	Tunneling
12241	Fine Grading & Soil Preparation	1244	Other Off-Site Work
12242	Top Soil & Planting Beds		
12243	Seeding & Sodding		
12244	Planting		
12245	Planters		
12246	Special Landscape Feature		



UNIFORMAT ELEMENT/ITEM

دورة مستوى معلومات التكاليف



Design UNIFORMAT Level 2		Construction CSI	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	Total UNIFORMAT Costs:	
Level 3			General Requirements	Sitework	Concrete	Masonry	Metals	Wood - Plastic	Thermal And Moisture Protect	Doors And Windows	Finishes	Specialties	Equipment	Furnishings	Special Construction	Conveying Systems	Mechanical	Electrical		
01	Foundations	011 Standard Foundations																		
		012 Spec Foundation Cond																		
02	Substructure	021 Slab On Grade																		
		022 Basement Excavation																		
		023 Basement Walls																		
03	Superstructure	031 Floor Construction																		
		032 Roof Construction																		
		033 Stair Construction																		
04	Ext. Closure	041 Exterior Walls																		
		042 Ext. Doors & Windows																		
05	Roofing																			
06	Int. Const.	061 Partitions																		
		062 Interior Finishes																		
		063 Specialties																		
07	Conveying Sys.																			
08	Mechanical	081 Plumbing																		
		082 H.V.A.C.																		
		083 Fire Protection																		
		084 Spec. Mechanical Syst.																		
09	Electrical	091 Service & Distribut.																		
		092 Lighting And Power																		
		093 Spec. Electrical Syst.																		
10	Gen Cond. OH&P																			
11	Equipment	111 Fixed & Movable Equip.																		
		112 Furnishings																		
		113 Special Construction																		
12	Sitework	121 Site Preparation																		
		122 Site Improvements																		
		123 Site Utilities																		
		124 Off-Site Work																		
Cost Totaled by CSI Divisions																				

العلاقة ما بين CSI and UNIFORMAT

System	Unit Measure	Meaning
01 Foundations		
011 Standard Foundations	FPA	footprint area (square feet)
	KIP	1,000 pounds
02 Substructure		
021 Slab on Grade	SFSA	square foot of surface area
022 Basement Excavation	CY	cubic yards
023 Basement Walls	SFSA	square foot of surface area
03 Superstructure		
031 Floor Construction	SFA	supported floor area (square feet)
032 Roof Construction	SRA	supported roof area (square feet)
033 Stair Construction	LFR	lineal feet of riser
	FLT	flight
04 Exterior Closure		
041 Exterior Walls	XWA	exterior wall area (square feet)
042 Exterior Doors & Windows	XDA	exterior door/window area (square feet)
05 Roofing	SQ	square (100 square feet)
06 Interior Construction		
061 Partitions	PSF	partition square feet
062 Interior Finishes	SFSA	square feet of surface area
	GSF	gross square feet
07 Conveying Systems	LO	landing openings
08 Mechanical		
081 Plumbing	FU	fixture unit
082 HVAC	TONS	one ton = 12,000 btuh's
	MBH	1,000 btu's per hour (heating system measure)
083 Fire Protection	HEAD	number of sprinkler heads
	STA	stations (for standpipe systems)
09 Electrical		
091 Service & Distribution	AMP	amperes of connected load
092 Power & Lighting	NSF	net square feet
10 General Conditions & Profit	PCT	percent
11 Equipment	EA	each
12 Site Work		
121 Site Preparation	ACRE	acre
122 Site Improvement	SY	square yard
	SF	square feet
123 Site Utilities	LF	lineal feet



COST DATA
(Continued)

ELEMENTAL CATEGORY	MATERIAL QUALITY OR SYSTEM TYPE	SYSTEM COST	PARAMETER QUANTITY	UNIT MEAS.	UNIT COST	% COST
01 FOUNDATIONS						
011 Standard Foundations						
012 Special foundations conditions						
02 SUBSTRUCTURE						
021 Slab on grade						
022 Basement excavation						
023 Basement walls						
03 SUPERSTRUCTURE						
031 Floor construction						
032 Roof construction						
033 Stair construction						
04 EXTERIOR CLOSURE						
041 Exterior walls						
042 Fenestration						
05 ROOFING						
051 Roof system						
052 Opening/Skylights						
06 INTERIOR CONSTRUCTION						
061 Partitions						
062 Interior finishes						
063 Specialties						
07 CONVEYING SYSTEMS						
071 Elevators						
072 Escalators						
08 MECHANICAL						
081 Plumbing						
082 HVAC						
083 Fire protection						
084 Special mechanical systems						
09 ELECTRICAL						
091 Service and distribution						
092 Lighting and power						
093 Special electrical systems						
10 GENERAL CONDITIONS AND PROFIT						
	NET BUILDING COST					
11 EQUIPMENT						
111 Fixed and movable equipment						
112 Furnishings						
113 Special construction						
	GROSS BUILDING COST			GSF		100%
12 SITE WORK						
121 Site preparation						
122 Site improvements						
123 Site utilities						
124 Off site work						
	CONSTRUCTION COST					



التكاليف الاولية التكاليف الرأسمالية للمشروع



منهجية تصنيف ورقمنة عناصر تكاليف دورة حياة المشروع وفق Uinformat

- تصنيف عناصر المشروع وفق ترميز Uinformat

- تجميع عناصر التكاليف على ضوء مستوى Uinformat

- التكاليف الأولية
- تكاليف الصيانة
- تكاليف التشغيل
- تكاليف الاستبدال

- تجميع عناصر التكاليف من كافة المشاريع في نموذج موحد وفق ترميز Uinformat

General information

ELEMENTAL CATEGORY	MATERIAL QUALITY SYSTEM TYPE	QUANTITY
O1 FOUNDATIONS		
O11 Standard Foundation	Separate footings	2598 m2
O2 SUBSTRUCTURE		
O21 Slab on Grade	120mm/150mm concrete	8908 m2
O2122 Grade Beams	Grade beams+ neck col	1008 m2
O22 Basement Excavation	For Separate footings+grade beams+backfilling	8612m3
O3 SUPER STRUCTURE		
O31 Floor Construction	columns +beams +solid slabs+300 mm thick precast hollow slabs+900 mm double tee beams	7027 m2
O32 Roof Construction	250 mm thick Solid concrete	74 lm
O33 Stair Construction		
O4 Exterior Closures	double Block walls(150 mm+100 mm blocks) Total Hight 5.1m to 7.4m+Fenestration	Gross area 7559m2
O411 Exterior Walls Const	double Block walls(150 mm+100 mm blocks) covered by plaster & paint+ Terracotta tiles	area 6424 m2 (85%)
O4111 External skin	Terracotta tiles 30 mm on wall/On metal chassis	3637 m2
	Plaster +external paint	2787 m2
O421 Windows	Aluminium windows Openable (aluminium profile+ double glazing)	area586m2(8%)
O422 Curtain walls	Glazing curtain wall Fixed panels	area 549m2(7%)
O5 ROOFING		
O501 Roof covering	1.5 mm pvc+150mm insulation	7433 m2
O6 INTERIOR CONSTRUCTION		
O611 Fixed Partitions	Hollow blocks (fire rated / non fire) Building perimeter 2830 lm Hight 3.2 m	Net area 8864m2
O62 Interior Finishes		
O621 Wall finishing	Acrylic emulsion paint on 20 mm thick cement plaster Industrial granite tiles	11998 m2 1359m2

0622 Floor finishing	Resilient floor vinyl rolls	5969m2
	Stamped concrete	1848 m2
	Terrazzo tiles	1111m2
	Epoxy paint on 100 mm thick cement screed with hardener	768m2
0623 Ceiling finishing	Industrial granite tiles	373 m2
	Textured paint	667 m2
	Gypsum acoustic tiles	2121m2
063 Specialties	Gypsum board suspended ceiling	5042 m2
	Acoustic gypsum board	685 m2
O63 Specialties	Toilet accessories+Signage	9437 m2
O8 MECHANICAL		
O81 Plumbing	pipes +sanitary fixtures	93 pieces
O82 HVAC	Dry cooling system capacity 139.24 ton Including ductworks & accessories	139.24 Ton
O83 Fire Protection	Smoke Control+ sprinklers	9437 m2
O9 ELECTRICAL		
O91 Service and Distribution	Electrical panels +cables+ wires	1,500 kVA transformer - 13.8kV-400/230V
O92 Lighting and Power	LED LIGHTING	1977 Nos
O93 Special Electrical System	Telecommunication /IP telephony voice communication system/(IP-CCTV) system / public address system/Audio visual system/Class rooms audio visual system	9437 m2
11 EQUIPMENT		
111 Fixed and Movable Equipment	Workstation+Sport equipment's	9437 m2
112 Furnishings	Fixed and loose furniture Pantry equipment	9437 m2
113 Special construction	Structure steel space truss with columns and sandwich PVC roofing panels	1905 m2
Main building Gross area		1 Floor
Building perimeter		9437 m2
Net area		988 lm
Hight		9437 m2
		5.1m/7.4m

project budgeting for Building

project budjeting for building						
ELEMENTAL CATEGORY	MATERIAL QUALITY OR SYSTEM TYPE	SYSTEM COST	PARAMETER QUANTITY	UNIT MEASURE	UNIT COST	% COST
O1 FOUNDATIONS	Separate footings					4.60
O11 Standard Foundation		1,451,416.00	2598	M2	558.67	
O12 Special Foundations condition						
O2 SUBSTRUCTURE						6.00
O21 Slab on Grade	120mm /150 mm concrete	811,455.00	8908	M2	91.09	
O2122 Grade Beams	Grade beams+ neck col	586,686.00	1008	M2	582.03	
O22 Basement Excavation	For Separate footings+grade beams+backfilling	555,292.00	8612	M3	64.48	
O3 SUPERSTRUCTURE						12.00
O31 Floor Construction	columns +beams +solid slabs+300 mm thick precast hollow slabs+900 mm double tee beams	3,855,295.00	7027	M2	548.64	
O32 Roof Construction						
O33 Stair Construction	250 mm thick Solid concrete	4,568.00	74	LM	61.73	
O4 Exterior Closures	double Block walls(150 mm+100 mm blocks) Total Hight 5.1m to 7.4m+Fenestration	2,706,582.00				8.50
O411 Exterior Walls Const	double Block walls(150 mm+100 mm blocks)	639,256.00	6424	M2	99.51	
O4111 External skin	Terracotta tiles 30 mm on wall/On metal chassis	630,699.00	3637	M2	173.41	
	Plaster +external paint	82,600.00	2787	M2	29.64	
O421 windows	Aluminium windows Openable (aluminium profile+ double glazing)	760,456.00	586	M2	1297.71	
O422 Curtain walls	Glazing curtain wall Fixed panels	593,571.00	549	M2	1081.19	
O5 ROOFING						3.00
O501 Roof covering	1.5 mm PVC sheets +150 mm insulations	1,010,888.00	7433	M2	136.00	
O6 INTERIOR CONSTRUCTION						

For items o411 to o422

project budgeting for Building

project budgeting for building						
ELEMENTAL CATEGORY	MATERIAL QUALITY OR SYSTEM TYPE	SYSTEM COST	PARAMETER QUANTITY	UNIT MEASURE	UNIT COST	% COST
0611 Fixed Partitions	Internal block(non fire & fire rated)	517,856.00	8864	M2	58.42	1.60
062 Interior Finishes						
0621 Wall finishing	Acrylic emulsion paint on 20 mm thick cement plaster	1,512,792.00	11998	M2	126.09	5.60
	Industrial granite tiles	284,031.00	1359		209.00	
0622 Floor finishing	Resilient floor vinyl rolls	1,015,558.00	5969	M2	170.14	4.50
	Stamped concrete	173,908.00	1848		94.11	
	Terrazzo tiles	107,119.00	1111		96.42	
	Epoxy paint on 100 mm thick cement screed with hardener	55,062.00	768		71.70	
	Industrial granite tiles	86,999.00	373		233.24	
0623 Ceiling finishing	Textured paint	13,340.00	667	M2	20.00	3.00
	Gypsum acoustic tiles	224,826.00	2121		106.00	
	Gypsum board suspended ceiling	536,060.00	5042		106.32	
	Acoustic gypsum board	100,424.00	685		146.60	
063 Specialties	Toilet accessories+Signage	217,523.00	9437	M2	23.05	0.70
08 MECHANICAL						
081 Plumbing	pipes +sanitary fixtures	883,429.00	93	pieces	9499	3.00
082 HVAC	Dry cooling system capacity 139.24 ton Including ductworks & accessories	3,009,885.00	139.24	Ton	21617	9.00
083 Fire Protection	Smoke Control+ sprinklers	269,296.00	9437	M2	29	1.00
09 ELECTRICAL						
091 Service and Distribution	Electrical panels +cables+ wires	1,708,850.00	1,500 kVA transformer - 13.8kv-400/230V	KVA	1139	5.20
092 Lighting and Power	LED LIGHTING	3,643,933.00	1977	Nos.	1843	11.30
093 Special Electrical System	Telecommunication /IP telephony voice communication system/(IP-CCTV) system / public address system/Audio visual system/Class rooms audio visual system	3,412,913.00	9437	M2	362	11.00
11 EQUIPMENT						
111 Fixed and Movable Equipment	Workstation+Sport equipment's	248,059.00	9437	M2	3412913	1.00
112 Furnishings	Fixed and loose furniture Pantry equipment	1,604,527.00	9437	M2	170	5.00
113 Special construction	Structure steel space truss with columns and sandwich PVC roofing panels	1,280,160.00	1905	M2	672	4.00
	GROSS BUILDING COST	34,595,314.00	9437	M2	3666	100.00

مثال تجميع بند تشطيبات الأرضيات

CONSTRUCTION OF SCHOOLS IN MUTRAFIAH SECTOR F1 - PHASE 1					
DETAILED COST ESTIMATE					
4-09.02	Floor finishes				
a.	200 mm length x 200 mm width x 20 mm thick	339	m ²	187	63,393
b.	Marble thresholds	40	m	90	3,600
4-09.02.05	Granite tiles for stairs				
a.	Landing external	10	m ²	221	2,210
b.	Steps treads external	74	m	120	8,880
c.	Steps risers external	74	m	90	6,660
4-09.03.03	Thresholds				
a.	Aluminum thresholds	47	m	48	2,256
	Total for Industrial granite tiles				86,999
4-09.02.02	Terrazzo tiles				
a.	200 mm length x 200 mm width x 30 mm thick	666	m ²	108	71,928
4-09.02.09	Concrete paving tiles - roof walkway				
a.	500 mm x 500 mm x 50 mm thick	445	m ²	67	29,815
4-09.03.02	Terrazzo tiles skirting				
a.	100 mm height	336	m	16	5,376
	Total for Terrazzo tiles				107,119
4-09.02.03	Resilient floor finish vinyl rolls				
a.	3 mm thick	5,808	m ²	162	940,896
4-09.02.04	3 mm thick vinyl roll on raised floor	161	m ²	362	58,282
	Total for Resilient floor finish vinyl rolls				
4-09.03.01	Vinyl skirting				
a.	100 mm height	3,276	m	5	16,380
					1,015,558
4-09.02.06	Stamped concrete, broom finish				
a.	500 mm length x 500 mm width x 100 mm thick	59	m ²	67	3,953
4-09.02.07	Stamped concrete tiles				
a.	500 mm length x 500 mm width x 50 mm thick	1,789	m ²	95	169,955
	Total for Stamped concrete				173,908
4-09.02.08	Epoxy paint on 100 mm thick cement screed with hardener and broom finish	366	m ²	45	16,470
4-09.02.10	Seamless polyurethane on rubber base mat				
a.	50 mm thick	402	m ²	96	38,592
	Total for Epoxy paint				55,062

تكاليف الصيانة

التكاليف اللازمة للمحافظة على الأداء الوظيفي للمبنى (المرفق) أو جزء من المبنى أو أنظمتها أو عناصره خلال عمره الافتراضي وتشمل على جميع تكاليف العمالة وقطع الغيار و المواد الاستهلاكية والمعدات اللازمة لأعمال الصيانة المجدولة والغير مجدولة وتكون عادة تكاليف ثابتة سنوية .





LIFE CYCLE DATA

ITEM DESCRIPTION	UNIT OF MEASURE	MAINTENANCE DESCRIPTION	MAINTENANCE ANNUAL COST			ENERGY DEMAND (EU)	REPLACEMENT LIFE (YRS)	PERCENT REPLACED
			LABOR	MATERIAL	EQUIPMENT			

Arch - finish Maintenance

Arch -finish Maintenance												
Serial	ITEM DESCRIPTION	UNIT OF MEASURE	MAINTENANCE DESCRIPTION	MAINTENANCE ANNUAL COST				Quantity	Cost/Unit	ENERGY DEMAND (EU)	REPLACEMENT LIFE (YRS)	PERCENT REPLACED
				LABOR	MATERIAL	EQUIPMENT	Total					
O4	Exterior closures			31,400.00	17,000.00	11,200.00	59,600.00	7,559.00	7.88			
O411	Exterior Walls-150 mm double Block walls+100 mm block	M2	general maintenance +Preventative maintenance					6424	0.0	NA	25	100
O4111	External skin -Terracotta tiles 30 mm on wall/On metal chassis	M2	Preventative & general maintenance	11000	1200	4500	16700	3637	4.6	NA	20	100
	External skin -Plaster +external paint		Preventative & general maintenance	3000	1500	0	4500	2787	1.6	NA	15	
O421	Windows-Aluminum windows Openable (aluminum profile+ double glazing)	M2	General cleaning +Preventative maintenance	14400	7800	4200	26400	586	45.1	NA	25	100
O422	Curtain walls-Glazing curtain wall Fixed panels	M2	General cleaning +Preventative & general maintenance	3000	6500	2500	12000	549	21.9	NA	25	100
O5	ROOFING											
O501	Roof covering	M2	General cleaning +Preventative & general maintenance	10250	11400	1800	23450	7433	3.15	NA	20	100
O6	INTERIOR CONSTRUCTION											
O62	Interior Finishes											
621	Wall Finishing											
	Wall finishing-Acrylic emulsion paint on 20 mm thick cement plaster	M2	General cleaning +Preventative & general maintenance	12750	8242	400	21392	11998	1.8	NA	20	100
	Wall finishing-Industrial granite tiles		General cleaning +Preventative & general maintenance	6500	5158	1800	13458	1359	9.90	NA	20	100
622	Floor finishing											
	Resilient floor vinyl rolls	M2	General cleaning +Preventative & general maintenance	11,000.00	8600	800	20,400.00	5969	3.4	NA	20	100
	Stamped concrete		General cleaning +Preventative & general maintenance	1,500.00	1000	500	3,000.00	1848	1.6	NA	20	100
	Terrazzo tiles		General cleaning +Preventative & general maintenance	2,100.00	1000		3,100.00	1111	2.8	NA	20	100
	Epoxy paint on 100 mm thick cement screed with hardener		General cleaning +Preventative & general maintenance	3,000.00	1700	700	5,400.00	768	7.0	NA	20	100
	Industrial granite tiles		General cleaning +Preventative & general maintenance	1,650.00	1100	200	2,950.00	373	7.9	NA	20	100
623	Ceiling finishing											
	Textured paint	M2	General cleaning +Preventative & general maintenance	500	600	0	1100	667	1.6	NA	20	100
	Ceiling finishing- Gypsum acoustic tiles		General cleaning +Preventative & general maintenance	2200	600	400	3200	2121	1.5	NA	20	100
	Ceiling finishing- Gypsum board suspended ceiling		General cleaning +Preventative & general maintenance	2800	2500	1000	6300	5042	1.2	NA	10	100
	Ceiling finishing- Acoustic gypsum board		General cleaning +Preventative & general maintenance	1000	1458	400	2858	685	4.2	NA	15	100

HVAC-MAINTANNCE

HVAC- Maintenance												
Serial	ITEM DESCRIPTION	UNIT OF MEASURE	MAINTENANCE DESCRIPTION	MAINTENANCE ANNUAI COST			Total	Quantity	Cost/Unit	ENERGY DEMAND (EU)	REPLACEMENT LIFE (YRS)	PERCENT BEPLACED
				LABOR	MATERIAL	EQUIPMENT						
082	HAVC											
0823	Cooling Generating System											
08231	Chilled water system											
	Chilled water - Air cooled water chiller unit 70-ton capacity	EA	Inspection +preventative maintenance	8000	10000	2855	20855	139 tan	150.04		25	70
	Major replacement child water pump (Every 8 years)		Major Replacement cost item	2000	24000	1100	27100				8	20
	Chilled water pump 139 t		preventative Inspection	1300	1150	550	3000				15	70
08241	Air Distribution						0					
	Galvanized steel ductwork cladding, 0.5 mm thick aluminum preformed insulation	M2	Chick leakage general maintenance	12000	2500	1000	15500	7346	111.5	NA	20	60
08242	Exhaust ventilation system						0					
	Exhaust vans different capacity	EA	Insurance Inspection + general maintenance	1200	1100	200	2500	24	18		15	80
08244	Chilled water system						0					
	Chilled water steel pipe (black steel different sizes)+valves	LM	Inspection +general maintenance replacing	4500	1200	400	6100	668	9.1	NA	15	70
	preformed insulation		general maintenance Change the track	1200	450	0	1650	668	2.5	NA	15	70
	cladding, 0.5 mm thick aluminum sheet		general maintenance Change the track	1600	700	0	2300	668	3.4	NA	15	70
	Valves for Chilled water steel pipe (different sizes)	EA	Inspection +general maintenance replacing	4970	1680	350	7000	26	269.2		20	70
08245	Change over Distribution System						0					
	diffuser, ceiling mounted (SCD)+Return linear bar grill,		Cleaning+ general maintenance	4000	1000	500	5500	520	10.6	NA	20	70
	Sand trap +Exhaust air louver		Cleaning+ general maintenance	4700	2400	1000	8100	368	22.0	NA	20	70
	Fire damper		Cleaning+ general maintenance	2100	800	450	3350	53	24.1	NA	15	70
0825	Terminal & package units Units						0					
	Air terminal units (ATU)+Air handling units-Circulating air handling +Fan coil unit	EA	Insurance Inspection + general maintenance	9350	10900	2000	22250	276	80.6		15	80
0826	Control system& Instrumentation						0		0			
08264	Cooling Generating System						0					
	Cooling Generating System-digital control panels control devices Control valves and wiring	EA	Teasting+general maintenance replace Brocken units	3500	6500	0	10000	20	500		15	100

الأسس والمبادئ التي تبنى عليها الإجراءات الإدارية والفنية الضبط والسيطرة

توثيقها في صيغة أمر عمل والذي يشتمل على :

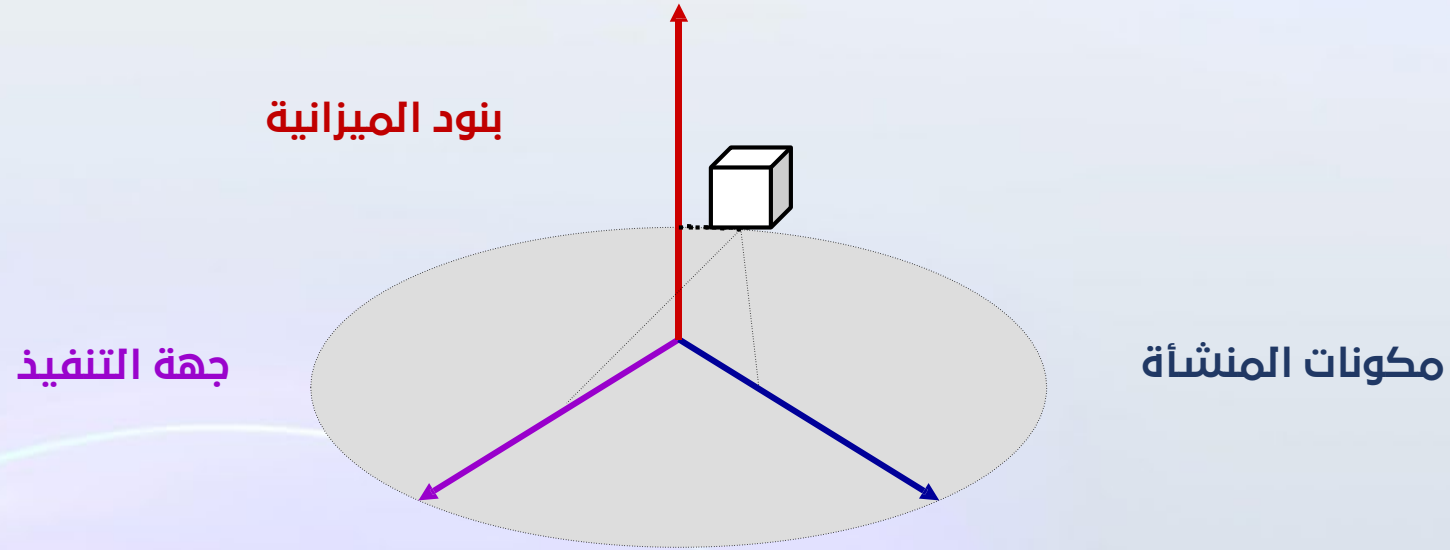
- رقم أمر العمل
- الجهة المستفيدة
- رمز حساب التكلفة
- تقديرات الموارد المستخدمة
- زمن التنفيذ

فصل حق إصدار أمر العمل عن الجهات التنفيذية

الأسس والمبادئ التي تبنى عليها الإجراءات الإدارية والفنية

نظم محاسبية

حصر جميع أنشطة أعمال التشغيل والصيانة وتحديد قيمتها النقدية



خارطة توزيع الموارد (البعد الثلاثي)

الأسس والمبادئ التي تبني عليها الإجراءات الإدارية والفنية

نظم محاسبية

حصر جميع أنشطة أعمال التشغيل والصيانة وتحديد قيمتها النقدية

- تكاليف الوحدة Cost Center

- القالب الموحد UNIFORMAT

- نظام محاسبة العملية (ABC) Activity Based Cost Control System



تكاليف التشغيل

جميع تكاليف استخدام المبنى (المرفق) أو أنظمة أو أي عنصر من المبنى للقيام بوظيفة الأساسية خلال عمره الافتراضي. ويشمل على تكاليف الطاقة , مواد استهلاكية , العمالة اللازمة لتشغيل المعدة أو الجهاز الخ وهي عادة تكون تكاليف دورية " سنوية "



الاستبدال

جميع التكاليف المترتبة على اعادة تأهيل جزء من المبنى (المرفق) أو أحد أنظمتة أو عناصره للقيام بوظيفة الأساسية خلال مدة امتلاك المرفق والاستبدال أما أن يكون جزئى أو كلى وعادة ماتكون تكاليف ثابتة ولا تتكرر بصفة دورية (سنوية)



Total - ARCH

Total -Arch							
System Type	Comp. Categ.	Comp. Name	Units	Init. Cost	Manit. Cost/ Year	Replacement and High Costs	
						Tasks	
						Yr	Cost
O4 Exterior closures							
	O411 Exterior Walls	150 mm double Block walls+100 mm block covered by plaster & paint+ Terracotta tiles	SQM	99.51	0	25	
	O4111 External skin	Terracotta tiles 30 mm on wall/On metal chassis	SQM	173.41	4.6	20	
		Plaster +external paint	SQM	29.64	1.6	15	
	O421 Windows	Aluminium windows Openable (aluminium profile+ double glazing)	SQM	1297.71	45.1	25	
	O422 Curtain walls	Glazing curtain wall Fixed panels	SQM	1081.19	21.9	25	
O5 ROOFING							
	O501 Roof covering	1.5 mm PVC sheets +150 mm insulations	SQM	136	3.15	20	
O62 Interior Finishes							
	0621 Wall finishing						
		Acrylic emulsion paint on 20 mm thick cement plaster	SQM	126.1	1.8	20	
		Industrial granite tiles	SQM	209	9.9	20	
	0622 Floor finishing						
		Resilient floor vinyl rolls	SQM	170.1	3.4	20	
		Stamped concrete	SQM	94.1	1.6	20	
		Terrazzo tiles	SQM	96.4	2.8	20	
		Epoxy paint on 100 mm thick cement screed with hardener	SQM	71.7	7.0	20	
		Industrial granite tiles	SQM	233.2	7.9	20	
	0623 Ceiling finishing						
		Textured paint	SQM	20	1.6	20	
		Gypsum acoustic tiles	SQM	106	1.5	10	
		Gypsum board suspended ceiling	SQM	106.32	1.2	15	
		Acoustic gypsum board	SQM	146.60	4.2	20	

Total - HVAC

Total - HVAC							
System Type	Comp. Cater.	Comp. Name	Units	Inuit Cost	Manit. Cost/Year	Replacement and High Costs Tasks	
						Yr	Cost
082 HVAC							
0823	Cooling Generating Systems						
08231	Air cooled water chiller unit	chiller unit70-ton capacity	EA	290502	10427.5	25	
		Replacement partially 70-pump +belts	EA	27100	3100	8	
		Chilled water pump capcity 139 t	EA	11264.5	1500	15	
0824	Distribution Systems						
08241	Air Distribution	Galvanized steel ductwork cladding, 0.5 mm thick aluminum preformed insulation	M2	157.91	4.53	20	
08242	Exhaust ventilation system						
		Exhaust vans different capacity	EA	1987	166	15	
08244	Hot & Chilled Water Distribution	Chilled water steel pipe (black steel different sizes)+valves	LM	341.3	22.53	15	
08245	Change over distribution System	diffuser, ceiling mounted (SCD)+Return linear bar grill,	EA	306.8	12.1	20	
		Sand trap +Exhaust air louver		172	22	15	
		Fire damper		391.3	63.2	15	
0825	Terminal & Package	Air terminal units (ATU)+Air handling units- Circulating air handling +Fan coil unit	EA	6397	166	15	
0826	Controls & Instrumentation						
08264	Cooling Generating System	digital control panels&control devices&Control valves and wiring	EA	1047.2	33.33	15	

Life-Cycle Cost Analysis

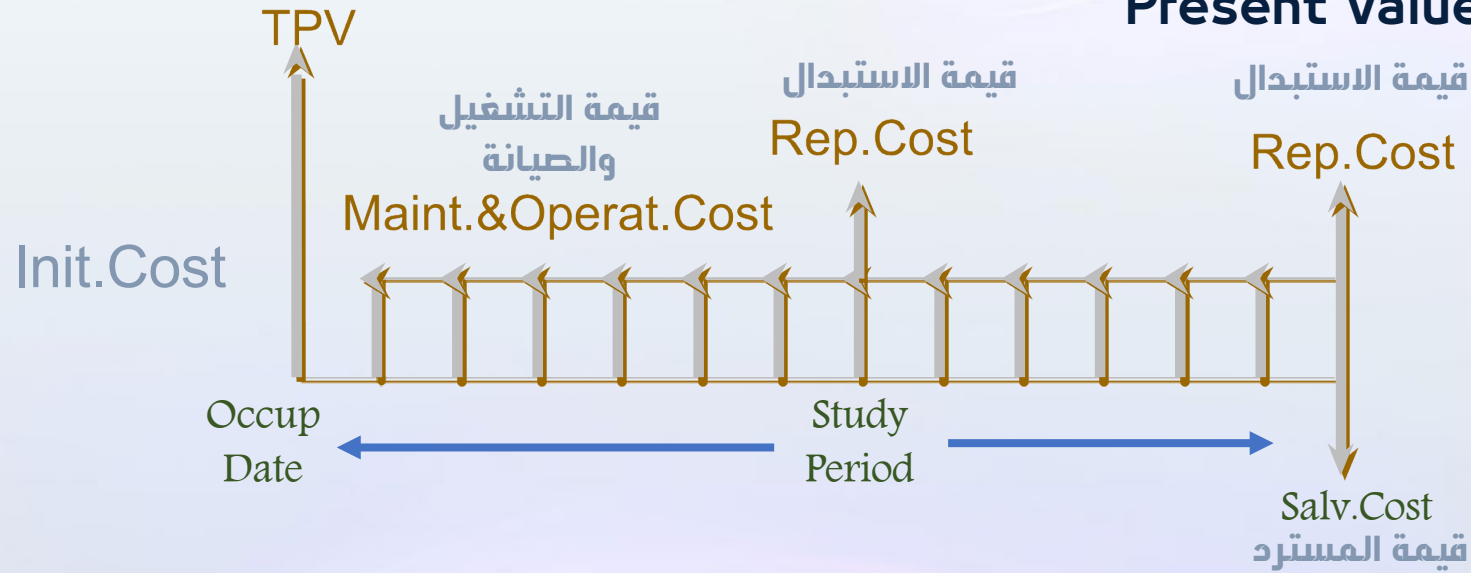
EPS BASED MAINTENANCE AND REPAIR COST DATA FOR USE IN LIFE CYCLE COST ANALYSIS (\$ PER UNIT MEASURE)												
COMPONENT DESCRIPTION	um	PRESENT WORTH OF ALL 25 YEAR MAINTENANCE AND REPAIR COSTS (d=10%)				PRESENT MAINTENANCE AND REPAIR PLUS HIGH COST REPAIR AND REPLACEMENT COSTS						
		By Resources			Washington D.C. Total	Annual Maintenance and Repair			Replacement and High Costs Tasks			
		labor	material	equipment		labor	material	equipment	Yr	labor	material	equipment
ARCHITECTURE												
ROOFING												
ROOF COVERING												
BUILTUP ROOFING	SF	0.03987	0.37166	0.01994	1.25	0.00487	0.03167	0.00244	28	0.04938	0.70490	0.02469
PLACE NEW MEMBRANE OVER EXISTING-BUILDUP									14	0.02414	0.69960	0.01207
MOD. BIT./THERMOPLASTIC	SF	0.02415	0.33069	0.01208	0.86	0.00245	0.03218	0.00123	20	0.05659	0.85860	0.02829
THERMOSETTING	SF	0.01667	0.23941	0.00833	0.61	0.00173	0.02202	0.00086	20	0.03683	0.69960	0.01841
SLATE	SF	0.01809	0.10432	0.00904	0.50	0.00253	0.01458	0.00126	70	0.06885	6.04200	0.03442
CEMENT ASBESTOS	SF	0.01760	0.24341	0.00881	0.63	0.00246	0.03403	0.00123	70	0.05437	0.75190	0.02718
TILE	SF	0.01519	0.20982	0.00759	0.54	0.00212	0.02933	0.00106	70	0.10169	3.07400	0.05084
ROLL ROOFING	SF	0.07156	0.42684	0.03578	2.01	0.00757	0.01556	0.00378	10	0.04141	0.74963	0.02070
SHINGLES	SF	0.02222	0.22132	0.01111	0.71	0.00262	0.02383	0.00131	40	0.04118	0.74497	0.02059
REPLACE NEW OVER EXISTING-SHINGLED ROOF									20	0.02996	0.43460	0.01498
METAL	SF	0.01422	0.11058	0.00711	0.42	0.00199	0.01546	0.00099	30	0.36265	2.17300	0.18132
FIBERGLASS RIGID STP. ROOF	SF	0.02161	1.15262	0.01080	1.63	0.00228	0.06266	0.00114	20	0.04543	6.01550	0.02272
CONCRETE, SEALED PANEL ROOF	SF	0.04260	0.11748	0.02131	1.06	0.00596	0.01642	0.00298	60	0.06123	24.07419	0.03061
CONCRETE, SEALED PANEL RF4	SF	0.03950	0.08408	0.01974	0.96	0.00552	0.01175	0.00276	300	0.04342	24.07419	0.02171
CONCRETE, SEALED POURED	SF	0.09872	0.62996	0.04936	2.81	0.01380	0.08807	0.00690	500	3.81056	18.03219	1.90528
FIBERGLASS, RIGID ROOF	SF	0.03832	1.15262	0.01915	2.00	0.00468	0.06266	0.00234	20	0.04133	6.01550	0.02066

اقتصاديات تكاليف دورة حياة المشروع

- القاعدة الأساسية التي بنيت عليها نظرية تكاليف دورة حياة المشروع
- العوامل التي تؤخذ في الاعتبار عند أي تحليل استثماري
- معرفة كافة طرق التدفق النقدي
- جميع التكاليف ينبغي أن تستند إلى نقطة أساسية مأخوذ في الاعتبار القيمة الزمنية للنقود
- القيمة الزمنية للنقد .

اقتصاديات تكاليف دورة حياة المشروع

طريقة القيمة الحالية Present Value Method □

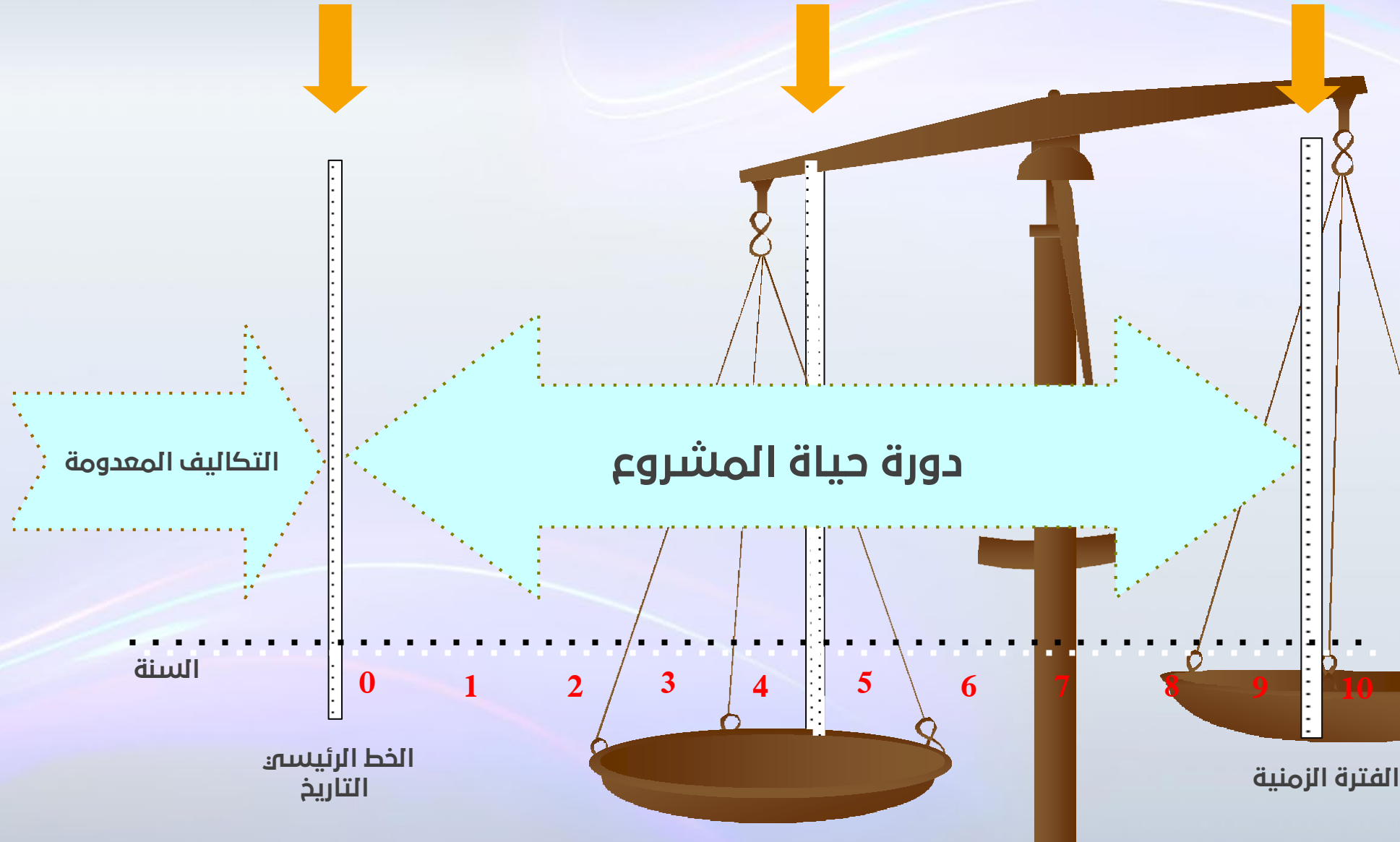


$$LCC=TPV=Init.Cost+PV(Maint.&Operat.Cost)+PV(Rep.Cost)-PV(Salv.Cost)$$

التكاليف الحالية

التكاليف المستقبلية

حسب المتعارف عليه فان التكلفة والفائدة
تحتسب في التحليل المالي بنهاية السنة



اقتصاديات تكاليف دورة حياة المشروع

□ العوامل التي تؤخذ في الاعتبار عند تطبيق تحليل تكاليف دورة حياة المشروع

- ❖ فترة التحليل والدراسة
- ❖ معدل الاستثمار
- ❖ تأثير التضخم

اقتصاديات تكاليف دورة حياة المشروع

□ فترة التحليل والدراسة

- ❖ العمر الافتراضي
- ❖ العمر التقني
- ❖ العمر الإقتصادي
- ❖ العمر الإلزامي

اقتصاديات تكاليف دورة حياة المشروع

□ معدل الإستثمار

❖ يحدد بناءً على المحفظة الاستثمارية للمالك .



اقتصاديات تكاليف دورة حياة المشروع

□ تأثير التضخم

- ❖ التضخم العام
- ❖ التضخم النسبي:

■ منهجية تحليل ودراسة تكاليف دورة حياة المشروع

- ❖ مرحلة تحديد مجال الدراسة
- ❖ مرحلة التطوير
- ❖ مرحلة التقويم
- ❖ مرحلة الاختيار / التوصية

مرحلة التقويم

تنقسم هذه المرحلة الى خطوتين رئيسيتين

- ❖ حساب تكلفة الملكية الكلية (دورة حياة المشروع) لمختلف البدائل
- ❖ تحليل المخاطرة



LIFE CYCLE COST ANALYSIS (LCCA)

Project / Location:

Idea:

Description:

Project Life Cycle = 8 Years
 Discount Rate = 6%
 Present Time =

Alternative 1 Describe: Alternative 2 Describe: Alternative 3 Describe: Alternative 4 Describe:

Carpet A

Carpet B

INITIAL COSTS				Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth
Construction Costs											
A.	Placing Carpet			20	20.00	15	15.00	0	0.00	0	0.00
B.					0.00	0	0.00	0	0.00	0	0.00
C.					0.00		0.00	0	0.00	0	0.00
D.					0.00		0.00	0	0.00	0	0.00
E.					0.00		0.00	0	0.00	0	0.00
F.					0.00		0.00	0	0.00	0	0.00
G.					0.00		0.00	0	0.00	0	0.00
H.					0.00		0.00	0	0.00	0	0.00
I.					0.00		0.00	0	0.00	0	0.00
J.					0.00		0.00	0	0.00	0	0.00
Total Initial Cost					20		15		0		0
Initial Cost PW Savings (Compared to Original Design)							5				0
REPLACEMENT COST/ SALVAGE VALUE											
	Description	Year	PW Factor								
A.	Carpet A	8	0.0	1.0000	20	20.00	0.00	0	0.00	0	0.00
B.	Carpet B	4	4.0	0.7921	0	0.00	15	11.88	0	0.00	0
C.	Carpet C	8	0.0	1.0000	0	0.00	0.00	0	0.00	0	0.00
D.			0.0	1.0000		0.00	0.00		0.00		0.00
E.			0.0	1.0000		0.00	0.00		0.00		0.00
F.			0.0	1.0000		0.00	0.00		0.00		0.00
G.			0.0	1.0000		0.00	0.00		0.00		0.00
H.			0.0	1.0000		0.00	0.00		0.00		0.00
I.	Salvage Value		0.0	1.0000		0.00	0.00		0.00		0.00
Total Replacement/Salvage Costs					20.00		11.88		0		0
ANNUAL COSTS											
	Description	Escl. %	PWA								
A.	Maintenance & Operations		6.210		2	12.42	3	18.63	0	0.00	0
B.			6.210		0	0.00	0	0.00	0	0.00	0
C.			6.210			0.00	0	0.00	0	0.00	0
D.			6.210			0.00	0	0.00	0	0.00	0
E.			6.210			0.00	0	0.00	0	0.00	0
F.	Energy		6.210			0.00	0	0.00	0	0.00	0
Total Annual Costs (Present Worth)					12.42		18.63		0.00		0.00
Total Life Cycle Costs (Present Worth)					52.42		45.51		0		0
Life Cycle Savings (Compared to Original Design)							6.91		0		0

DO NOT TOUCH	
0.94339623	8
0.94339623	8
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0.94339623	8

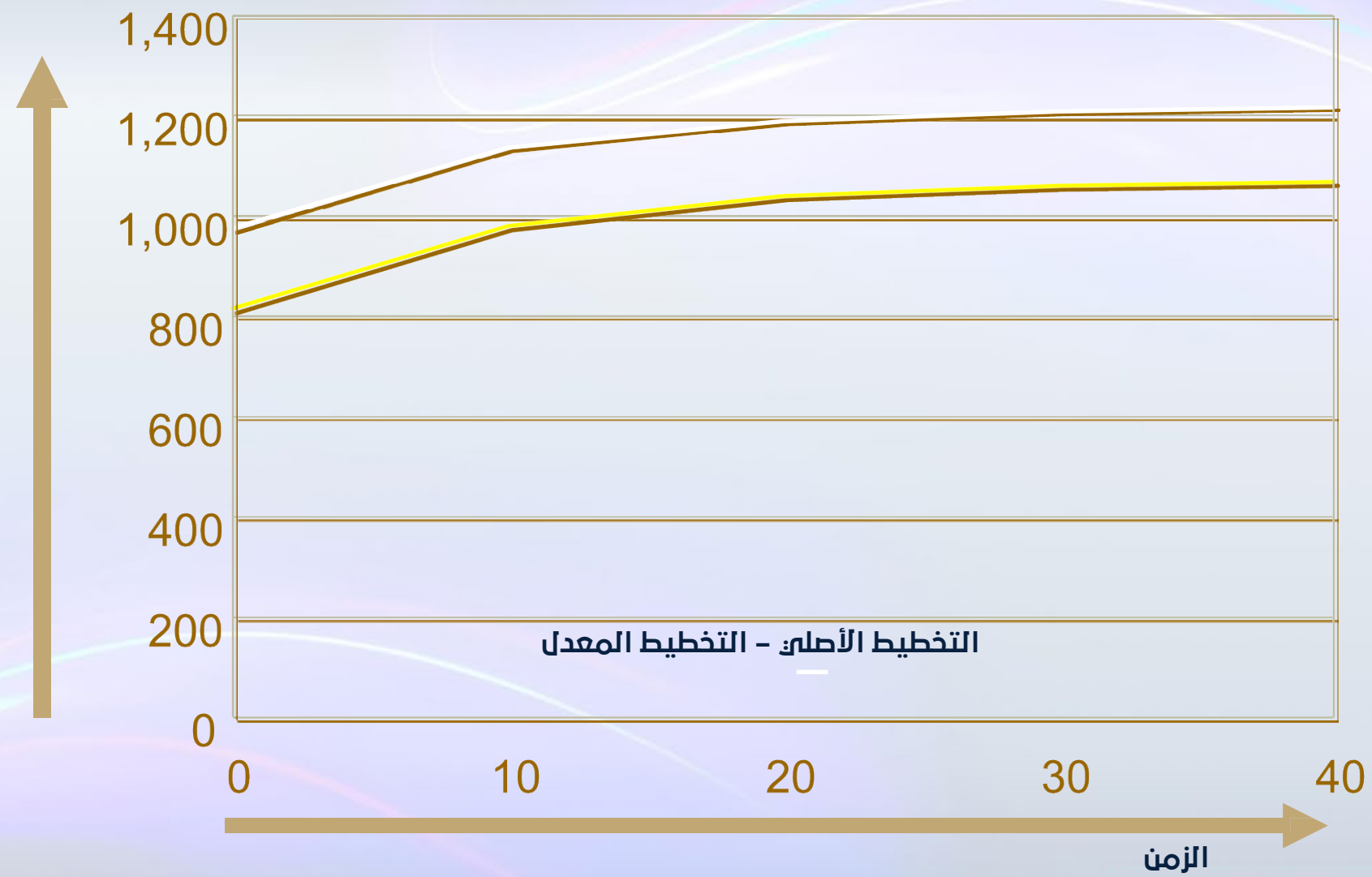
النموذج الإلكتروني

مرحلة التقويم

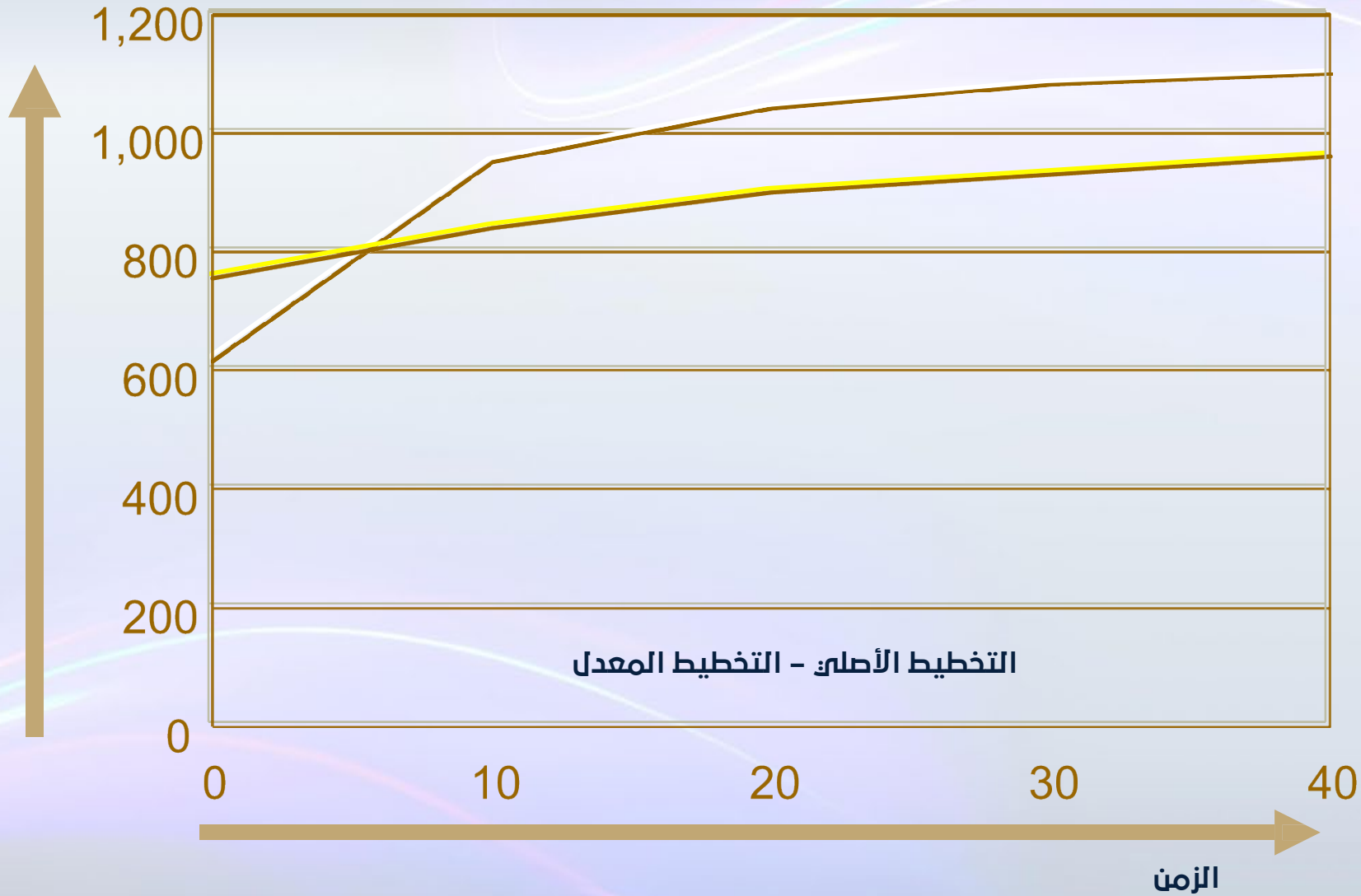
تحليل المخاطرة

- ❖ تحليل الحساسية
- ❖ تحليل نقطة التقاطع
- ❖ مقارنة التكاليف بالفوائد (C/B)

التكاليف الكلية



التكاليف الكلية



التكاليف الكلية



فاعلية جدوى الاستثمار

Benefit - to - Cost ratio (BCR)

مؤشر قياس لفاعلية جدوى الاستثمار

$$BCR = \frac{Benefit}{Cost} = \frac{Net Savings}{Investment} = SIR$$

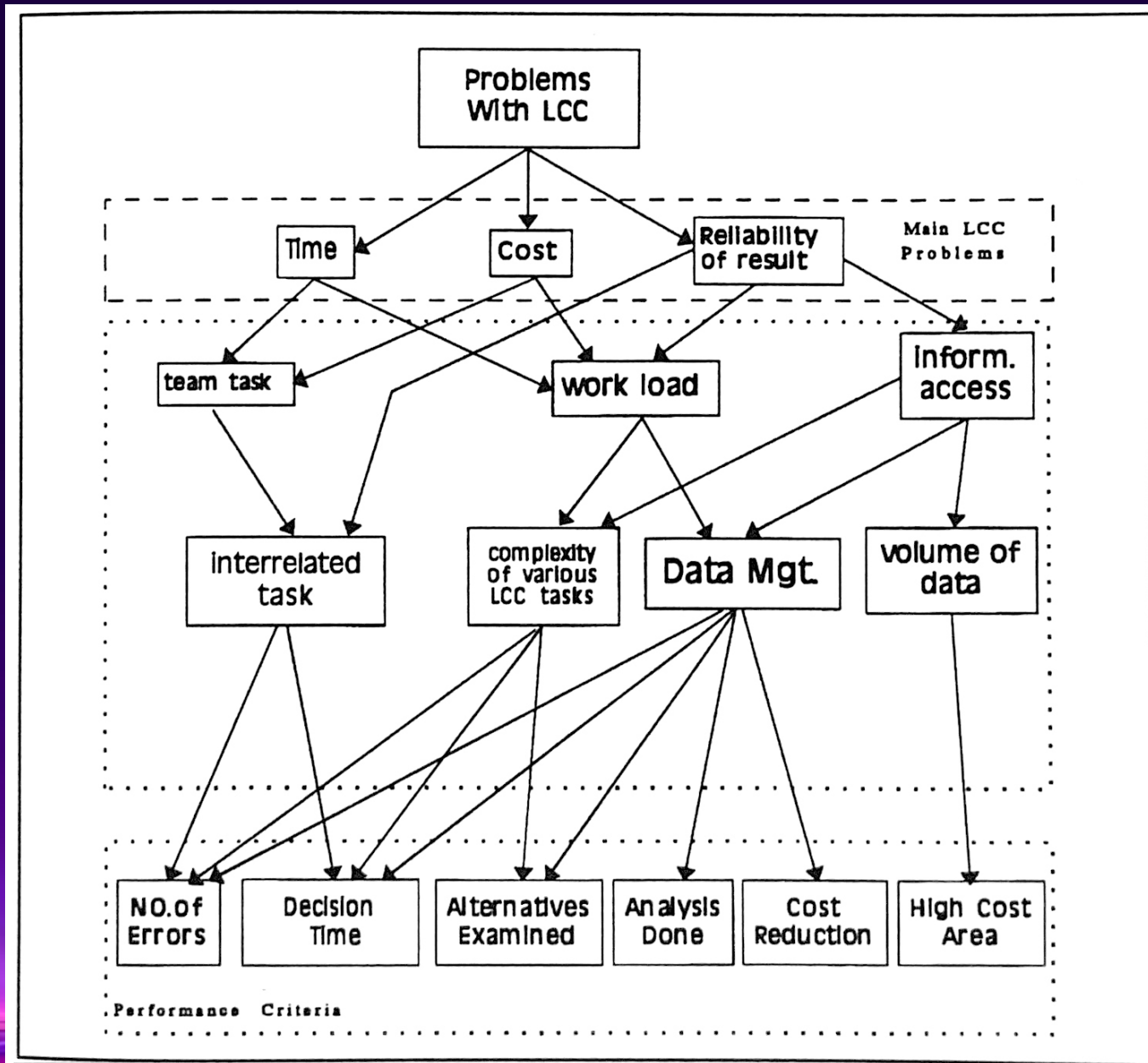
$$SIR = \frac{PW Savings}{Investment Cost}$$

إذا كانت القيمة < 1

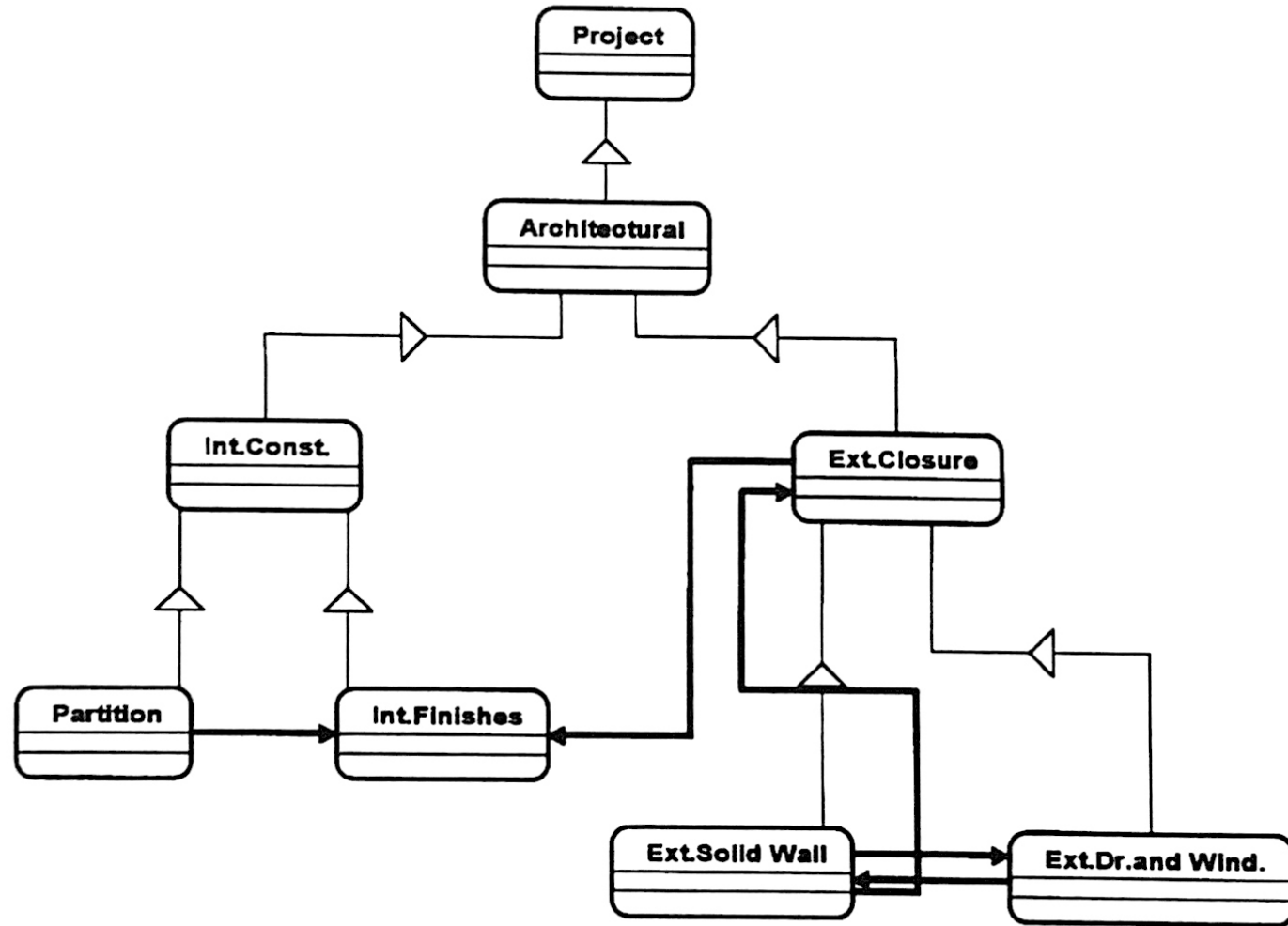
يعتبر الاستثمار ذو فاعلية

مرحلة الاختيار

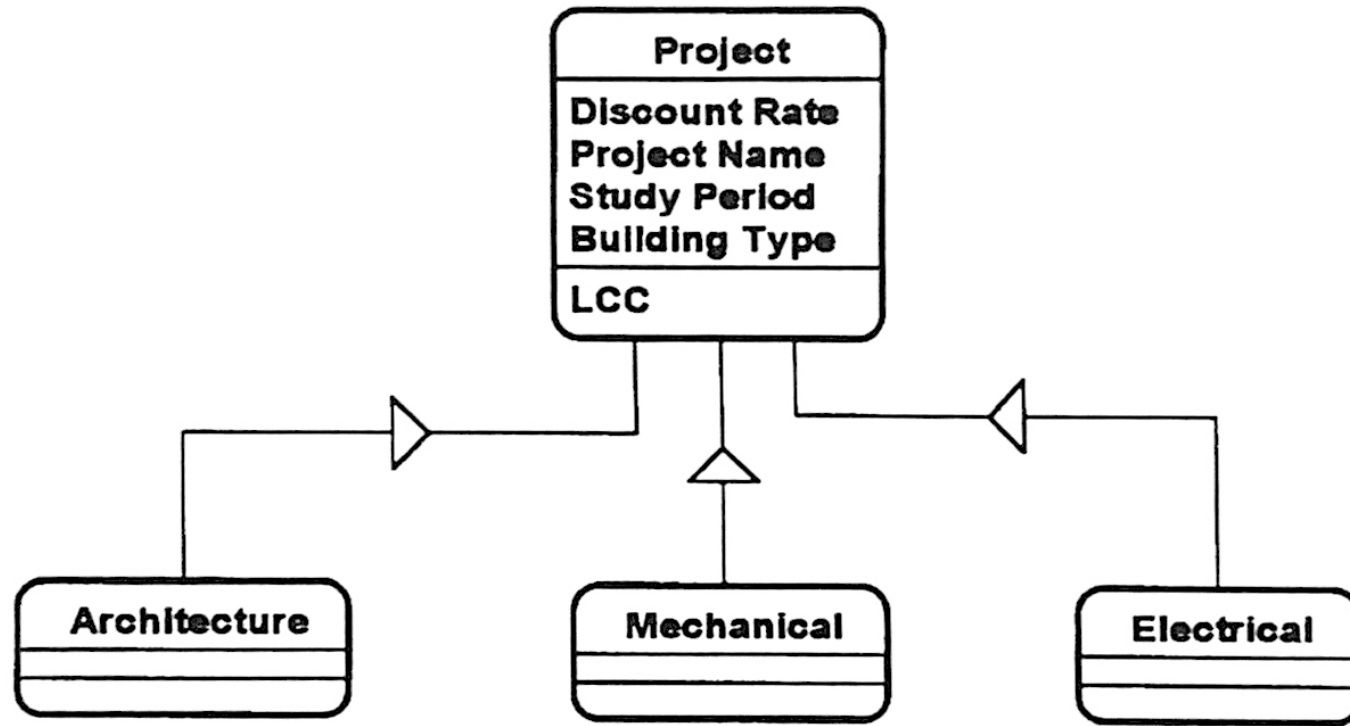
- 1 - مراجعة نهائية للبدائل المتنافسة على ضوء المعايير الاقتصادية
- 2 - مراعاة الفوائد غير الملموسة (عوامل البيئة , السلامة , الجمال) ... الخ
- 3 - التوصيات النهائية



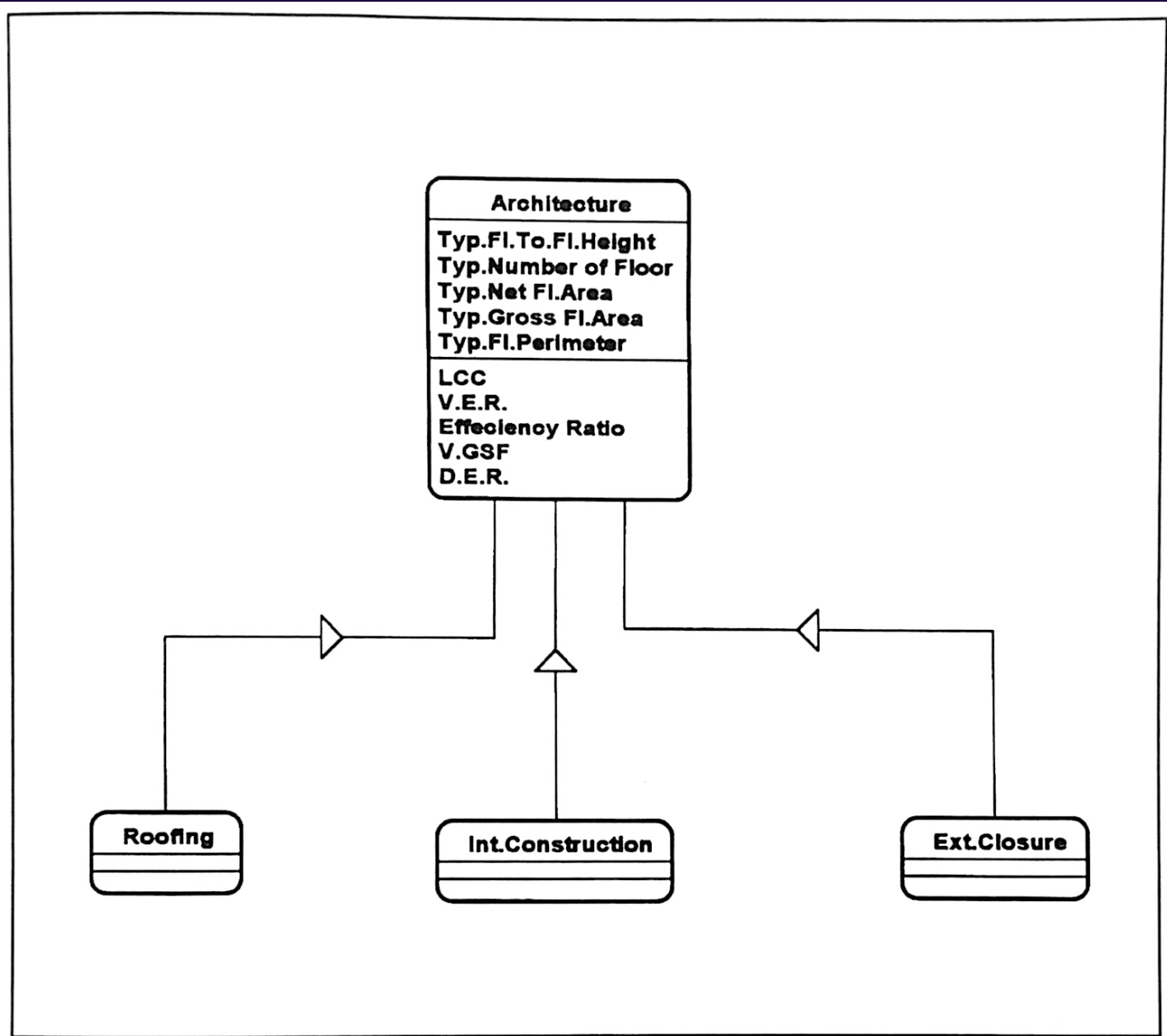
Relationship Between Problems and Criteria



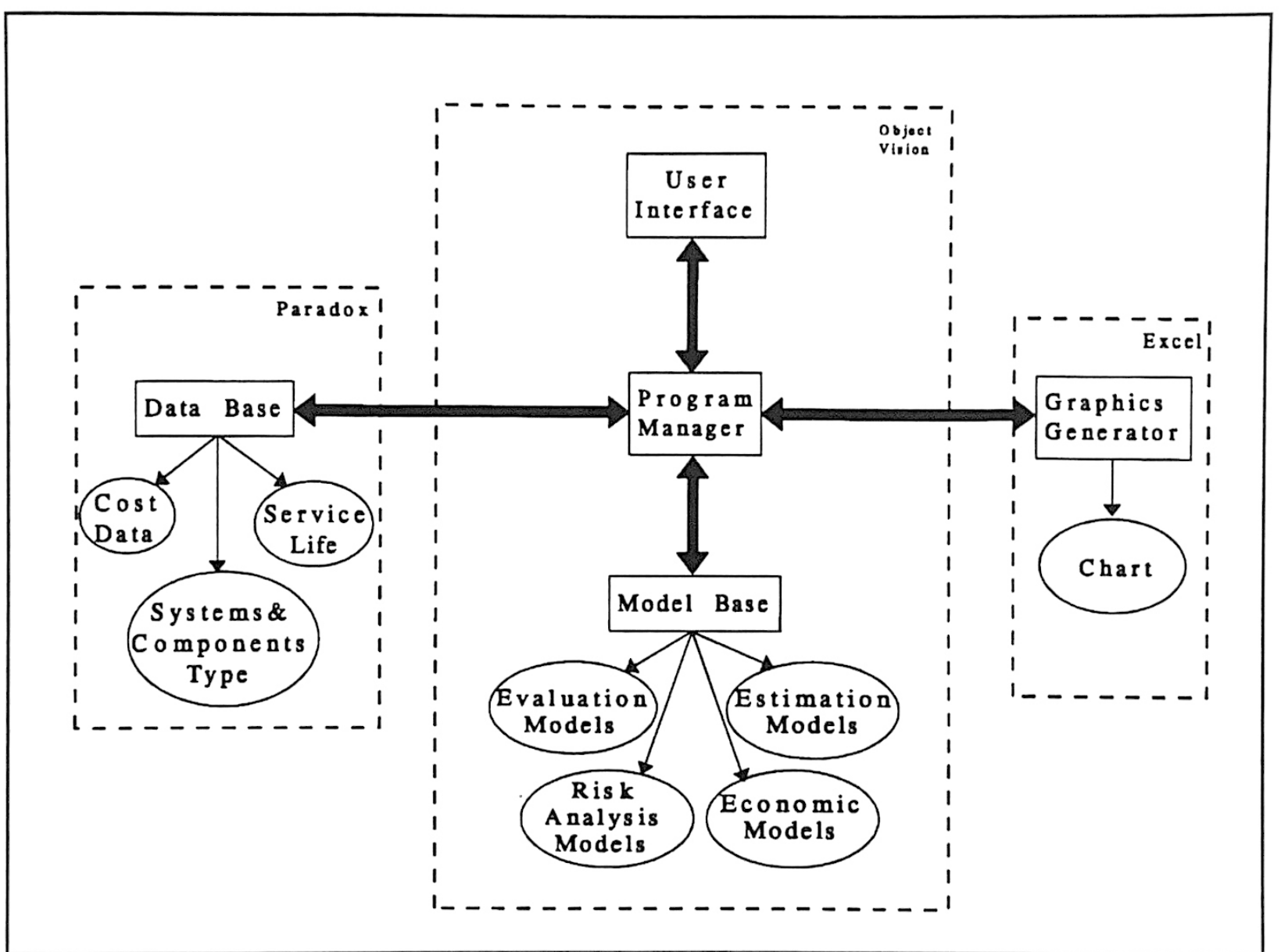
Global Object Model Structure



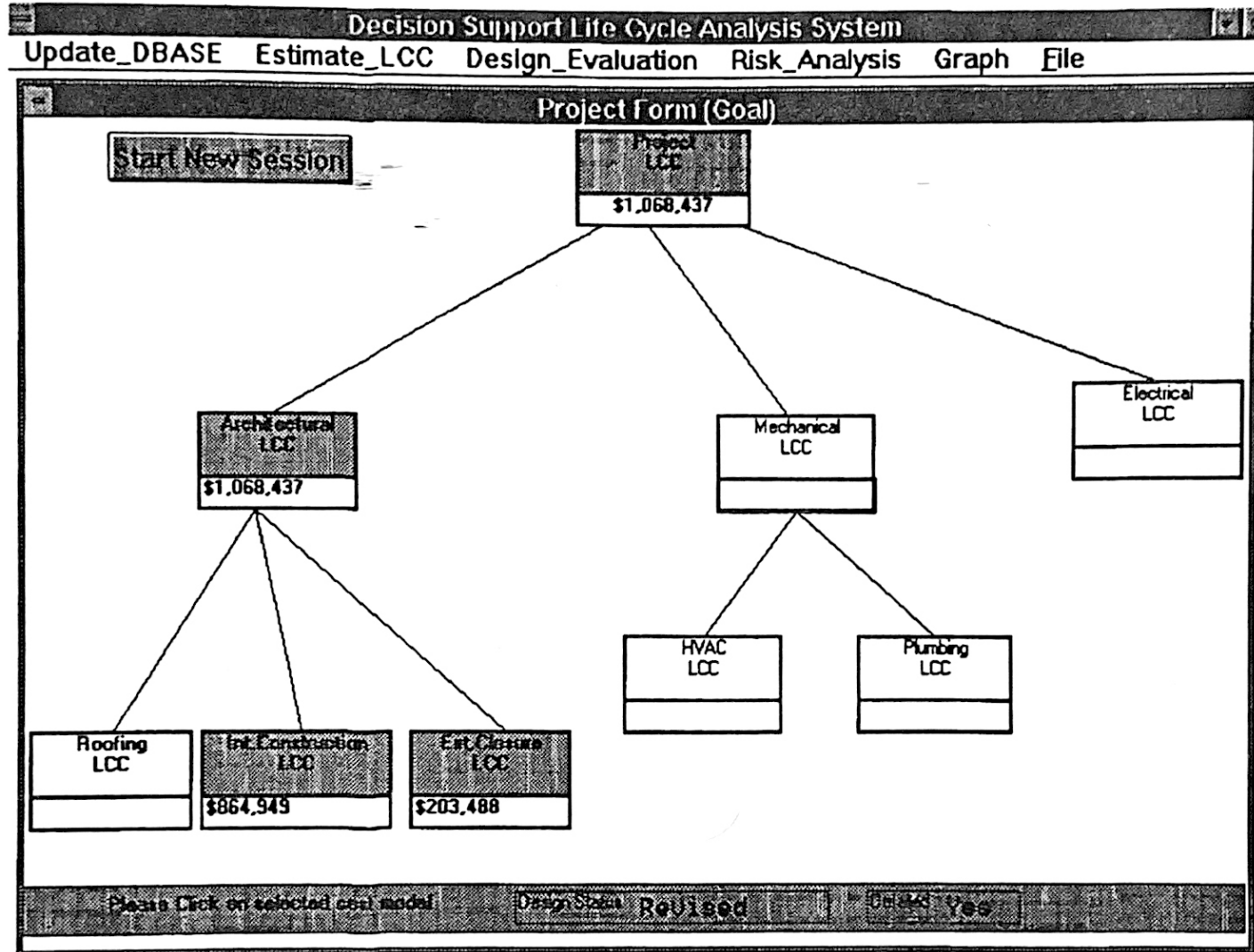
Project Object Structure



Architectural Object Structure



DSLICAS Components



Cost Model Menu

Decision Support Life Cycle Analysis System

Update_DBASE Estimate_LCC Design_Evaluation Risk_Analysis Graph File

Project Form (Goal)

Start New Session

Project LCC
\$1,068,437

Electrical LCC

Architectural LCC
\$1,068,437

Project (Complete)
 Project Name
storage5
 User's Name
Usere # 14
 Building Type
Storage
 Study Period **40** Years
 Discount Rate **10.00%**

Plumbing LCC

Roofing LCC

Int. Construction LCC
\$864,949

ESD Storage LCC
\$203,488

Please Click on selected name model

Project Form

Decision Support Life Cycle Analysis System
 Update_DBASE Estimate_LCC Design_Evaluation Risk_Analysis Graph File

Project Form (Goal)

Start New Session

Project LCC: \$1,068,437

Electrical LCC

Architectural (Goal)

Summary of Building Description

Architectural LCC	Typical No. of Floors "FL"	Typical FL to FL Height "FL"	Typical BLDG. Perimeters "FL"	Typical G.FL. Area "Sq.FL"	Typical N.FL. Area "Sq.FL."
\$1,068,437	1	26.25	404	38777	36777.00

Efficiency Ratio 94.84%

Clear Done

Please insert parameter quantity and hit Return

Roofing LCC

Int. Construction LCC: \$864,949

Ext. Closure LCC: \$203,488

Please Click on selected component Description: ReUseed Print: Yes

Architectural Form

Decision Support Life Cycle Analysis System

Update_DBASE Estimate_LCC Design_Evaluation Risk_Analysis Graph File

Ext. Wall (Goal)

Total Ext. Wall Area
10000 SF

Ext. Wall Type
 Int. Skin
 Ext. Skin

Component Type	Service Life			LCC/Unit
	<input type="checkbox"/> Min	<input checked="" type="checkbox"/> Ave	<input type="checkbox"/> Max	
Gypsum Brd. Pntd. 1Fl	90	100	110	\$5.88
Gypsum Brd. Pntd. 2Fl	90	100	110	\$8.29
Gypsum Brd. Pntd. 3Fl	90	100	110	\$11.56
Marble 1Fl	50	60	70	\$50.51

Total Int. Skin LCC \$104,600.00	Total Ext. Skin LCC \$83,750
Total Ext. Wall LCC \$188,350	

Click Item to select Ext. Wall Type

Selected Int. Skin Wall Type Table				Selected Ext. Skin Wall Type Table			
Item	Comp. Selected	Qty. *SF*	LCC	Item	Comp. Selected	Qty. *SF*	LCC
1	Concrete Blocks 1Fl	5000.00	\$32,250.00	3	Plaster W/Paint 1Fl	5000.00	\$56,700.00
2	InsulALPanel 3Fl	5000.00	\$72,350.00	4	Paint Work 1Fl	5000.00	\$27,050.00

Exterior Solid Wall Form

Decision Support Life Cycle Analysis System

Update_DBASE Estimate_LCC Design_Evaluation Risk_Analysis Graph File

Project Form (Goal)

Sensitivity Analysis (Complete)

Start New S

Discount Rate	10.00%	Original Design LCC	Revised Design LCC
Study Period	40 Years		

Architecture		
Int. Construction		
Partition	\$12,843	\$12,843
Int. Finishes		
Wall Finishes	\$77,528	\$65,528
Ceiling Finishes	\$594,451	\$602,595
Floor Finishes	\$182,261	\$183,983
Ext. Clouser		
Ext. Wall	\$334,550	\$188,350
Ext. Doors & Windows	\$15,138	\$15,138
Total LCC	\$1,216,772	\$1,068,437
Net Savings	\$148,334	

Done

Electrical LCC

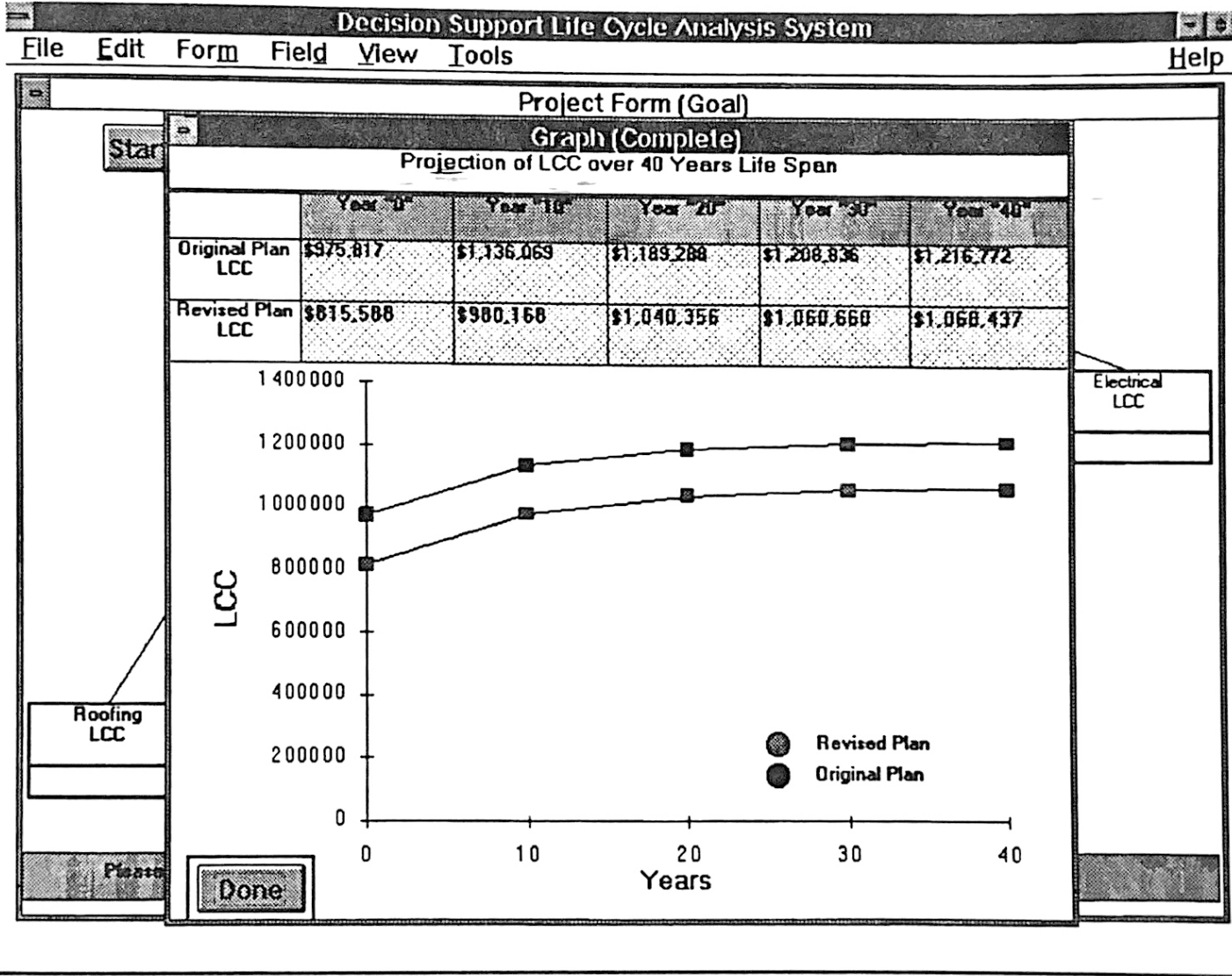
Roofing LCC

Int. \$864.

Arch \$1,064

Please Click on

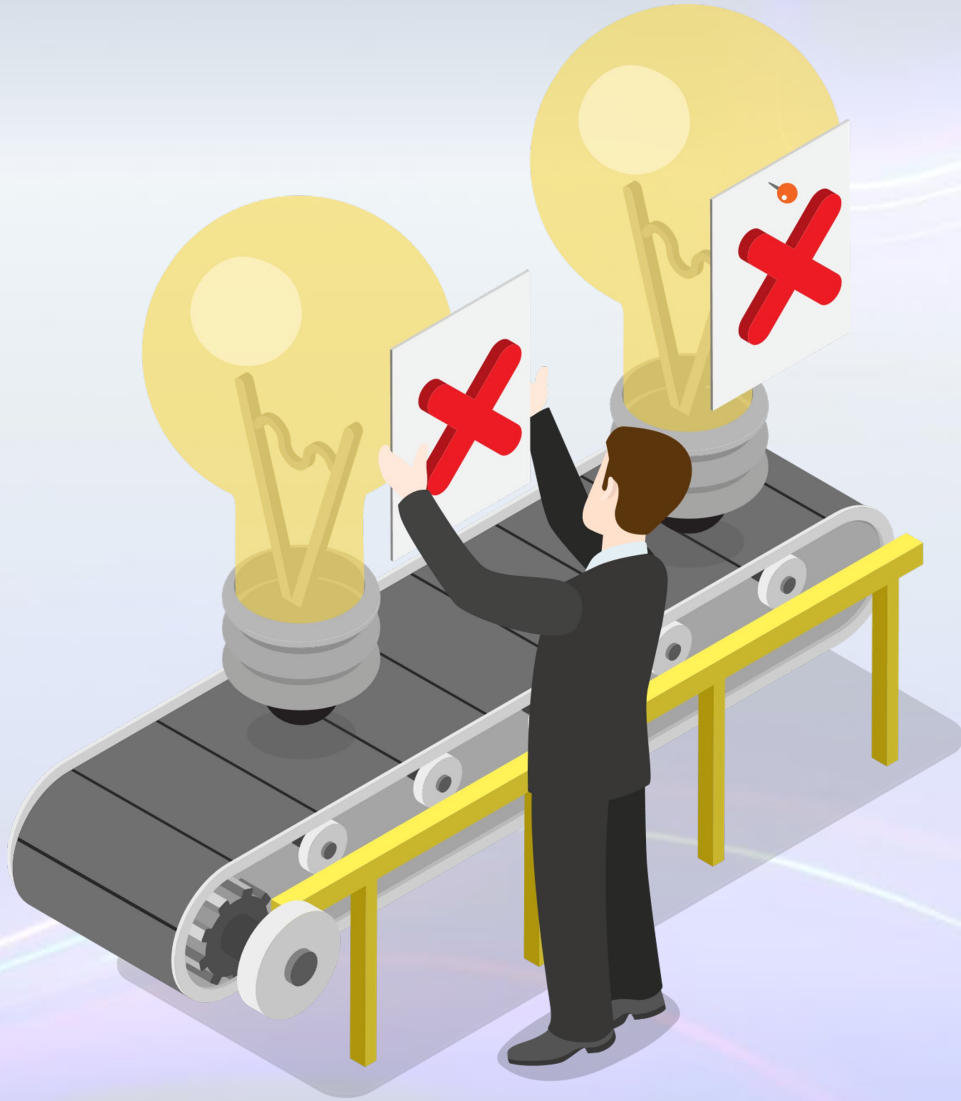
Sensitivity Analysis Form



LCC Projection Graph

هل المرفق يخدمنا أم نحن نخدم المرفق؟؟





خلاصة القول

تزويد متخذي القرار بوسيلة تساعدكم في إدارة
الموارد وذلك بناءً على إجمالي تكاليف الملكية
وليس مقتصرًا على تكاليف رأس المال

خاتمة

إملاك المشروع لا أن يمتلكنا المشروع



تحت رعاية صاحب السمو الملكي الأمير خالد الفيصل
مستشار خادم الحرمين الشريفين، أمير منطقة مكة المكرمة



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