

ADAPTATION OF IoT in AUTOMATED WASTE MANAGEMENT

**By Ir. CHEA THEAN TEIK
STREAM GROUP SDN. BHD.**



PRESENTATION OUTLINE



Conventional Waste Management & the Issues



Automated Waste Collection System (AWCS) & Why AWCS?



Case Studies



Stream Group of Companies



Conventional Waste Management & The Issues

Automated Waste Collection System (AWCS) & Why AWCS?

Case Studies

Stream Group of Companies

Conventional Waste Management: Key Issue-1, Commingle of Wet & Dry Waste



Manual Transfer



Commingled Dry, Wet, Recyclables and Non-Recyclables



Commingled Wet Organic Waste



Conventional Waste Management: Key Issue-2, Open Storage, Pest Breeding Ground



**Colony of Rats (Pest) in Refuse
Centre, Breeding Ground for Pest**



Conventional Waste Management: Key Issue-3, Pest in Mall, Hygiene Issues



Pest, Hygiene Issues



Conventional Waste Management: Key Issue-3, Public and Environmental Nuisances



**Public Nuisance,
collection & transporting
waste**



**Environmental Nuisance,
Leachate & odor**





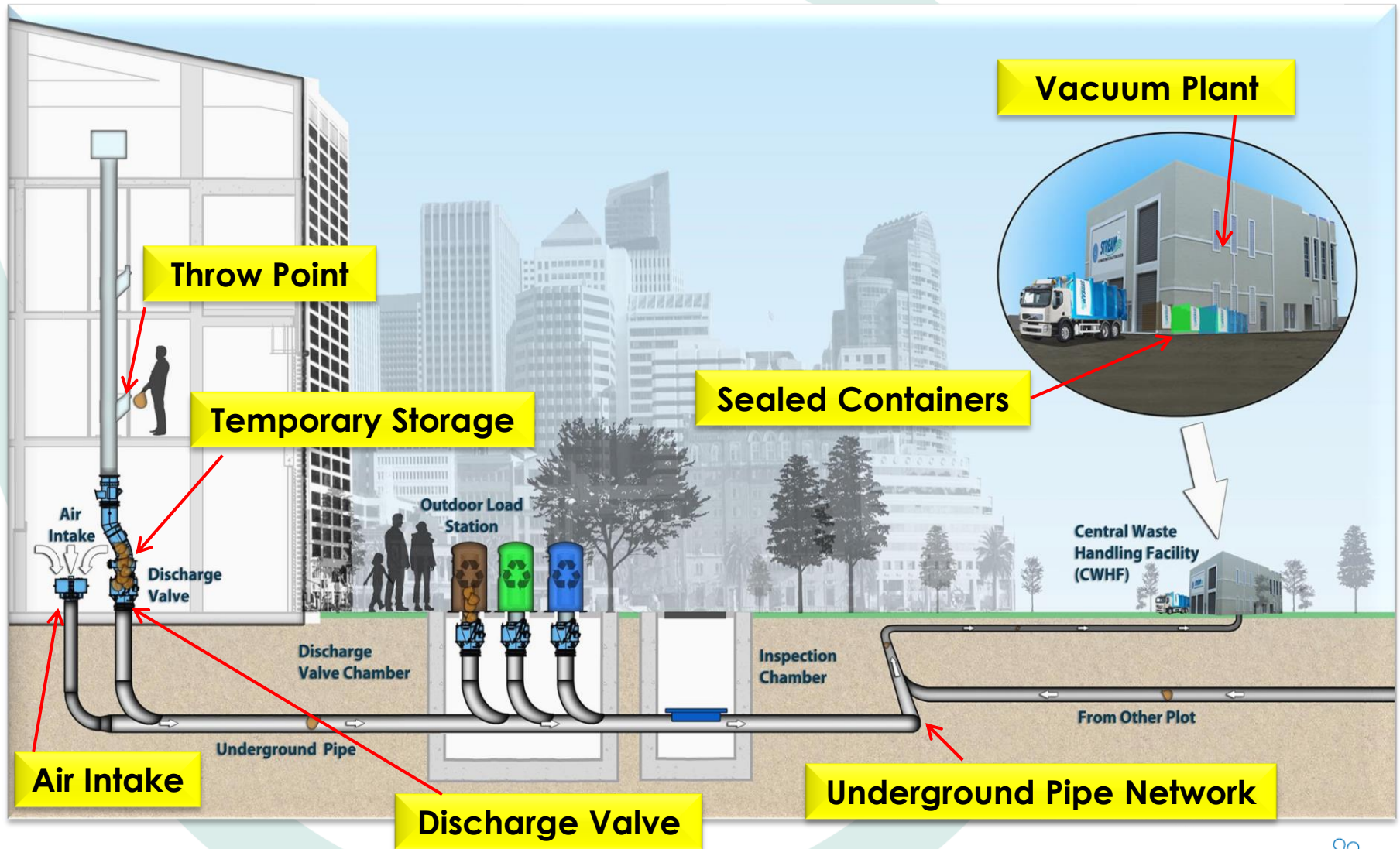
Conventional Waste Management & The Issues

**Automated Waste Collection System (AWCS) &
Why AWCS?**

Case Studies

Stream Group of Companies

AUTOMATED WASTE COLLECTION SYSTEM COMPONENT

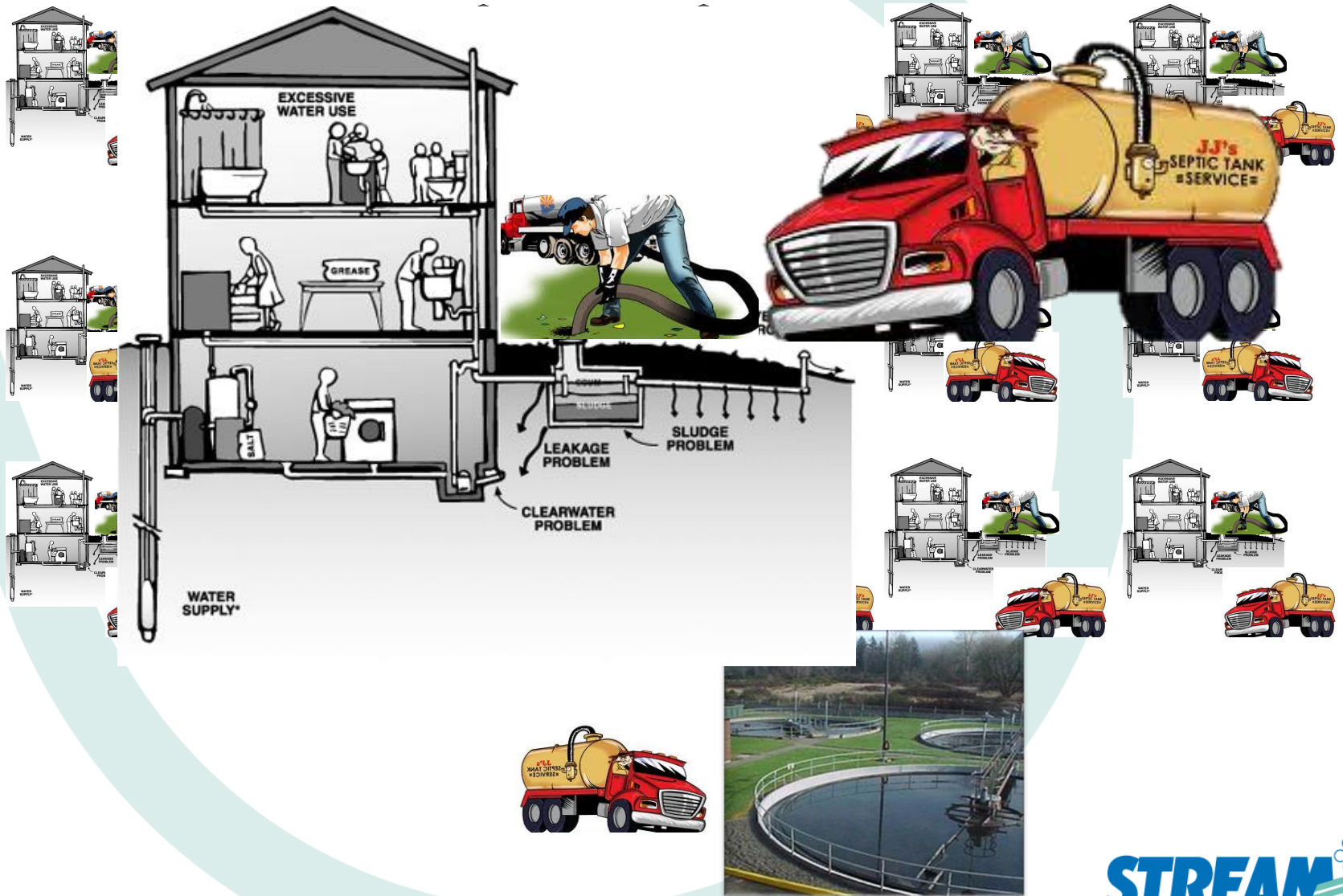


REMEMBERING SEWERAGE: Before 60s



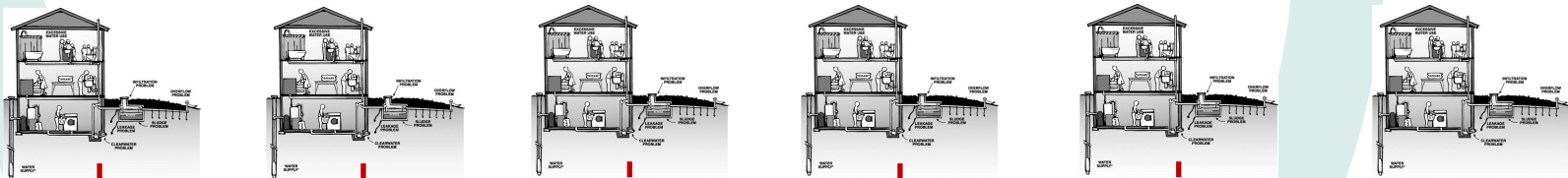
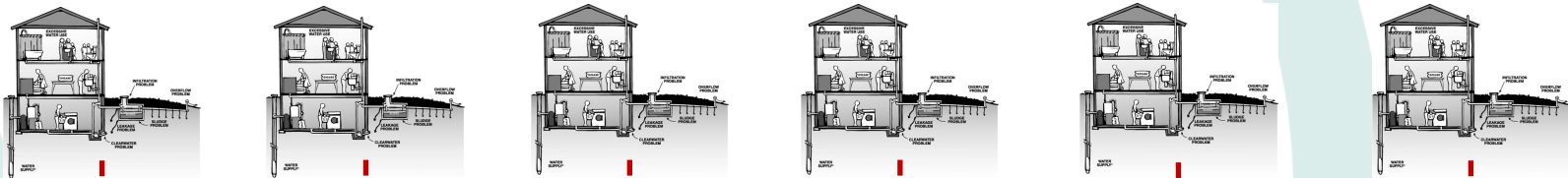
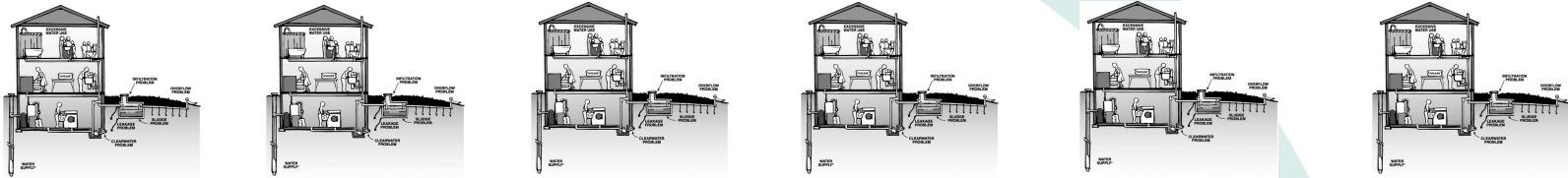
Why AWCs?

REMEMBERING SEWERAGE: After 60s (Septic Tank introduced)



Treatment Plant

REMEMBERING SEWERAGE: After 90s (sewerage treatment plant)



(Automated Sewerage
Collection System)







WHAT DETAILS ONT LOBBY...



CONVENTIONAL WASTE COLLECTION SYSTEM



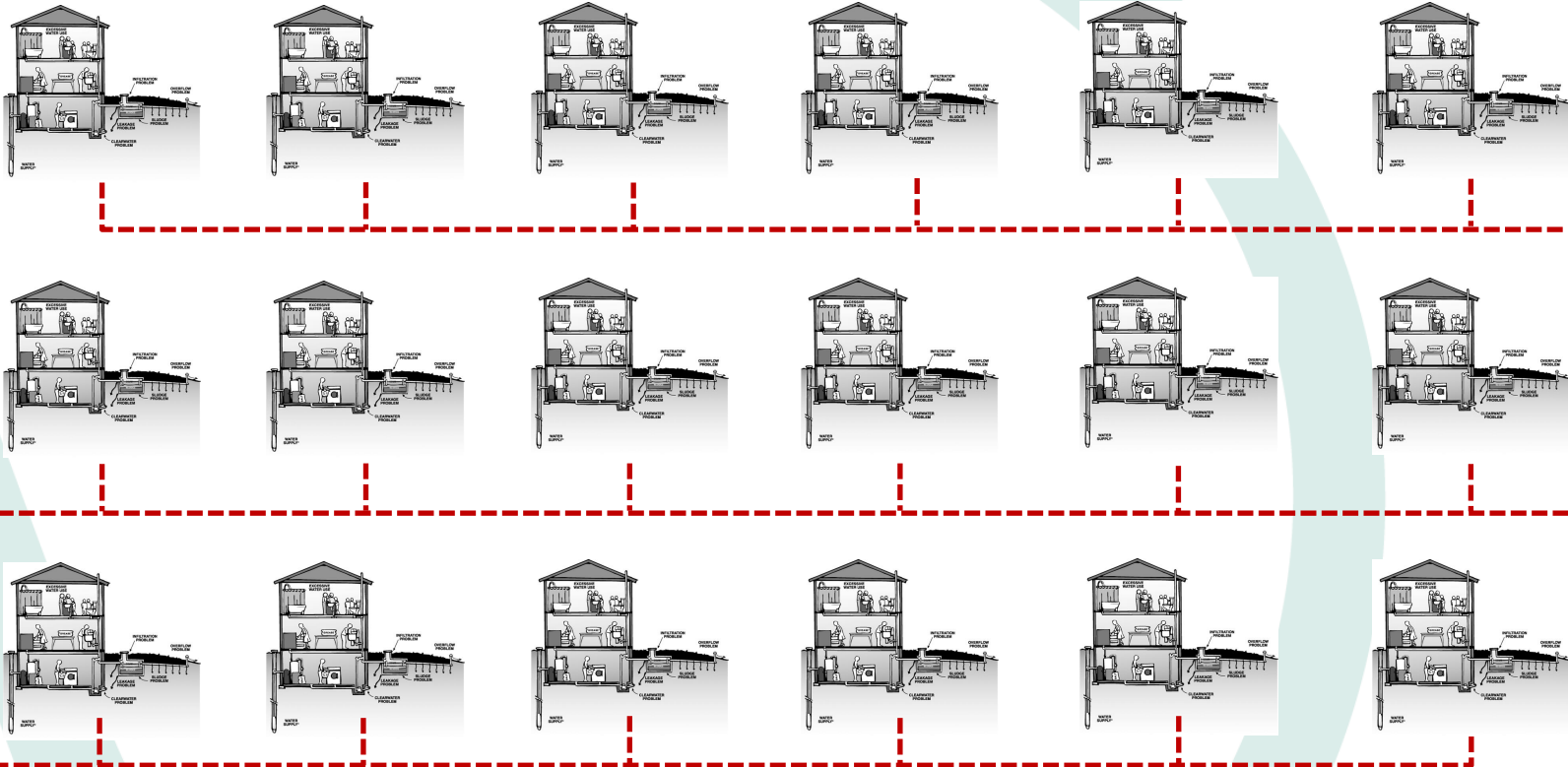


CONVENTIONAL WASTE HANDLING



Landfill

WHY NOT AWCS ??



Material Recovery Facility



Aerobic Digestion Plant

(Automated Waste
Collection System)



Current Piped/Cabled/Infra-structured utilities :

Water Supply



Sewage



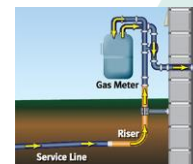
Power Supply



Transportation

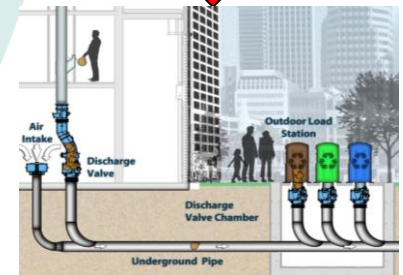


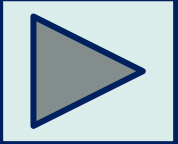
City Gas



Non-Piped Utility

Solid Waste







Conventional Waste Management & The Issues

Automated Waste Collection System (AWCS) & Why AWCS?

Case Studies

Stream Group of Companies

Project-1: ASPEN VISION CITY, ECOCITY, BATU KAWAN

Project Information

- ▶ Country : Malaysia
- ▶ City : Penang
- ▶ Developer : Aspen Group
- ▶ Project Startup : 2018
- ▶ Project Completed : 2021
- ▶ Application : Mixed Development
- ▶ Area of development : 245 Acres

STREAM Automated Waste Collection System

- ▶ Type of System : Gravity Vacuum + Full Vacuum System
– District Wide System
- ▶ Total Pipe Length : >3,000m
- ▶ AVWCS Capacity : 20.5 metric ton/day (Module-1 of 3)

EcoCity Batu Kawan



a) Pengurusan sisa pepejal .

Bagi pengurusan sisa pepejal adalah di cadangkan vakum . Infrastruktur yang perlu disediakan adalah :- kaedah sistem

i. RangkaianLaluan Sistem Paip (Piping Network)



ii. Pusat Pengumpulan.



EcoCity
BATU KAWAN



MAJLIS PERBANDARAN
SEBERANG PERAI

GARISPANDUAN PERANCANGAN
DAN
PELAN INDUK PEMBANGUNAN

b) Kemudahan-Kemudahan Yang Perlu Disediakan.

Bagi memastikan sistem pengurusan sisa pepejal ini efektif beberapa kemudahan perlu di sediakan iaitu :-

- Depo Lori – Unit Kejiranan 6
- Pusat Kompos /Pusat Recycle /Pusat E-waste
– Unit Kejiranan 1,2,3 dan 4
- Pusat pelupusan sisa parit/ pasir/sisa CnD
– Unit Kejiranan 6

CASE STUDY 1: ASPEN VISION CITY MODULE 1



A prestigious project jointly developed by:



CASE STUDY 1: ASPEN VISION CITY MODULE 1



CASE STUDY 1: ASPEN VISION CITY MODULE 1

PEMBANGUNAN
BERCAMPUR
47.10 ek

UNIVERSITI

17.30 ek

CENTRAL WASTE HANDLING FACILITY.
REF DWG : SEMY/417-16/AVCO/QT/01-01

Module 1

CENTRAL WASTE HANDLING FACILITY.
REF DWG : SEMY/417-16/AVCO/QT/02-01

Module 2 & 3

Module 1 Underground
Waste Transport Pipe

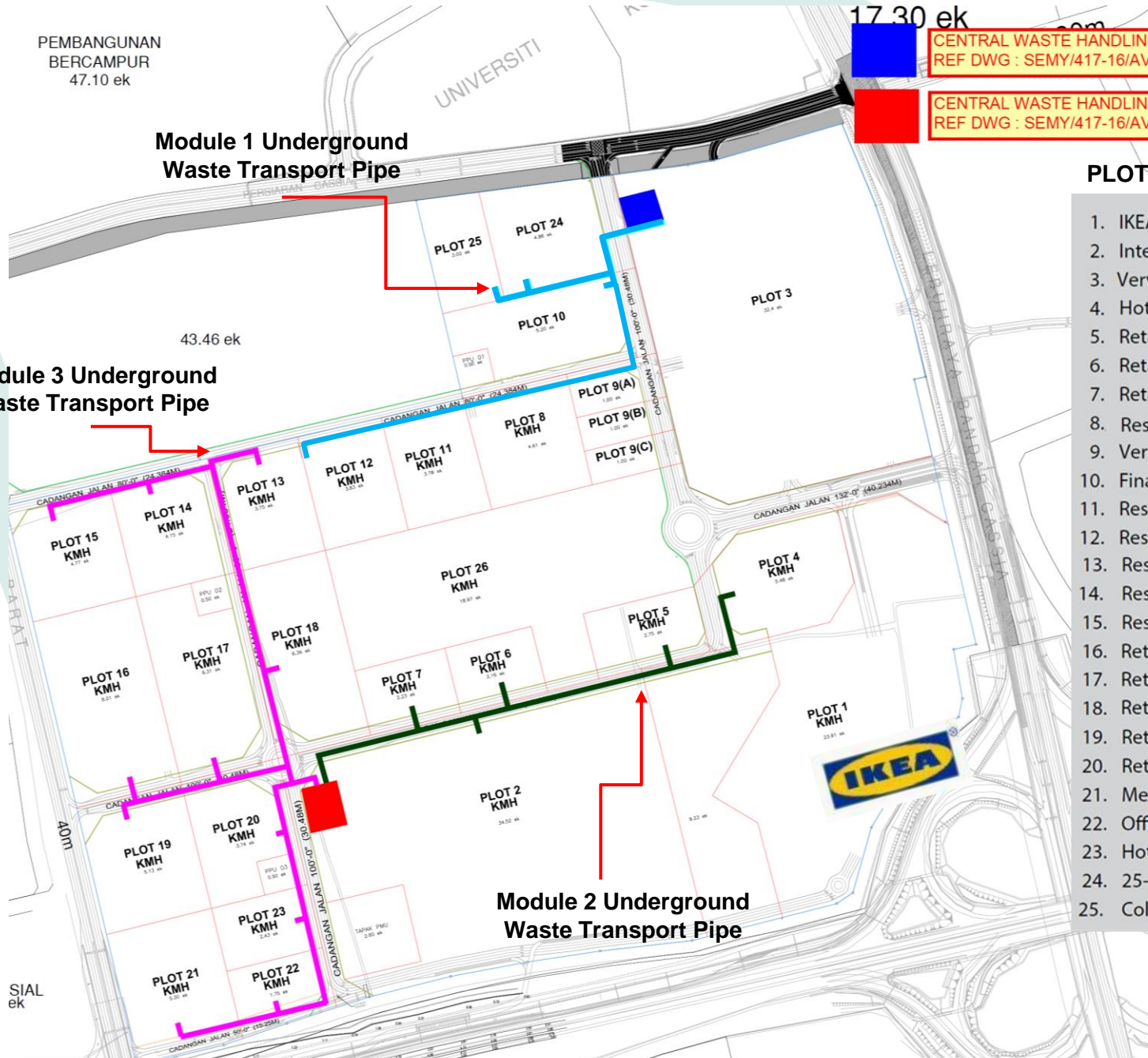
43.46 ek

Module 3 Underground
Waste Transport Pipe

Module 2 Underground
Waste Transport Pipe

PLOTS:

1. IKEA Store
2. Integrated Regional Shopping Centre
3. Vervéa Shop Offices
4. Hotel, Office Tower & Serviced Suites
5. Retail & Serviced Suites
6. Retail & Serviced Suites
7. Retail & Serviced Suites
8. Residential
9. Vertu Resort
10. Financial Hub
11. Residential
12. Residential
13. Residential
14. Residential
15. Residential
16. Retail / Office & Residential
17. Retail / Office & Residential
18. Retail / Office & Residential
19. Retail & Serviced Suites
20. Retail & Serviced Suites
21. Medical Centre & Healthcare Facilities
22. Office
23. Hotel
24. 25-acre Central Island Park
25. Columbia Asia Hospital










- Waste Infrastructure Pipeline
- CWHF Central Waste Handling Facility / Bin Center



CASE STUDY 1: ASPEN VISION CITY MODULE 1

-  Underground Waste Pipeline
-  Spiral Waste Bin
-  Central Waste Handling Facility
-  Discharge Valve
-  Full Vacuum Station



CASE STUDY 1: CONSTRUCTION PHASE



Central Waste
Handling Facility
– Central Station

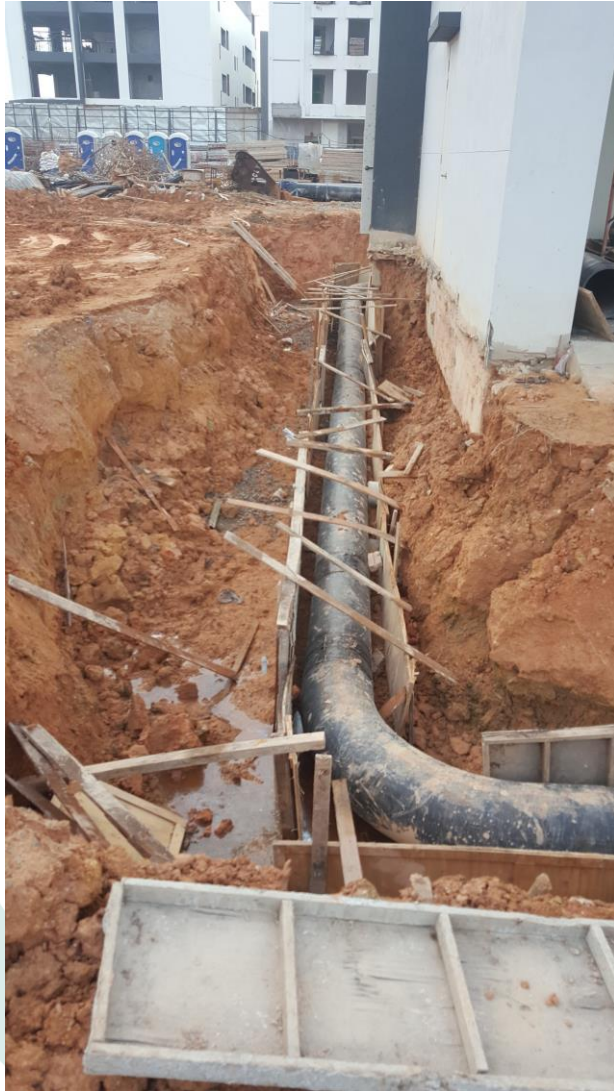
CASE STUDY 1: CONSTRUCTION PHASE



Central Waste Handling Facility (CWHF) in progress



CASE STUDY 1: CONSTRUCTION PHASE



Underground piping installation in progress

CASE STUDY 1: CONSTRUCTION PHASE



CASE STUDY 1: CONSTRUCTION PHASE



Completed Central Waste Handling Facility (CWHF) **STREAN**™

Project Information

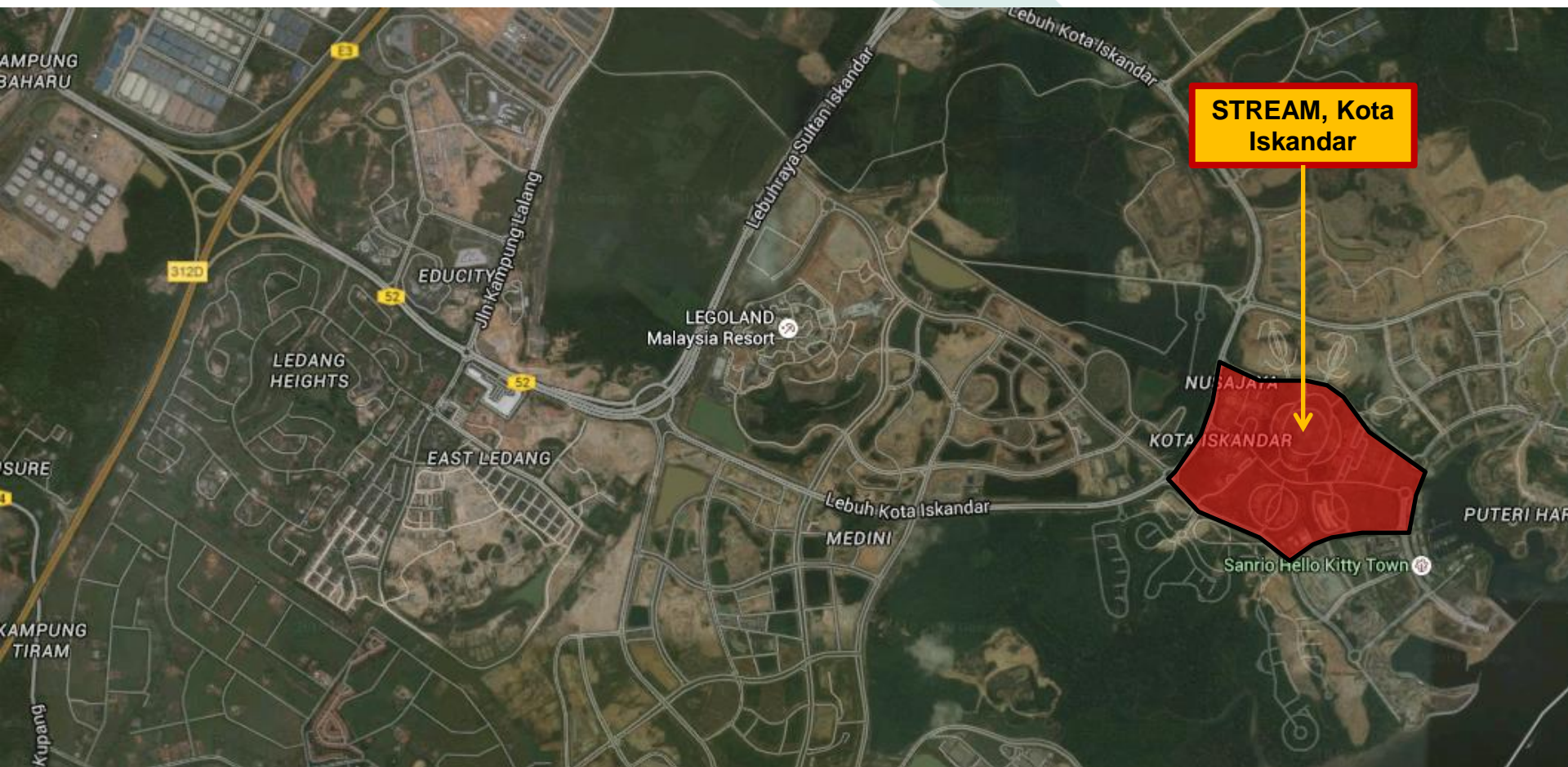
- ▶ Country : Malaysia
- ▶ City : Johor Bahru
- ▶ Developer : Johor State Government
- ▶ Project Startup : 2006
- ▶ Project Completed : 2009
- ▶ Application : State Government New Administrative Centre
- ▶ Area of development : 110 Acres

STREAM Automated Waste Collection System

- ▶ Type of System : Gravity Vacuum + Full Vacuum System
– District Wide System
- ▶ Total Pipe Length : 4,300m
- ▶ AVWCS Capacity : 30 metric ton/day

Project-2: KOTA ISKANDAR MALAYSIA

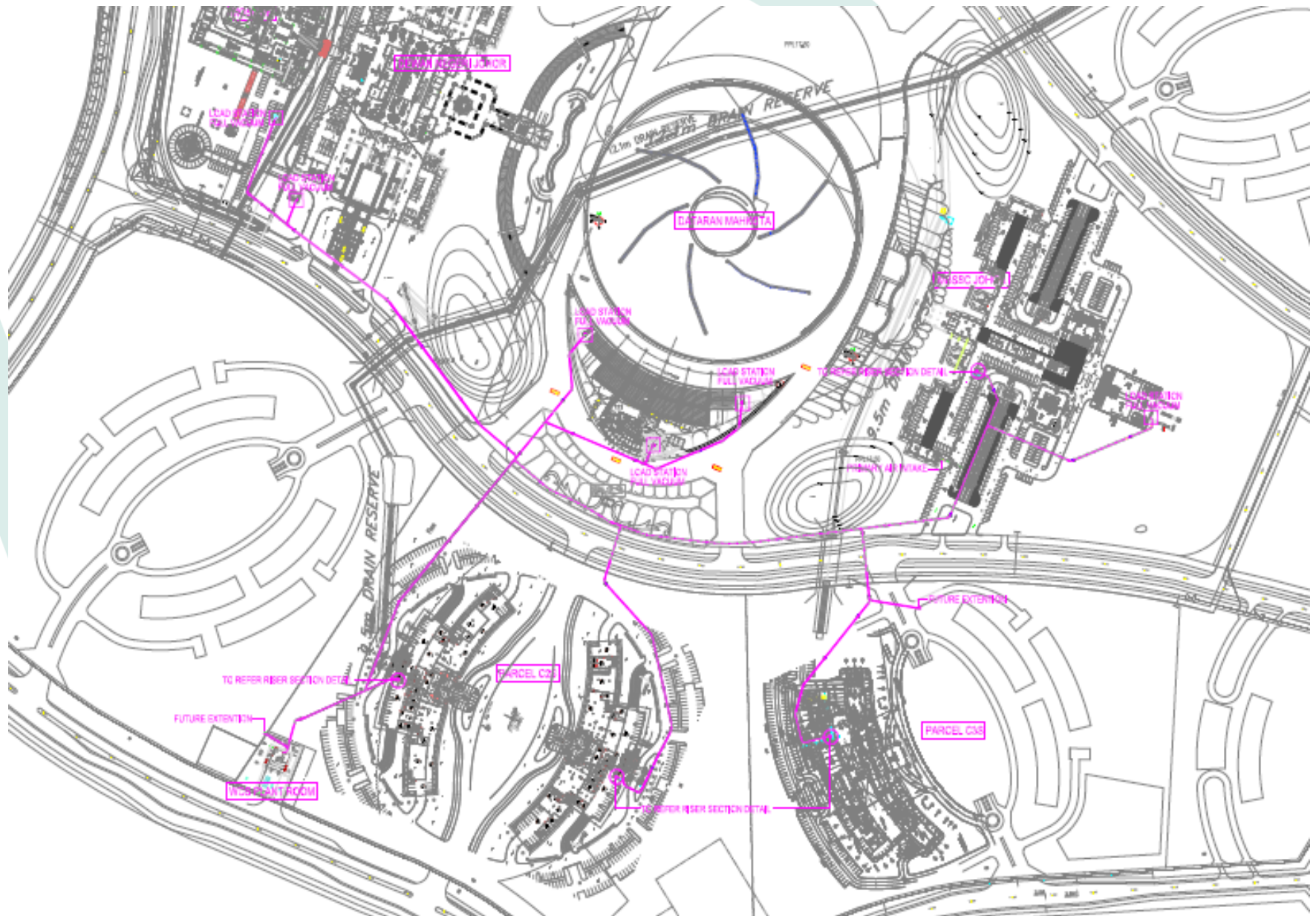
AERIAL VIEW OF NUSAJAYA & MEDINI, MALAYSIA



AERIAL VIEW OF KOTA ISKANDAR_NUSAJAYA



INFRA PIPING LAYOUT PLAN



Project-2: KOTA ISKANDAR MALAYSIA

FIELD FEEDER COMPONENT



Volume Control
Hopper Door

Full Vacuum
Station



Outdoor Throw
Station



Storage Section

Discharge
Valve

Front View of
Full Vacuum
Station



Project-2: KOTA ISKANDAR MALAYSIA

CENTRAL WASTE HANDLING FACILITY

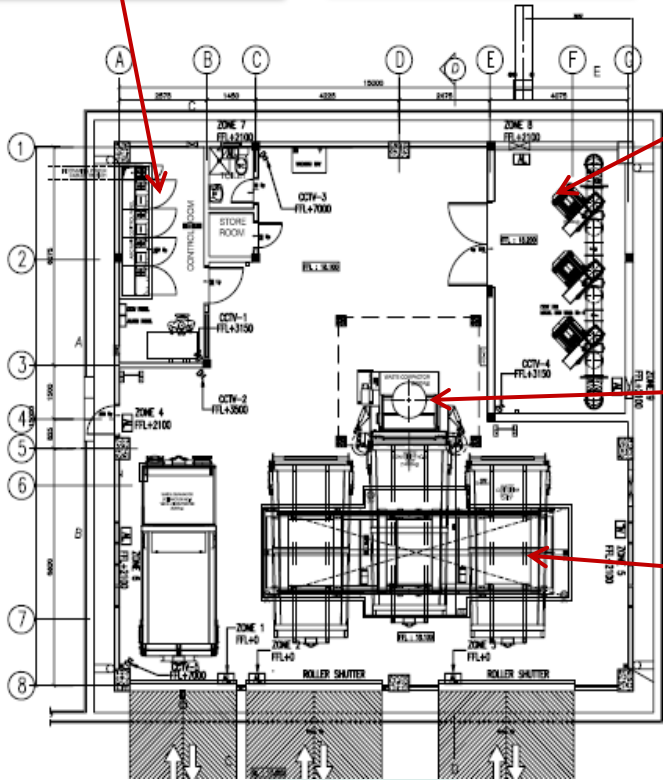
Control Panel



Exhauster



Separator



Compactor



Conveyor

Project-3: HDB Tampines North, Singapore

Project Information

- ▶ Country : Singapore
- ▶ City : Tampines North
- ▶ Developer : Housing Development Board (HDB) 
- ▶ Project Startup : 2014
- ▶ Project Completed : 2019
- ▶ Application : Government Non Landed Residential Development
- ▶ Size of development : >2,600 dwelling units

STREAM Automated Waste Collection System

- ▶ Type of System : Gravity Vacuum c/w Outdoor Throw Station
– District Wide System
- ▶ Total Pipe Length : 1,400m
- ▶ AVWCS Capacity : 8 metric ton/day, 2 Fractions



LEGEND

- RESIDENTIAL BLOCK
- CARPARK
- CARPARK LIFT LOBBY
- ELECTRICAL SUBSTATION
- BIN CENTRE
- PRECINCT PAVILION
- BUS STOP ● FUTURE BUS STOP
- COVERED LINKWAY
- FUTURE COVERED LINKWAY
- FUTURE PEDESTRIAN OVERHEAD BRIDGE
- BARRIER-FREE ACCESS ROUTE

COMMERCIAL / SOCIAL COMMUNAL FACILITIES

- RESIDENTS' COMMITTEE CENTRE
- CHILDCARE CENTRE
- EATING HOUSE
- SUPERMARKET
- SHOPS
- FUTURE AMENITIES

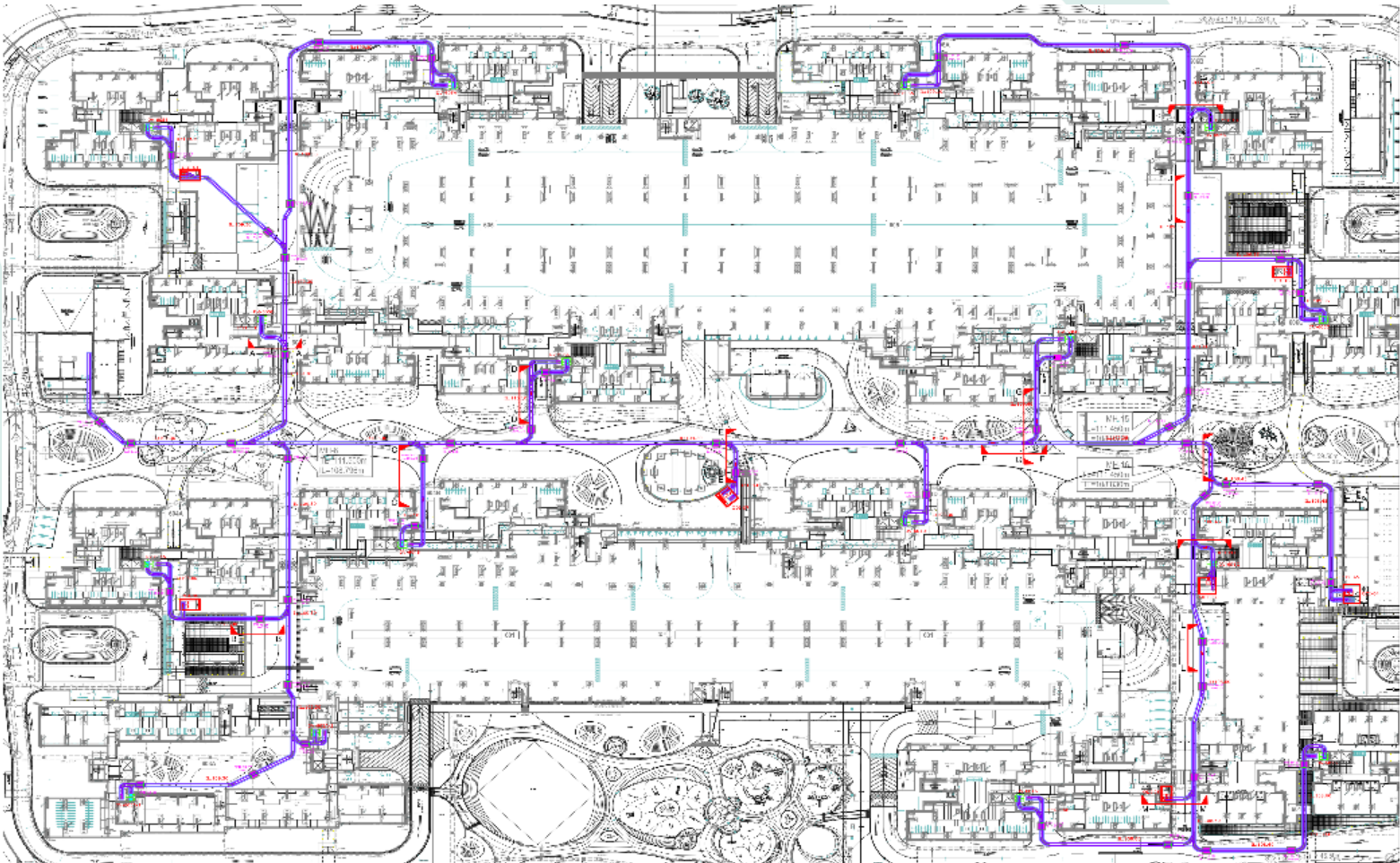
PRECINCT LEVEL FACILITIES

- COMMUNITY LIVING ROOM
- DROP OFF PORCH
- FUTURE 3-ON-3 BASKETBALL COURT
- PARK
- PERGOLA, SHELTER

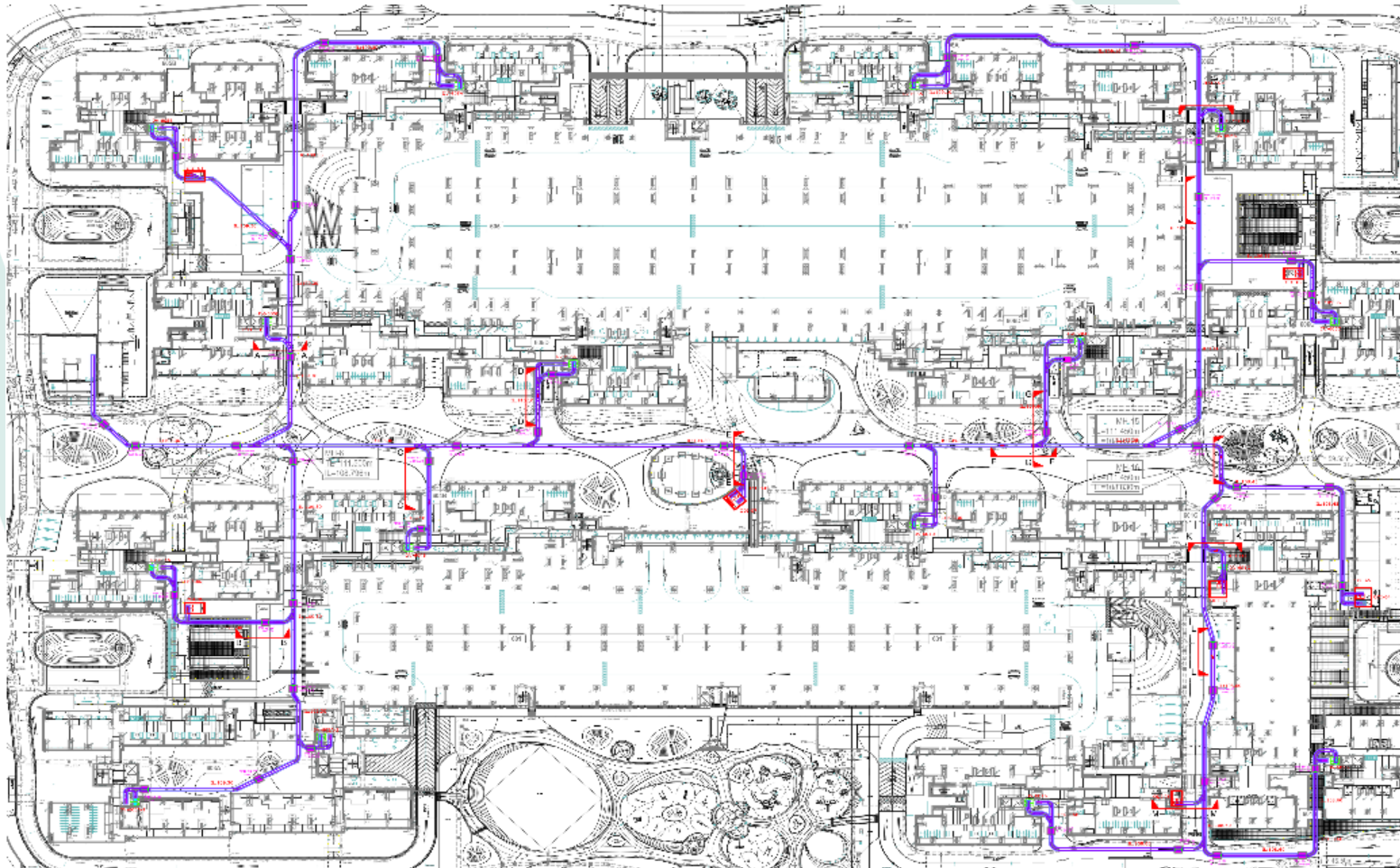
3 GENERATION / SPORT FACILITIES

- ELDERLY FITNESS STATION
- ADULT FITNESS STATION
- CHILDREN PLAYGROUND
- COMMUNITY GARDEN
- HARD COURT

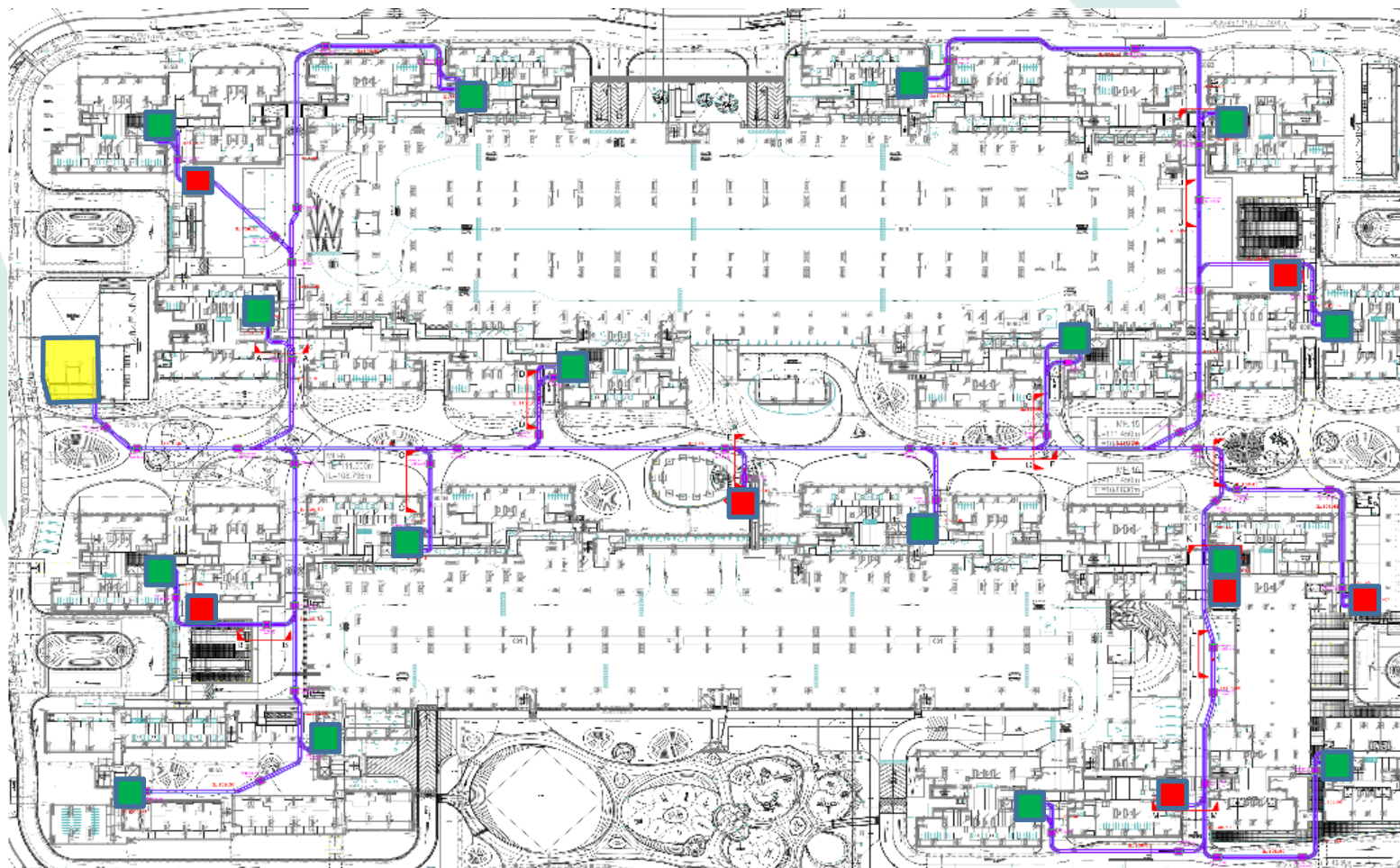
CASE STUDY 3: OVERALL PIPING LAYOUT



The image displays a comprehensive site plan for a large facility, likely a water treatment plant or industrial complex. The plan features a central rectangular area with a grid of streets, surrounded by various buildings and parking lots. A complex network of purple lines represents the piping system, with red arrows indicating flow direction. The layout is highly organized, with pipes running parallel to the main streets and connecting various buildings and parking areas. The STREAN logo is visible in the bottom right corner.



CASE STUDY 3: AWCS FEEDER POINTS



Legend:

- DV Room
– 16 Nos
- ODI Bunker
– 7 nos

CASE STUDY 3: LOAD STATIONS (GW & RW)



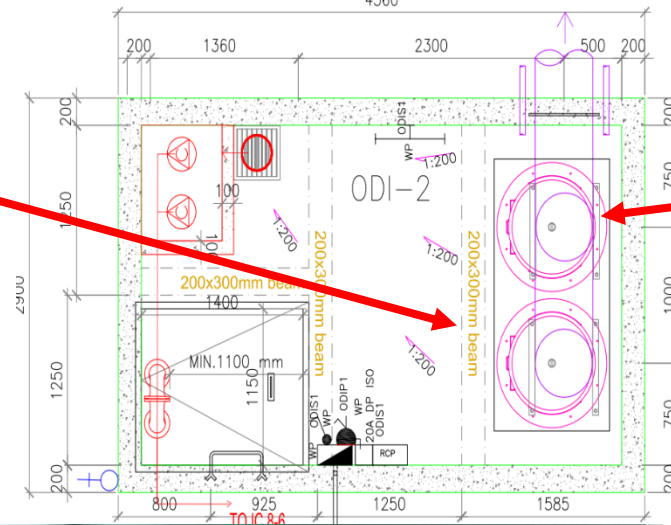
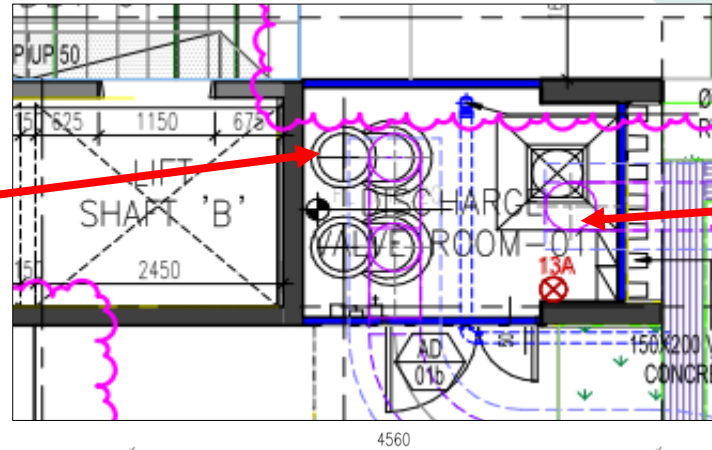
**Gravity Vacuum Load Station
on every floor of residential units**



Outdoor Load Station

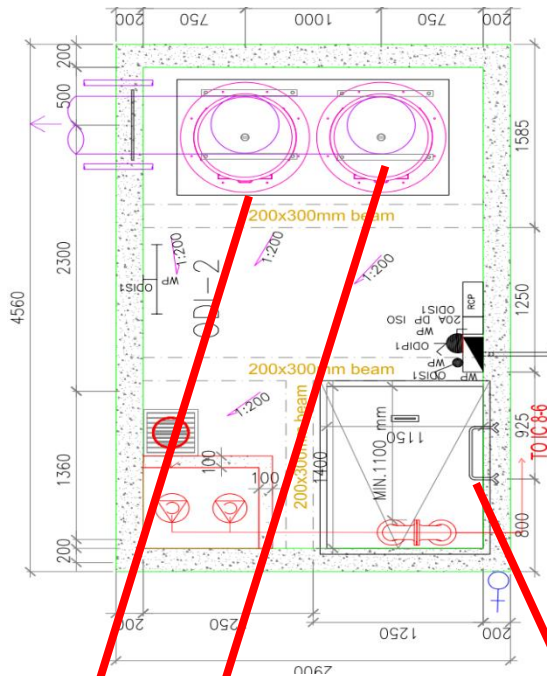
- **Every location of throw point will have 2 load stations (1 for recyclable waste, 1 for non-recyclable waste)**

CASE STUDY 3: DISCHARGE VALVE ROOM

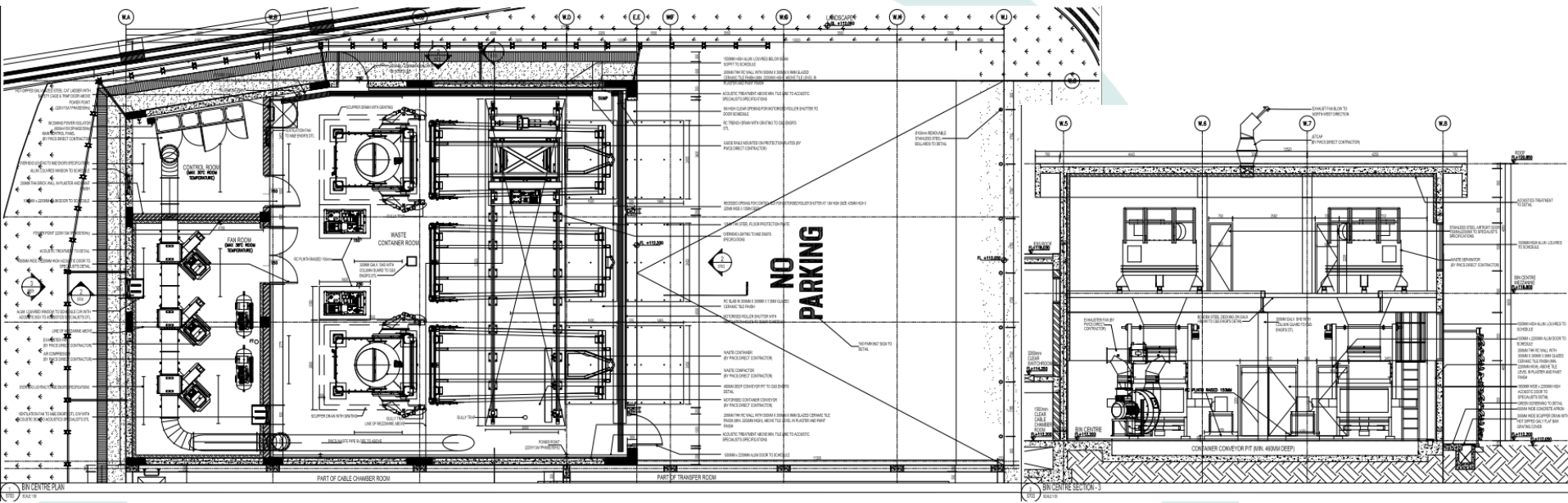


CASE STUDY 3: DISCHARGE VALVES

- Discharge Valves are located at the bottom of the chute and outdoor load station.



CASE STUDY 3: CENTRAL WASTE HANDLING FACILITY (CWHF)



CASE STUDY 3: CENTRAL WASTE HANDLING FACILITY (CWHF)



Project-4: AL RAHA BEACH ABU DHABI

Project Information

- ▶ Country : United Arab Emirates
- ▶ City : Abu Dhabi
- ▶ Developer : Aldar Properties
- ▶ Project Startup : 2009
- ▶ Project Completed : 2011
- ▶ Application : Mixed Development
- ▶ Area of development : **556 ha**
- ▶

STREAM Automated Waste Collection System

- ▶ Type of System : Gravity Vacuum + Full Vacuum + Screw Feeder
– District Wide System
- ▶ Total Pipe Length : >16,000m
- ▶ AVWCS Capacity : 200 metric ton/day

Project-4: AL RAHA BEACH ABU DHABI



**Al-Raha Beach,
Abu Dhabi, UAE.**



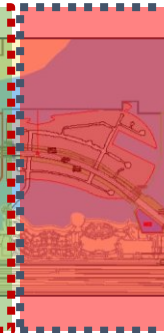
Project-4: AL RAHA BEACH ABU DHABI

AL RAHA BEACH DEVELOPMENT – East & Western Precinct and Lu'Luat Island

**ARB Western Precinct
(Design/Planning Stage)**

**Lu'Luat Island (Awarded
in 2015)**

**ARB Eastern Precinct
(Awarded in 2009)**



~12km

AUTOMATED WASTE COLLECTION SYSTEM



Project-4: AL RAHA BEACH ABU DHABI

AL RAHA BEACH DEVELOPMENT – East Precinct

Project Awarded in Year 2009, Completed in Year 2011. More than 120 Plots completed and operation for ~5 years. Balance ~80 'in-Plots' construction in Progress.



ALDAR HQ



AL DANA



AL BANDAR



AL MUEERA



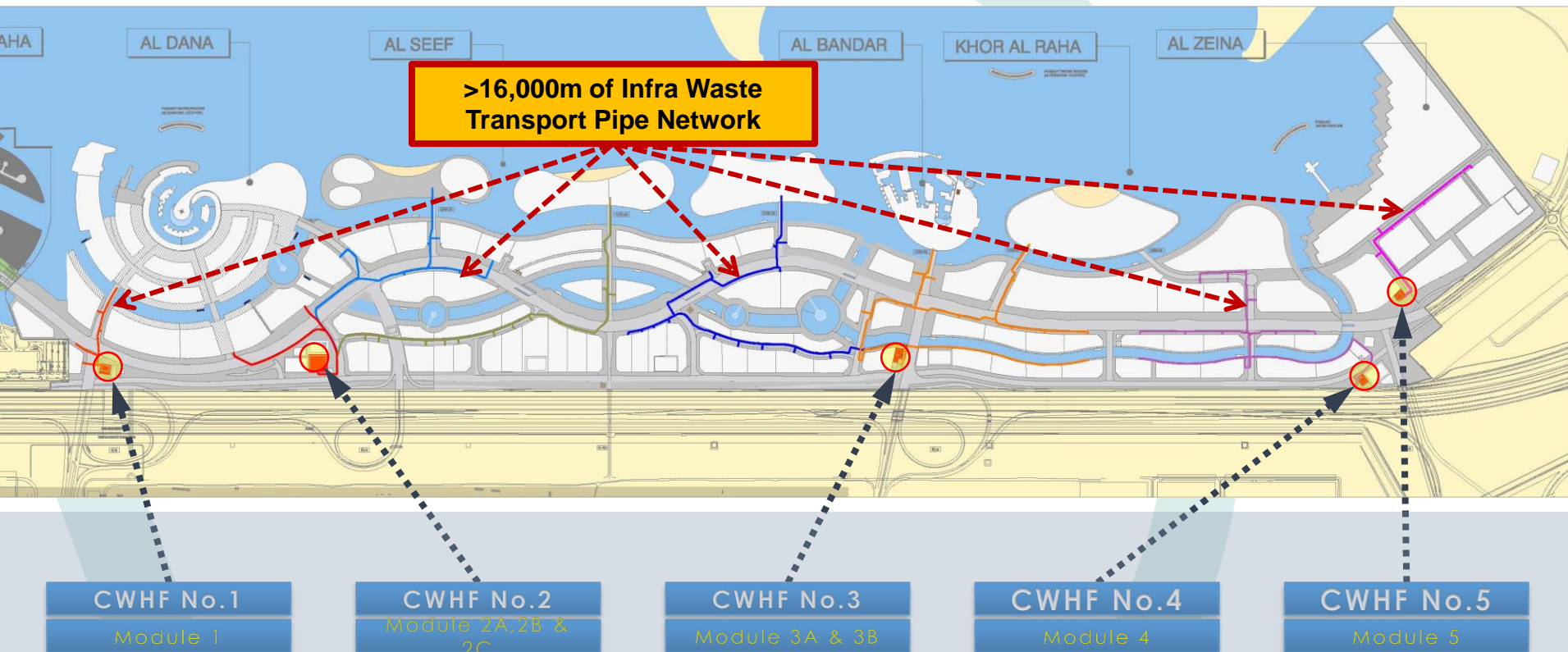
AL ZEINA

AUTOMATED WASTE COLLECTION SYSTEM



Project-4: AL RAHA BEACH ABU DHABI

AUTOMATED WASTE PIPES – 8 MODULES (EASTERN PRECINCT)



**Project Awarded in Year 2009,
Completed in Year 2011.**

Project-4: AL RAHA BEACH ABU DHABI



Project-4: AL RAHA BEACH ABU DHABI

AUTOMATED WASTE PIPES – 8 MODULES (EASTERN PRECINCT)



Project-5: AL-REEM ISLAND_ ABU DHABI

Project Information

- ▶ **Country** : United Arab Emirates
- ▶ **City** : Abu Dhabi
- ▶ **Developer** : Tamouh Investments
- ▶ **Project Startup** : 2008
- ▶ **Completed** : 2010
- ▶ **Application** : Mixed Development
- ▶ **Area of development** : 66 Acres

STREAM Automated Waste Collection System

- ▶ **Type of System** : Gravity Vacuum
– District Wide System
- ▶ **Total Pipe Length** : >4,000m
- ▶ **AVWCS Capacity** : 90 metric ton/day

Project-5: AL-REEM ISLAND ABU DHABI



**Al-Reem Island,
Abu Dhabi, UAE.**

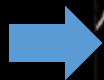
Project-5: AL-REEM ISLAND ABU DHABI



**Marina Square, Al-Reem
Island, Abu Dhabi, UAE.**

Project-5: AL-REEM ISLAND ABU DHABI

Marina
Square

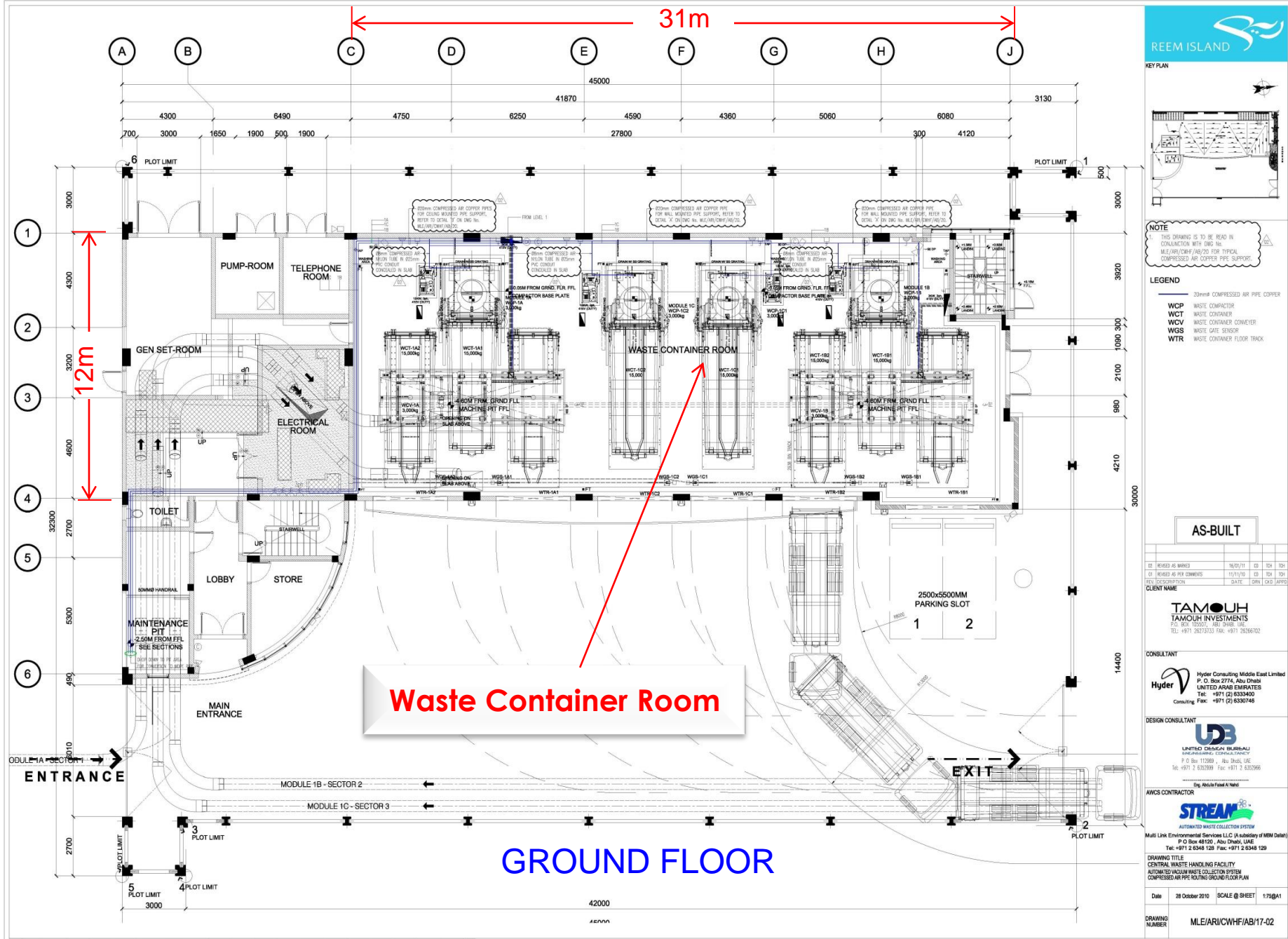


Project-5: AL-REEM ISLAND ABU DHABI

AERIAL VIEW OF MARINA SQUARE



Project-5: AL-REEM ISLAND ABU DHABI



Project-5: AL-REEM ISLAND ABU DHABI



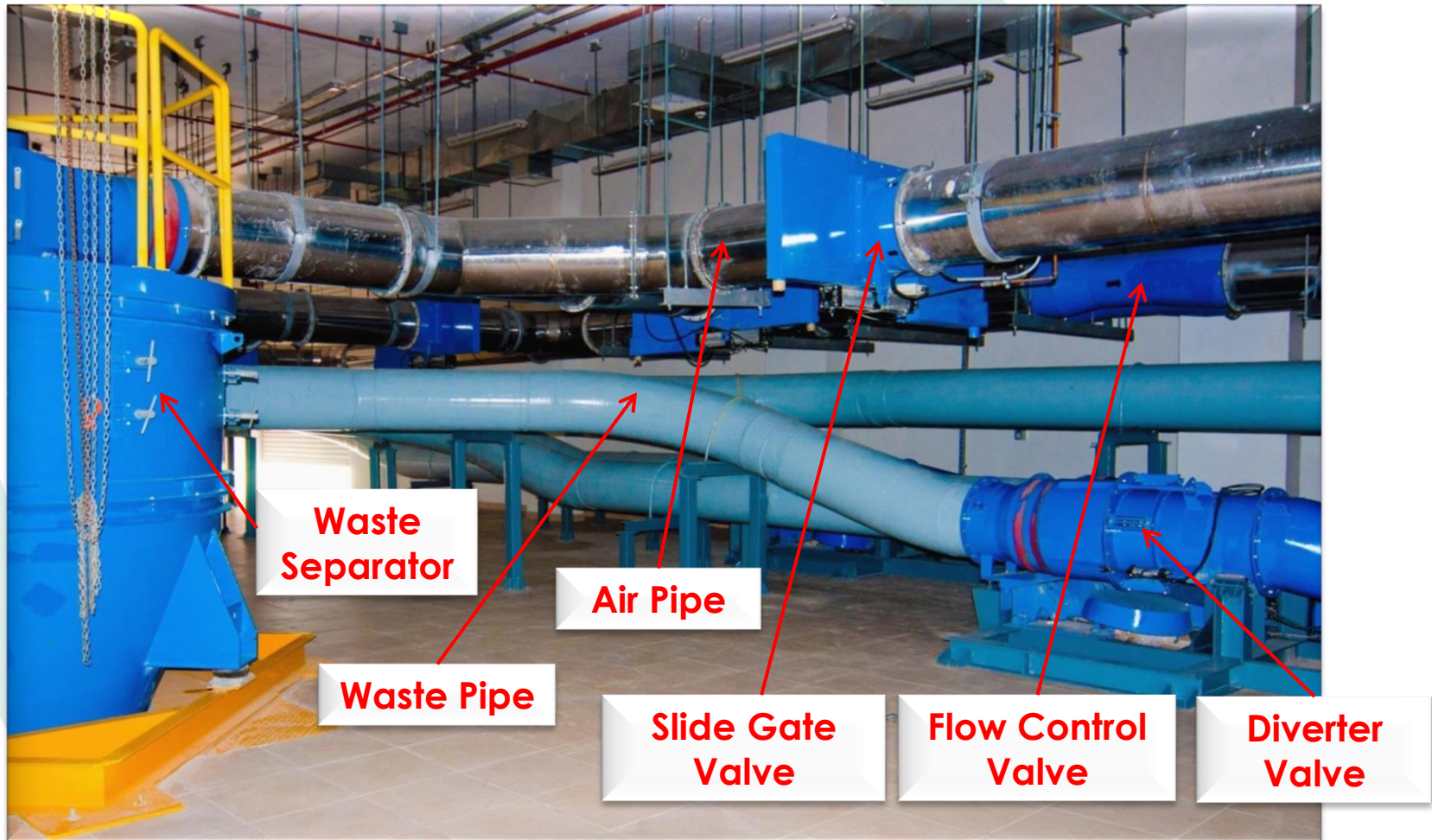
CENTRE WASTE HANDLING FACILITY (CWHF)

**Project Awarded in Year 2008,
Completed in Year 2010.**

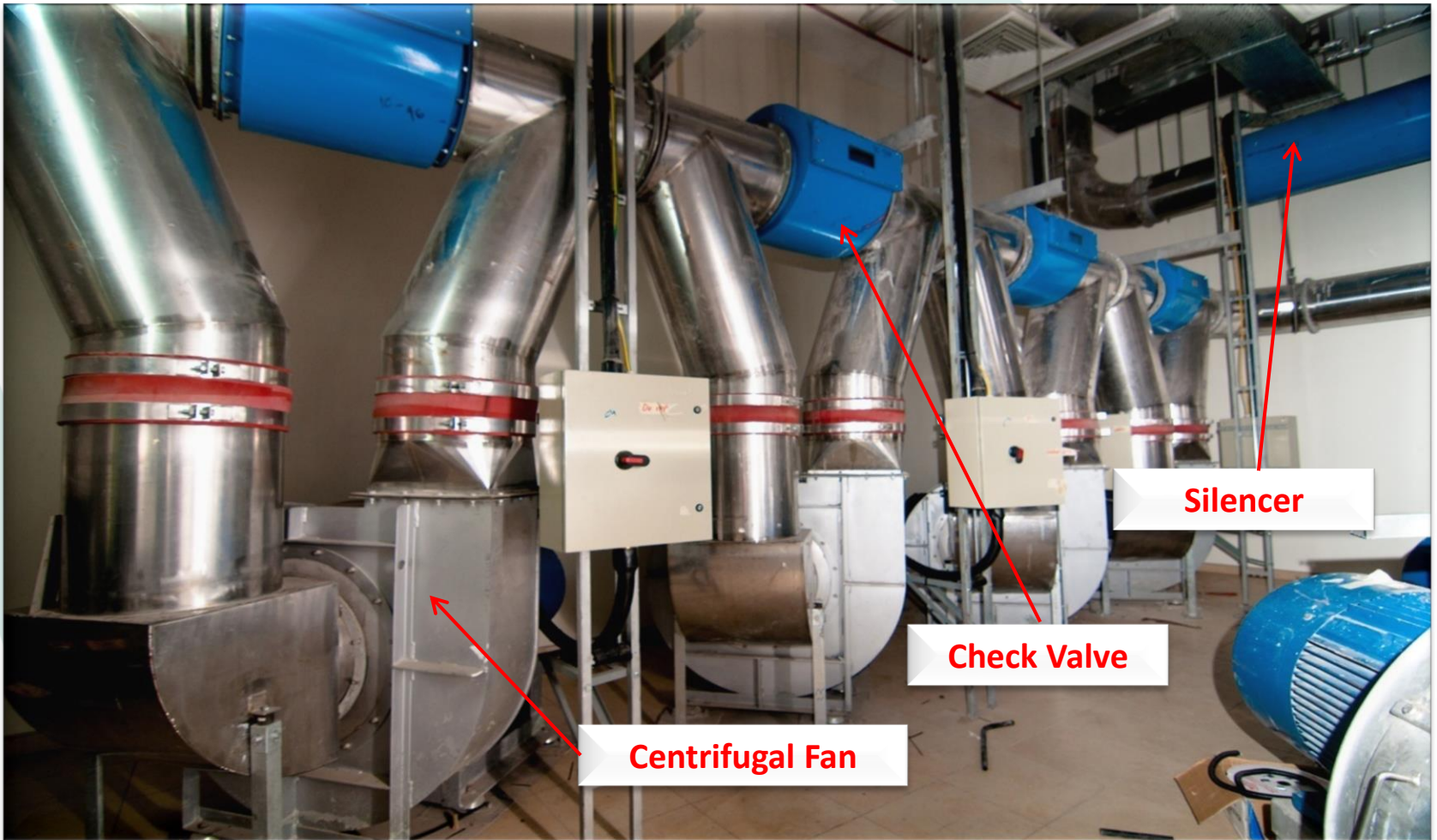


Project-5: AL-REEM ISLAND ABU DHABI

CENTRE WASTE HANDLING FACILITY – WASTE SEPARATOR ROOM



CENTRE WASTE HANDLING FACILITY – CENTRIFUGAL FAN ROOM



Project-5: AL-REEM ISLAND ABU DHABI

CENTRE WASTE HANDLING FACILITY



Waste Compactor

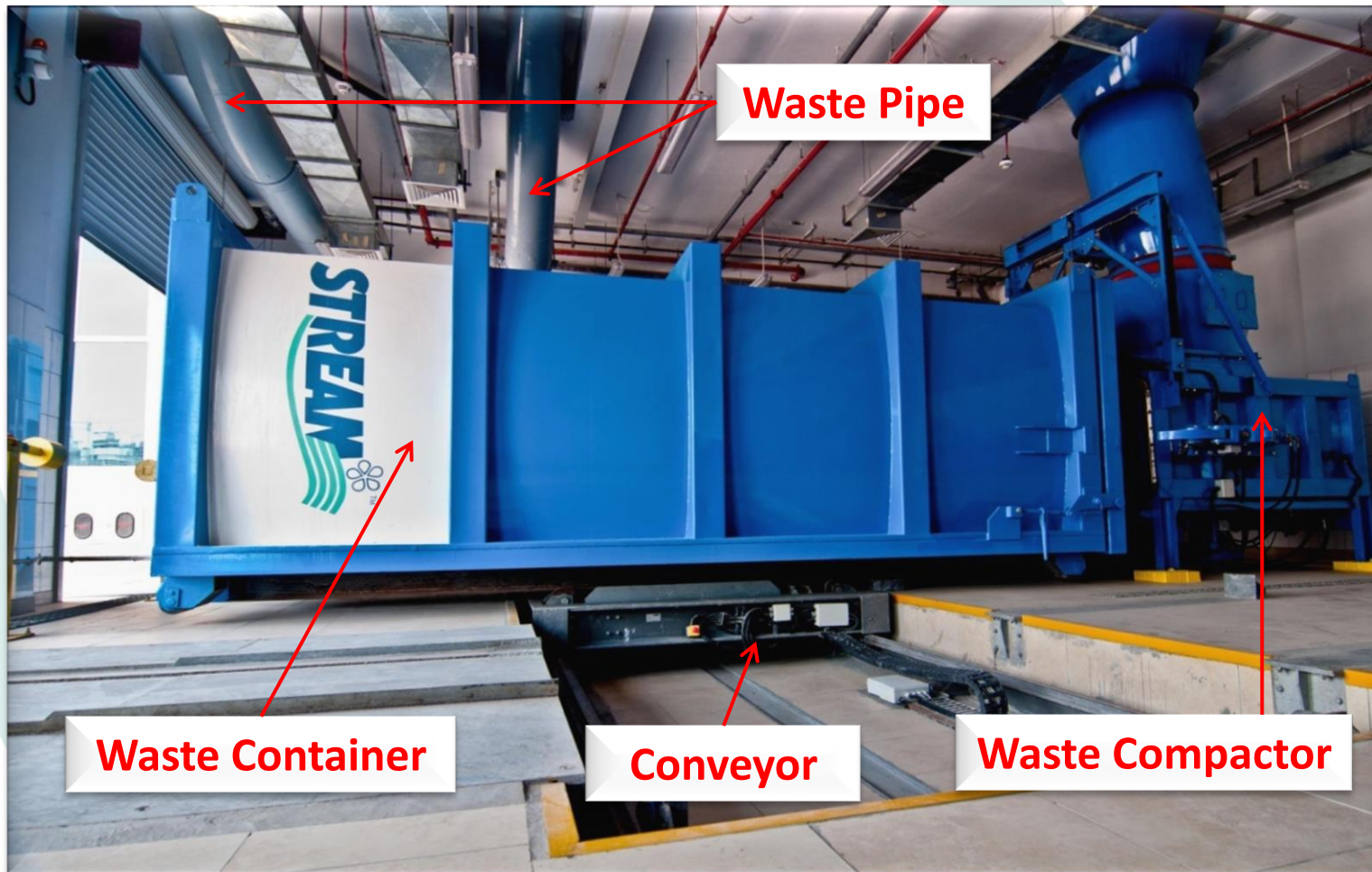


Main Control Centre



Pressure Differential Gauges

CENTRE WASTE HANDLING FACILITY – WASTE CONTAINER BAY



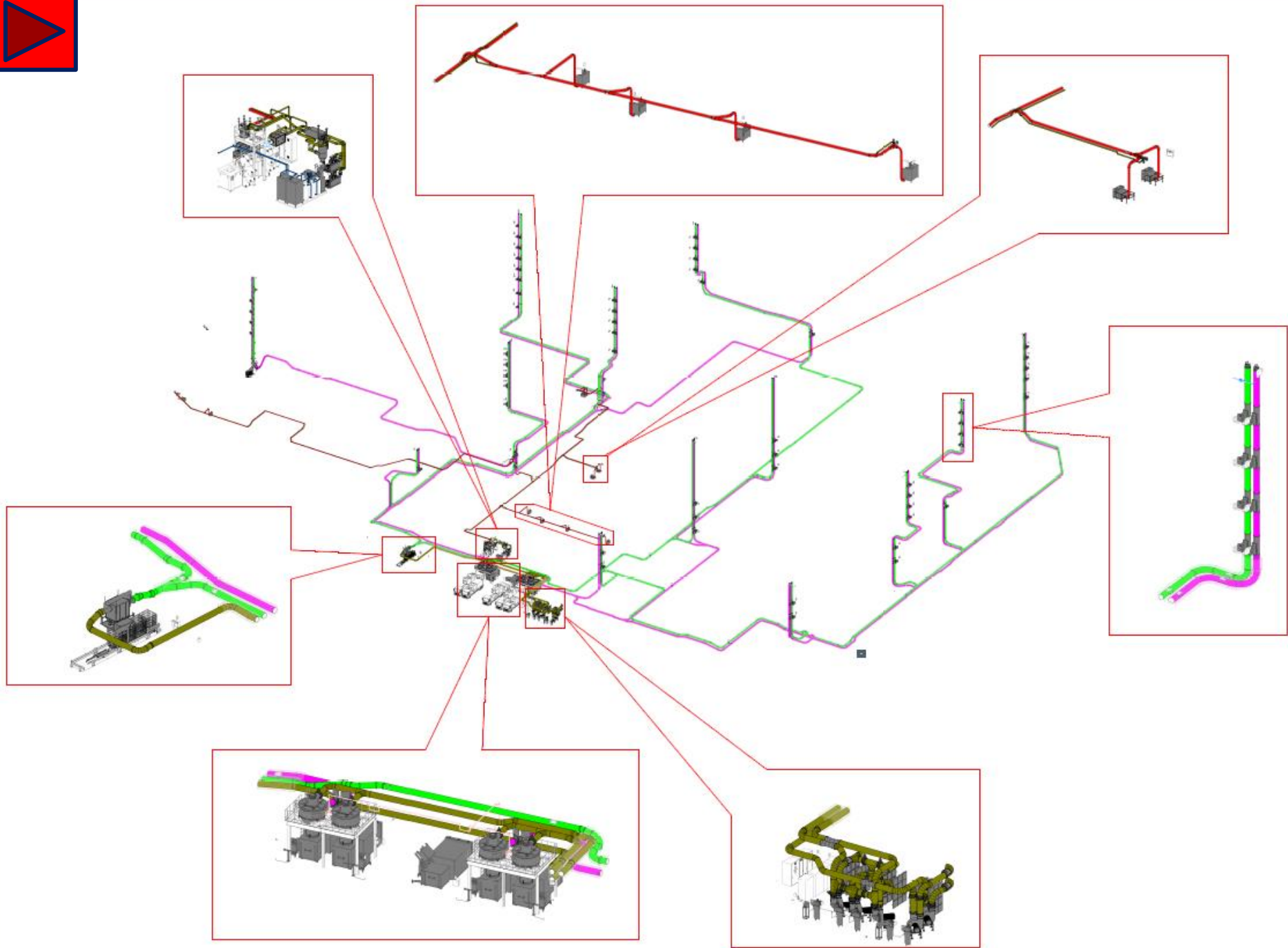
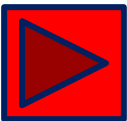
Project-6: Hospital, Singapore

Project Information

- ▶ Country : SINGAPORE
- ▶ City : SINGAPORE
- ▶ Developer : MOH, Singapore
- ▶ Project Startup : 2019
- ▶ Completed : 2023
- ▶ Application : Hospital, Soiled Linen, Food Waste and General Waste
- ▶ Size of Development : 800 beds

STREAM Automated Waste Collection System

- ▶ Type of System : Full Vacuum
- ▶ Total Pipe Length : >1,500m
- ▶ AVWCS Capacity : >15 metric ton/day, 2 Fractions + Soiled Linen



CASE STUDY 8: HOW THE SYSTEM WORKS

FULL VACUUM SYSTEM



***Full Vacuum Load Stations
Linen waste collection, and General waste collection***



***Full Vacuum Load Station's
Swing Door & Inner Door***

In OCH, the system covers for 2 different types of wastes:-

1. Linen Waste
2. General Waste

The overall waste collection process is as follow:

- User to activate Load Station (LS) switch key, Main Control Centre (MCC) will trigger the Centrifugal Fan (CF) and the Primary Air Intake (PAI).
- Once system is ready to use, the Inner-Door of Load Station will open for linen/waste transportation.
- Linen/waste will then be transported via piping network to the Central Waste Handling Facility.
- It only runs whenever the Full Vacuum key is plug into the ignition.

CASE STUDY 8: CENTRAL WASTE HANDLING FACILITY (CWHF)



Linen Collection 'Cage'



General Waste Container

LINEN

- For Linen system, the used/soiled linen will be transported from load station all the way to the collection point (as shown above).

GENERAL WASTE

- For general waste, the refuse will be transported from load station to a SEALED and ENCLOSED container via network of piping.
- When the container is filled up, it can be hauled up by arm-roll truck to its designated dumpsite or material recovery facility



Conventional Waste Management & The Issues

Automated Waste Collection System (AWCS) & Why AWCS?

Case Studies

Stream Group of Companies

STREAM-Our Journey



1991

Started as Nexa Corporation Sdn Bhd selling first Malaysian made Central Vacuum System.



1996

Acquired by Aldes Corporation of France, renaming Nexa Corporation Sdn Bhd to Nexaltes Sdn Bhd.



2004

Nexaltes Sdn Bhd became a member of AWC Berhad.



2010

Established Stream Environment Sdn Bhd alongside Nexaltes Group as a holding company.



2021

STREAM is represented in 7 countries: Malaysia, Singapore, United Arab Emirates, Qatar, Australia, China & India.



Brand name "STREAM" established, representing the meaning of vacuum conveying technology for all streams of homogenous waste.



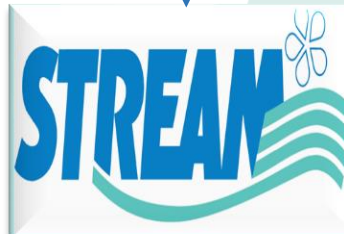
1999

First milestone of STREAM conveying municipal solid waste in Singapore. Developing its own Automated Waste Collection System.



2007

STREAM secured contracts valued over AED 400 million in United Arab Emirates.



2017

Renamed as Stream Group Sdn Bhd focusing on business development via expanding dealership networks across Asia countries.



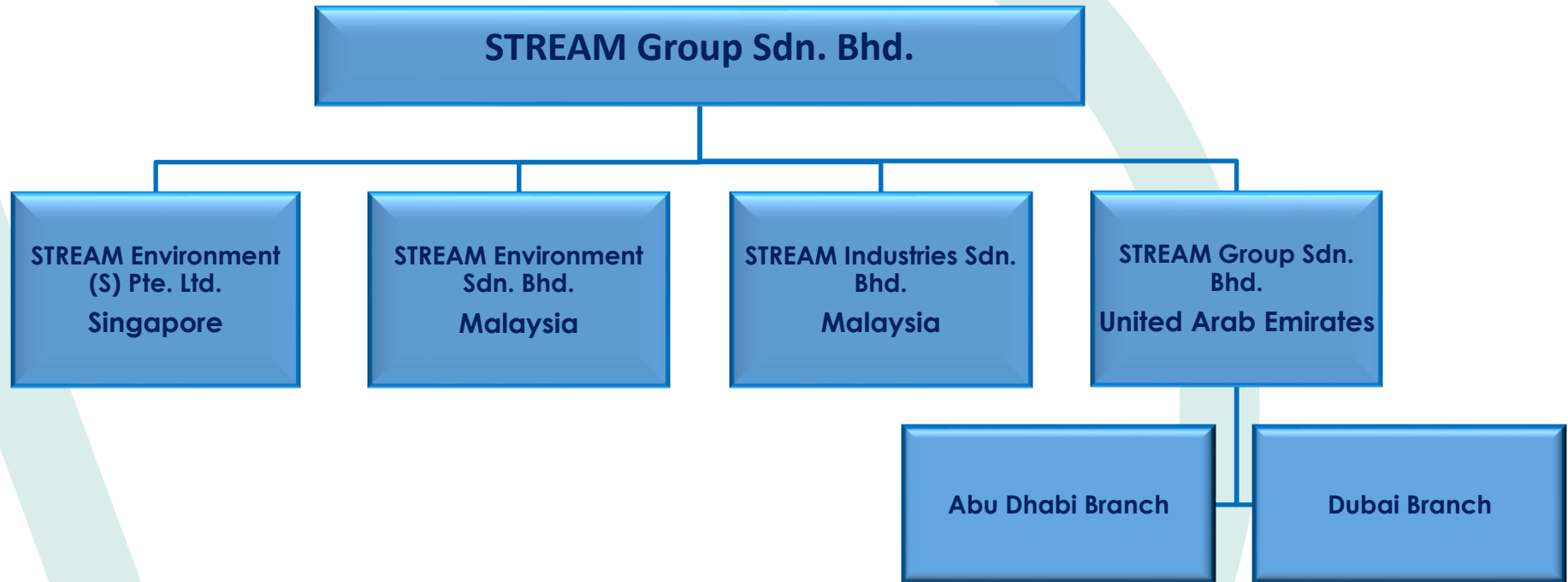
STREAM plans for EXPANSION of Business Development activities and Dealership Networks to many more countries in next 10 years.

Projects by STREAM

> 280

No. of Projects by **STREAM** Worldwide

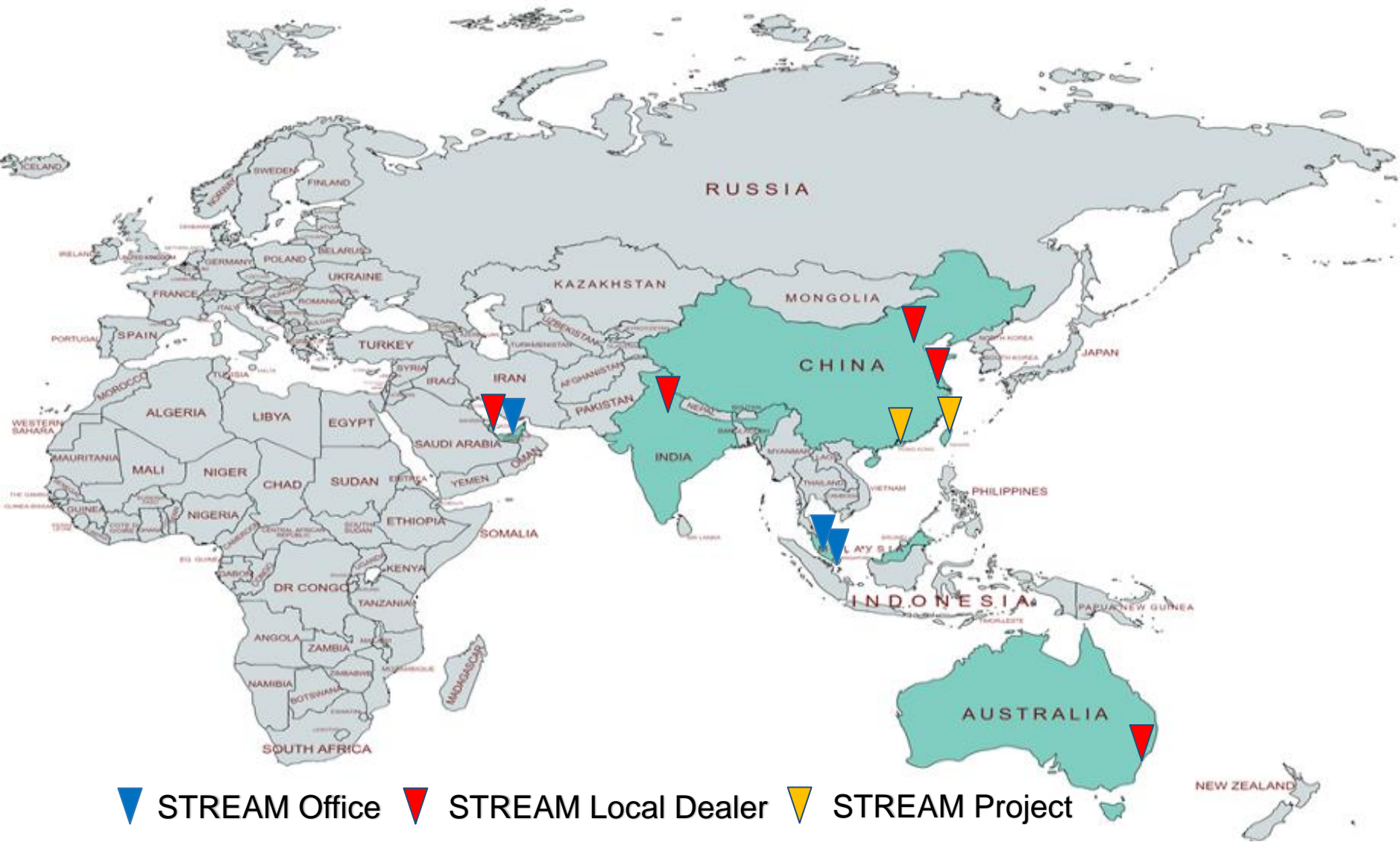
STREAM Organization



Local Representations



STREAM GLOBAL PRESENCE



THANK YOU

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