The MODA Project - Planning and Sustainability for a Saudi Arabian Medical City

Session: E10
Thursday, October 4, 2012
LEARNING OBJECTIVES

DISCUSS THE URBAN PLAN
  • User Volume and Impact
  • Client Goals

DISCUSS TRANSFORMING CURRENT OPERATIONAL PLAN INTO A SPECIALTY DRIVEN MODEL

DISCUSS INCORPORATING THE USER EXPERIENCE INTO SUCH AN OVERWHELMING ENVIRONMENT

DISCUSS APPROACH TO SUSTAINABILITY AND THE VALUE-DRIVEN SCORECARD
PANEL DISCUSSION

PANEL INTRODUCTIONS

MODA – A PROJECT OVERVIEW

PROJECT CHALLENGES AND APPROACH
  • TOWN PLANNING VS HOSPITAL PLANNING
  • 4 IDEAS ON SITE DESIGN
  • 4 IDEAS ON BUILDING DESIGN

SUSTAINABLE ENGINEERING
PROJECT BRIEFING
PROJECT

- MODA and GDMW
- Riyadh Military Hospital
- New Military Hospital Campus with Far-Future Expansion
- Desert Site near Riyadh International Airport
- Program, Master Plan and Tender Phase 1 in 600 Days
CAMPUS DIMENSIONS

- Length: Navy Pier to Soldier Field (Da Bears)
- Depth: Middle of the Pier to Michigan Avenue
- Average walking time from one end to the other (1hr-04mins)
- 264 Soldier Field Stadiums
SITE = 3.255 SQUARE KILOMETERS

MEDICAL ZONE = 2,450,000 GSM (5 PHASES)
  6,350 PATIENT BEDS
  110,000 GSM OUTPATIENT CARE
  130,000 PEOPLE DAILY (77,000 PATIENTS + VISITORS)

ACADEMIC CAMPUS = 120,000 GSM (7,000 PERSONS IN 5 COLLEGES)

HOUSING AND RETAIL FOR 50,000 PEOPLE
Medical Zone

- 2,450,000 GSM (26,500,000 GSF)
- 6,350 INPATIENT BEDS (1,200 PH1)
- > 120,000 GSM OUTPATIENT CARE

- CORE MEDICAL HOSPITAL
- TRAUMA HOSPITAL
- OUTPATIENT CENTER
- OP SURGICAL CENTER
- REGIONAL LAB
- ADMINISTRATION
- MATERIALS CENTER
- REGIONAL PHARMACY
- ONCOLOGY HOSPITAL
- PEDIATRIC HOSPITAL
- CARDIAC HOSPITAL
- NEUROLOGY HOSPITAL
- CONFERENCE CENTER
- INFRA-SUPPORT CAMPUS
PROBLEM DEFINITION

OUR VALUES
Agility  citizenship  collaboration  honesty  possibility
Problem Statement: Volume and Variation of User Types
CRITICAL SUCCESS FACTORS

• STATE-OF-ART TECHNOLOGY/ INTNL PLANNING STANDARDS
• DEVELOP A CAMPUS ENVIRONMENT TO HANDLE THE VOLUME
• CREATE A PATIENT-FRIENDLY ENVIRONMENT / PERSONAL RESPECT
• INTEGRATE TEACHING INTO THE MEDICAL ENVIRONMENT
• DEVELOP A LONG-TERM EXPANSION PLAN WITH PHASED APPROACH
SITE CONCEPTS

OUR VALUES
Agility  citizenship  collaboration  honesty  possibility
Initial Concepts for Campus Design – Town Planning Approach
Campus Design Approach – Mall Concept
Mall Concept – Component Zoning

- Housing
- Service
- Retail
- Medical
- Academic

MODA HEALTHCARE CITY PRESENTATION
RIYADH – KINGDOM OF SAUDI ARABIA
1. SPECIALTY-BASED COMPONENTS

2. SEPARATE CIRCULATION PATHWAYS

3. SUSTAINABLE MOVEMENT SYSTEMS

4. MODULAR EXPANSION

OUR VALUES
Agility    citizenship    collaboration    honesty    possibility
1. Create a Specialty Center Based Campus
1. Create a Specialty Center Based Campus (Scalable Components)

PROJECT COMPONENTS

• Core Hospital and A/E Center
• Oncology Center
• Neurology Center
• Orthopedic Center
• Pediatric Center
• Women’s Center
• xxxx
1. Create a Specialty Center Based Campus (Strong Outpatient Program)

OUTPATIENT PROGRAM

- Create a separate OP Centre
- OP Exam Clinics
- Rapid/Multi-Visit Functions
- Ambulatory Surgery
- Volunteer/Donor Programs
- Stand-Alone Capability
- Dedicated Access and Entry Points
- Separate Circulation System
2. Separate Circulation Pathways – Inner and Outer Traffic Ring
2. Separate Circulation Pathways – Entry Point of Service
3. Create a Sustainable Movement System Within the Campus
3. Create a Sustainable Movement System Within the Campus

- Monorail
- Pedestrian
- Green Zone
- Retail
4. Create A Modular Expansion Plan for the Future
BUILDING CONCEPTS

OUR VALUES
Agility  citizenship  collaboration  honesty  possibility
1. CREATE A SIMPLE PLAN

2. ENTRY POINTS AS MAJOR URBAN PLAZAS

3. PUBLIC “EXPERIENCE” PUSHED FORWARD

4. SUSTAINABLE SKIN DEVELOPMENT

OUR VALUES
Agility  citizenship  collaboration  honesty  possibility
1. Create a Simple Plan

PLANNING APPROACH

- Modular Approach to Towers
- Uniform Approach to Patient Care
- Tower – Court – Tower

- Keeps Campus Flexible
- Allows Users to move between Facilities
1. Create a Simple Plan

PLANNING APPROACH

• Separation of Staff and Public Circulation
• Public in a “mall” setting on front
• Staff on back bar with uniform support services
• All utilities are standardized in front and back bars
2. Consider Entry Points as Major Urban Plazas

**URBAN PLAZA**

- Consider volume of entry area
- Users from multiple forms of arrival
- Both entry and retail mentality
- Both highly mobile and stationary functions
3. Keep All Public “EXPERIENCE” in the Forward Bay

PUBLIC MALL CONCEPT

- Major public circulation spine
- Separate from medical departments
- Continuous around campus
- Uniform in planning approach to all specialty centers
- Circulation, retail and waiting
4. Sustainable Skin Development (Utilization of Daylight)

DAY LIGHTING AND WAYFINDING

• Keep public in this zone
• Offer comfortable spaces (physical/mental to draw users
• Use ample day lighting for sustainability
• Allow for ample views
• Use view corridors for wayfinding
PERFORMANCE DRIVEN DESIGN

- Map functions on inside of exterior wall
- “rate” the exterior skins as to their importance to the internal user and the aesthetic requirements
- Determine the associated budget for each area based on relative rating
- Develop a design/glazing strategy

4. Sustainable Skin Development (Exposure Valuation)

- **10%** rear
- **30%** courts
- **40%** front

<table>
<thead>
<tr>
<th>Total Area</th>
<th>Total Viewable Area</th>
<th>% Glazing Exposure (VA)</th>
<th>% Screened</th>
<th>% Ultra-High Perform</th>
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</thead>
<tbody>
<tr>
<td>20% side</td>
<td>30%</td>
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4. Sustainable Skin Development (Ultra High-Performance Glazing)

ULTRA HIGH-PERFORMANCE SKIN

- Using the rating data, develop glazing approach
- Use of second skin, double skin and high-performance glazing walls
- Use “punched” approach where appropriate
- Maintain concept to draw public to the outer bays with natural light and comfort
CAMPUS ENGINEERING
STARTING POSITION

• No Services

NEEDS

• Sanitary Services
• Electrical Utilities
• Emergency/Redundant Power
• Chilled Water/Cooling
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<th>Campus Buildings</th>
<th>Phase 1-4</th>
<th>Phase 1-5</th>
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<tbody>
<tr>
<td>Building Area</td>
<td>45,488,242 GSF</td>
<td>67,703,177 GSF</td>
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<tr>
<td>Chilled Water</td>
<td>114,095 Tons</td>
<td>172,950 Tons</td>
</tr>
<tr>
<td>Steam</td>
<td>444,438 lbs/hr</td>
<td>660,604 lbs/hr</td>
</tr>
<tr>
<td>Water</td>
<td>89,38,563 GPD</td>
<td>12,339,370 GPD</td>
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## Case Study: Water

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Case Study: Water

WATER DISTRIBUTION
- Water Storage will be a Combination of Central Storage and Local Building
- Local tanks can become buried for Other Design Initiatives
- Grid Configured System will Help to Develop Reliability
- Chilled Water from Two Plants

IRRIGATION DESIGN
- Primary Source will Originate from Onsite Sewage Treatment Plant
- Municipal Water will be Back-Up Only
- Satellite Sewage Tanks and Pumping Stations will be throughout Campus
CHILLED WATER RADIATOR

- Staged chillers with fluid coolers
- Chiller plant connected via tunnels/direct-bury pipes
- Sustainable – Zero Water Usage Plan

ON-SITE WATER USAGE

- 3 Means: Trucks, Wells, and City Water Connections
- Central and distributed water throughout campus
- Reliability: grid system for redundancy
Sustainable Engineering Approach

WATER
- Grey Water ReUse
- Option to Separate Black Water and Grey Water has been Developed for Greater Sustainability
- Water Harvesting – Multiple Sources
- Low-Flow Fixture Design

ENERGY
- Potential Solar Energy Usage
- Thermal Energy Storage
- Energy Recovery for Outdoor Air Vent Systems
- Variable Drive/Variable Air Volume Systems
- Radiant Cooling/Heat Recovery Chillers
OPEN DISCUSSION