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# 中华人民共和国石油天然气行业标准

**SY/T 5466—2004**

中文/English

代替 SY/T 5466—1997, SY/T 5958—94

## 钻前工程及井场布置技术要求

**Well site preparation and layout requirements**

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## 前　　言

本标准是对 SY/T 5958—94《井场布置原则和技术要求》和 SY/T 5466—1997《钻前工程技术条件》修订后的整合。修订的主要内容包括：

- 增加了特殊情况下井场面积如何确定的条款；
- 增加了基础型式、基础选择的原则和一般要求以及基础布置技术要求的部分条款；
- 增加了路面处理的要求；
- 增加了井控装置的布置内容；
- 增加了安全标志的内容及布置条款；
- 修改了井口距民房的距离；
- 修改了井场面积。

本标准的附录 A 为资料性附录。

本标准从实施之日起，同时代替 SY/T 5958—94 和 SY/T 5466—1997。

本标准由石油钻井工程专业标准化委员会提出并归口。

本标准起草单位：大港油田集团钻井工程公司。

本标准主要起草人：耿立新、田刚、高井友、胡世红、徐建星。

本标准所代替标准的历次版本发布情况为：

- SY/T 5958—94；
- SY/T 5466—1997。

本标准以中文和英文两种文字出版。当英文和中文两种版本有歧义时，以中文版本为准。

## 钻前工程及井场布置技术要求

### 1 范围

本标准规定了陆地石油和天然气井的钻前工程和井场主要设备布置的技术要求、井场安全标志及不同类型钻机的布置。

本标准适用于陆地石油和天然气井的钻前工程和不同类型钻机的井场布置。

### 2 规范性引用文件

下列文件中的条款通过本标准的引用而成为本标准的条款。凡是注日期的引用文件，其随后的修改单（不包括勘误的内容）或修订版本均不适用于本标准，然而，鼓励根据本标准达成协议的各方研究是否可使用这些文件的最新版本。凡是不注日期的引用文件，其最新版本适用于本标准。

SY/T 5087 含硫油气井安全钻井推荐作法

SY 5225—1994 石油与天然气钻井、开发、储运防火防爆安全生产管理规定

SY/T 5323—92 压井管汇与节流管汇

SY/T 5876—93 石油钻井队安全生产检查规定

SY/T 5957 井场电器安装技术要求

SY/T 5972 钻机基础选型与计算

SY/T 6199 钻井设施基础技术要求

SY/T 6276 石油天然气工业健康、安全与环境管理体系

SY 6355 石油天然气生产专用安全标志

JTJ 01 公路工程技术标准

### 3 钻前工程技术要求

#### 3.1 井场布置原则

3.1.1 根据自然环境、钻机类型及钻井工艺要求确定钻井设备安放位置。

3.1.2 充分利用地形，节约用地，方便施工。

3.1.3 满足防喷、防爆、防火、防毒、防冻等安全要求。

3.1.4 在环境有特殊要求的井场布置时，应有切实的防护设施。

3.1.5 有利废弃物回收处理，防止环境污染。

3.1.6 钻机井架和动力基础应尽力选在挖方处。

#### 3.2 井场方向的规定

3.2.1 以井口为中点，以井架底座的两条垂直平分线的延长线为准线，划分井场的前、后、左、右。

3.2.2 以与大门平行的井架底座的垂直平分线为准线，大门所在区域为前。

3.2.3 站在大门前方的准线上，面对大门，准线左侧区域为左，准线右侧区域为右。

#### 3.3 井位的确定

3.3.1 根据勘探或开发部门给定的井位坐标，由建设单位、地质部门和施工单位实地勘测确定地面井口位置，待基础施工结束后必须复测井位。

3.3.2 油、气井井口距高压线及其他永久性设施不小于75m，距民宅不小于100m，距铁路、高速公路不小于200m，距学校、医院和大型油库等人口密集性、高危性场所不小于500m。

- 3.3.3** 含硫油气田的井，应以使其周围居民不受硫化氢扩散影响为准则。
- 3.3.4** 含硫油气田的井，井场应选在较空旷的位置，尽量在前后或左右方向能让盛行风畅通。
- 3.3.5** 井口距堤坝、水库的位置应根据国家水利部门的有关规定执行。
- 3.3.6** 当井位的地理条件难以满足施工要求时，移动井口位置要呈报有关部门，同意后方可施工。

#### 3.4 大门方向的确定

- 3.4.1** 大门方向应符合井控规定。
- 3.4.2** 布置大门方向应考虑风频、风向。大门方向应背向季节风。
- 3.4.3** 一般情况下的井架大门方向要朝南或东南。
- 3.4.4** 井场道路应从前方进入，大门方向应面向进入井场的道路。
- 3.4.5** 含硫油气田的井大门方向，应面向盛行风。

#### 3.5 井场面积的确定

井场面积是指钻机主要设备、辅助设施、沉砂池、污水池、生产用房、锅炉房和井场道路所占的面积。

##### 3.5.1 各类型钻机井场面积见表1。

表1 各类型钻机井场面积

钻机级别	井场面积 m <sup>2</sup>	长 度 m	宽 度 m
ZJ10	3600	60	60
ZJ20	3900	60	65
ZJ30	4900	70	70
ZJ40	9000	100	90
ZJ50	10000	100	100
ZJ70	12000	120	100
ZJ70以上	>12000	>120	>100

**3.5.2** 实施欠平衡钻井作业的还应在井场两侧分别增加一个面积不小于1000m<sup>2</sup>的燃烧池和放喷池。其池体高度应在2m以上，池体中心点距井口应在75m以上。

**3.5.3** 在环境敏感地区，如盐池、水库、河流等，应在右侧增加一个专用的体积不少于200m<sup>3</sup>的放喷池，池体中心点距井口应在75m以上。

**3.5.4** 立式井应根据设计要求，预留出相应的井场面积。

**3.5.5** 在人口稠密地区，最小安全使用面积不低于表1的80%。进行特殊工艺井施工时，应根据施工的特殊性、车辆的多少等，在表1规定的基础上，适当增加井场面积。

#### 3.6 基础选型与布置的技术要求

##### 3.6.1 基础选择及布置的原则

基础选择及布置的原则应符合SY/T 5972的规定。

##### 3.6.2 基础施工及布置的技术要求

基础施工及布置的技术要求除应符合SY/T 6199的规定外，还应满足以下要求：

**3.6.2.1** 设备基础地基承载力不小于0.15MPa，遇不良地基应进行技术处理。

**3.6.2.2** 冻土地区现浇混凝土基础的基底应埋入冻结线以下250mm。

**3.6.2.3** 设备基础顶面应高于场地面 100mm。

**3.6.2.4** 钻井液储备罐如果未配供给、输出设施，储备罐底座应高于钻井液循环罐顶面 500mm 以上；钻井液储备罐如果配备了相应的供给、输出设施，则储备罐可不配高支架，底座可与钻井液循环罐底座处于同一平面上。水罐应满足钻台正常用水；储油高架罐底座应高于柴油机供油箱顶部 200mm 以上。

**3.6.2.5** 为防止基础积水，基础之间的地表应采用适当水泥抹成厚 50mm 的水泥面，并挖出排水沟。

**3.6.2.6** 基础养护按 SY/T 6199 的规定执行。

**3.6.2.7** 预留钻井鼠洞和圆井。

### 3.7 井场及道路

#### 3.7.1 井场

**3.7.1.1** 井场应平坦坚实，能承受大型车辆的行驶。

**3.7.1.2** 井场应满足钻井设备的布置及钻井作业的要求。

**3.7.1.3** 井场中部应稍高于四周，以利排水。

**3.7.1.4** 井场、钻台下、机房下、泵房要有通向污水池的排水沟。

**3.7.1.5** 雨季时，井场周围应挖环形排水沟。

**3.7.1.6** 井场应有利于污水处理设施的布置。

**3.7.1.7** 井架绷绳锚坑或绷绳墩位置应按各种类型钻机的井架安装说明书执行。

**3.7.1.8** 在草原、苇塘、林区的井，布置井场时应按照防火、防爆、防污染等国家及地方法规执行。

**3.7.1.9** 在河床、海滩、湖泊、盐田、水库、水产养殖场钻井时，井场应设置防洪、防腐蚀、防污染等安全防护设施。

**3.7.1.10** 在沙漠布置井场应侧重注意防风、防沙。

**3.7.1.11** 农田内井场四周应挖沟或围土堤，与毗邻的农田隔开。井场内的污油、污水、钻井液等不得流入田间或水溪。

#### 3.7.2 道路

**3.7.2.1** 山岭丘陵地区选定井场道路应避开滑坡、泥石流等不良地质地段。

**3.7.2.2** 通往井场的道路，应满足建井周期内各型车辆安全通行，特别应考虑满足抢险车辆的通行。

**3.7.2.3** 油气田的干道公路宜采用 JTJ 01 规定的三级公路标准。

**3.7.2.4** 油气田单井井场宜采用 JTJ 01 规定的四级公路标准。

**3.7.2.5** 根据油气田地质构造和井位布局确定道路走向。

**3.7.2.6** 特殊地区（如沙漠、草原、海滩）的井，可修建能满足运输通行条件的道路。

#### 3.7.3 路面处理

**3.7.3.1** 对于钻井作业周期较长或雨季钻井施工的井场道路，路面以能使车辆顺利通行为原则并预留会车台，必要时，可铺垫碎石、钢渣或废砖头等。铺垫宽度不得小于 4m，高度视路基而定。

**3.7.3.2** 对通往井位较多的干线路，路面铺垫宽度不得小于 8m，高度不得小于 0.3m，拐弯处路面需加宽 1m~2m，边坡比 1:1.25。

**3.7.3.3** 路拱坡度一般为 3%~5%。

#### 3.7.4 桥涵

**3.7.4.1** 通往井场的道路桥涵类别应根据油气田运输车辆的特殊性和钻探区的实际情况而定。

**3.7.4.2** 桥涵设计所采用的车辆荷载等级按 JTJ 01 的规定执行，计算荷载应采用“汽车—20 级”或“汽车—超 20 级”，验算荷载应采用“挂车—100 级”或“挂车—120 级”。

**3.7.4.3** 修筑道路要根据地形合理设置涵洞以利排水。涵洞顶部覆盖土的深度不得小于 0.5m。

#### 3.7.5 井场环保

**3.7.5.1** 在钻前工程设计和施工中，环境保护按照 SY/T 6276 的要求执行。

**3.7.5.2** 井场内应有良好的清污分流系统。

**3.7.5.3** 井场后（或右）侧应修建钻井液储备池（罐）。净化系统一侧应修建废液处理池，配备废液处理装置。振动筛附近应修建堆砂坑。

**3.7.5.4** 钻井液储备池（罐）、废液处理池、堆砂坑容积按钻井设计执行，对丛式井、多底井等特殊工艺井应增加容积。

**3.7.5.5** 钻井液储备池、废液处理池、堆砂坑应采取防渗漏及其他防污染措施。

**3.7.5.6** 发电房和油罐区四周应有环形水沟，并配备污油回收罐。

### 3.7.6 房屋

**3.7.6.1** 井场生产用房的布置应本着因地制宜、合理布局、有利生产的原则综合考虑。

**3.7.6.2** 野营房应置于井场边缘 50m 外的上风处。

**3.7.6.3** 钻井的主要设备宜设置遮盖棚。

## 4 井场设备布置

### 4.1 主要设备的布置

**4.1.1** 根据大门方向及不同钻机类型布置井架底座、绞车、柴油机及联动机、电动机、钻井泵的位置。

**4.1.2** 柴油机排气管出口要避免指向油罐区。

**4.1.3** 含硫油气田的井，其所有设备的安放位置应按照 SY/T 5087 的要求执行。

### 4.2 净化系统

**4.2.1** 循环罐布置在井场的右侧，中心线距井口 11m~18m，从振动筛依次向后设置。

**4.2.2** 高架钻井液槽应设置一定的坡度并满足录井要求。

**4.2.3** 除气器、除砂器、除泥器、离心机依次安装在循环罐上。

**4.2.4** 井场沉砂池、污水池的容积按照 3.7.5.4 的要求执行。

### 4.3 发电房及油罐区

#### 4.3.1 机械钻机

**4.3.1.1** 发电房应布置在井场的左方。

**4.3.1.2** 油罐区应布置在井场的左后方。

**4.3.1.3** 发电房与油罐区的距离按照 SY 5225—1994 中 3.2.20 的要求执行。

#### 4.3.2 电动钻机

**4.3.2.1** 发电机组和电控房（SCR/MCC）应并排置于井场的后方。

**4.3.2.2** 油罐区应布置在发电机组的后方或左后方。

**4.3.2.3** 发电房与油罐区的距离按照 SY 5225—1994 中 3.2.20 的要求执行。

### 4.4 井控设备

**4.4.1** 防喷器远程控制台应安装在面对井架大门左侧，距井口不小于 25m 的专用活动房内，并在周围保持 2m 以上的行人通道。

**4.4.2** 压井管汇设置在井场左侧，其技术要求按照 SY/T 5323—92 中 4.3.1.1 的要求执行。

**4.4.3** 节流管汇设置在井场右侧，其技术要求按照 SY/T 5323—92 中 4.3.1.2 的要求执行。

**4.4.4** 放喷管线设置应按照 SY 5225—1994 中 3.3.12 的要求执行；含硫油气田的井，其放喷管线的设置应按 SY/T 5087 的要求执行。

**4.4.5** 防喷器远程控制台和备用探照灯应有专线控制。

**4.4.6** 液气分离器应安装在井场右侧距井口 11m~14m 的地方。

### 4.5 井场主要用房

**4.5.1** 综合录井房、地质值班房、钻井液化验房、值班房应摆放在大门右前方。

- 4.5.2** 材料房、平台经理房（队长房）、钻井监督房等井场用房应摆放在有利于生产的位置。
- 4.5.3** 锅炉房应安装在季节风的下风位置，其布置按照 SY 5225—1994 中 3.2.20 和 4.2.1 的要求执行。
- 4.5.4** 含硫油气田的井，井场工程值班房、地质值班房、钻井液化验室设置的位置应按 SY/T 5087 的规定执行。

#### 4.6 消防器材

- 4.6.1** 消防器材房应设置在发电房侧面。器材配备数量按 SY/T 5876—93 中 3.1.7.1 的要求执行。
- 4.6.2** 含硫油气田消防器材房的摆放按 SY/T 5087 的要求执行。
- 4.6.3** 在井场左前方靠井场边缘和井场左后方发电房前各堆放消防砂 4m<sup>3</sup>。

#### 4.7 井场电路

井场电路应符合 SY/T 5957 的规定。

#### 4.8 其他设施的布置

- 4.8.1** 欠平衡钻井设施的位置按施工设计要求执行。
- 4.8.2** 钻井液材料应摆放在混合漏斗或加重泵处。

### 5 井场安全标志

- 5.1** 在井场明显处设置“安全第一，预防为主”的标志。
- 5.2** 含硫油气田的风向标位置按 SY/T 5087 的要求执行。
- 5.3** 在井场入口处设置“禁止非工作人员入内、禁止酒后上岗、严禁烟火”等标志。
- 5.4** 在上钻台处设置“戴安全帽、必须穿戴防护用品、防掉、防滑、防坠落”等标志。
- 5.5** 在绞车、柴油机、发电机等机械设备处设置“防机械伤人”标志。
- 5.6** 在井架梯子入口处、高空作业处，设置“必须系保险带”标志。
- 5.7** 在油罐区设置“严禁烟火”标志。
- 5.8** 在发电房闸刀盒等处设置“危险有电”标志。
- 5.9** 在压井管汇、节流管汇、高压闸门组等处设置“禁止乱动阀门”标志。
- 5.10** 在消防器材房、消防器材箱等处设置“禁止乱动消防器材”标志。
- 5.11** 在电、气焊房处设置“禁止混放”标志。
- 5.12** 在大门坡道处设置“禁止吊管下过人”标志。
- 5.13** 在井队食堂设置“当心天然气爆炸、注意先点火后开气、注意通风”等标志。
- 5.14** 在钻井液材料房设置“注意通风”标志。
- 5.15** 在储气瓶处设置“当心超压”标志。
- 5.16** 在钻台上、坐岗房等处设置“当心井喷”标志。
- 5.17** 在绞车和辅助小绞车附近设置“当心缠乱”标志。
- 5.18** 在井场的上风口位置设置“应急集合”标志和“逃生路线”标志。
- 5.19** 所有安全标志图案必须符合 SY 6355 的规定。

### 6 不同类型钻机井场布置示意图

钻井井场示意图是以井口为基准的示意图。各种类型钻机井场布置示意图参见附录 A。

附录 A  
(资料性附录)  
不同类型钻机井场布置示意图

- A. 1 ZJ10、ZJ20C、ZJ30C 钻机井场布置示意图见图 A. 1。
- A. 2 ZJ20K、ZJ30K 钻机井场布置示意图见图 A. 2。
- A. 3 大庆Ⅱ型、ZJ50J 钻机井场布置示意图见图 A. 3。
- A. 4 ZJ40J、F320(三机两泵)、ZJ70J 钻机井场布置示意图见图 A. 4。
- A. 5 ZJ40L、ZJ50L、ZJ70L、ZJ70LC、ZJ70LD 钻机井场布置示意图见图 A. 5。
- A. 6 ZJ40D、ZJ40DB、ZJ50D、ZJ50DB 电动钻机井场布置示意图见图 A. 6。
- A. 7 ZJ70D、ZJ70DB 电动钻机井场布置示意图见图 A. 7。

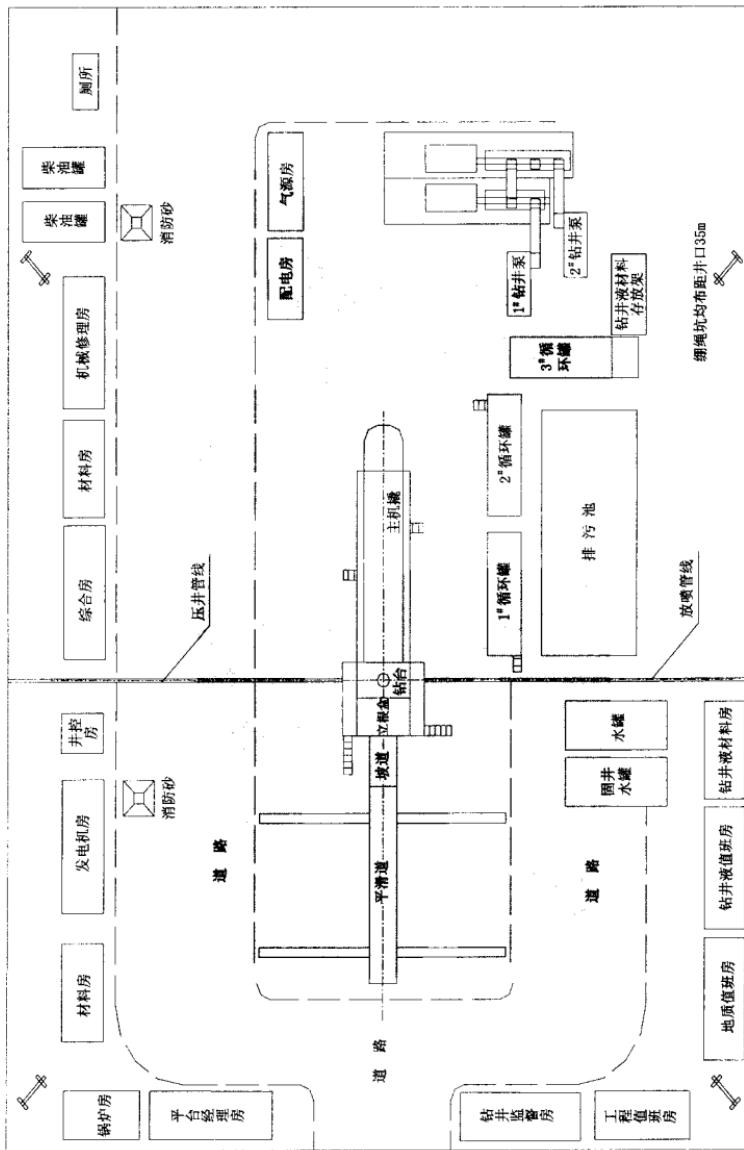


图 A.1 ZJ10、ZJ20C、ZJ30C 钻机井场布置示意图

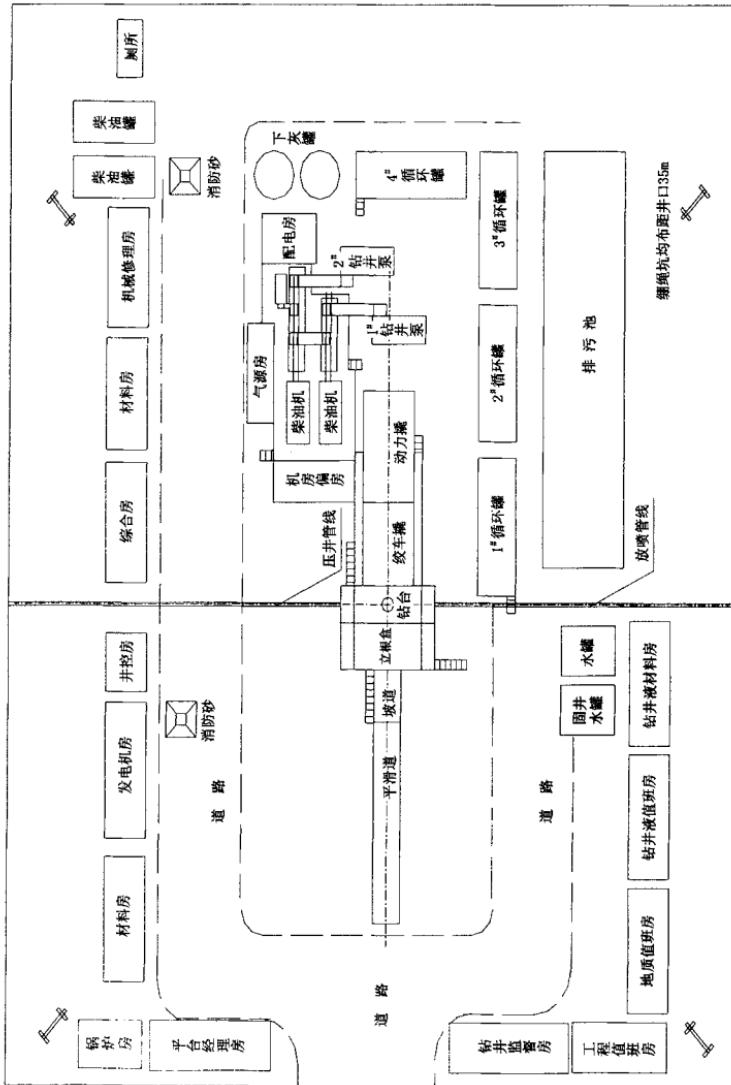


图 A.2 ZJ20K、ZJ30K 钻机井场布置示意图

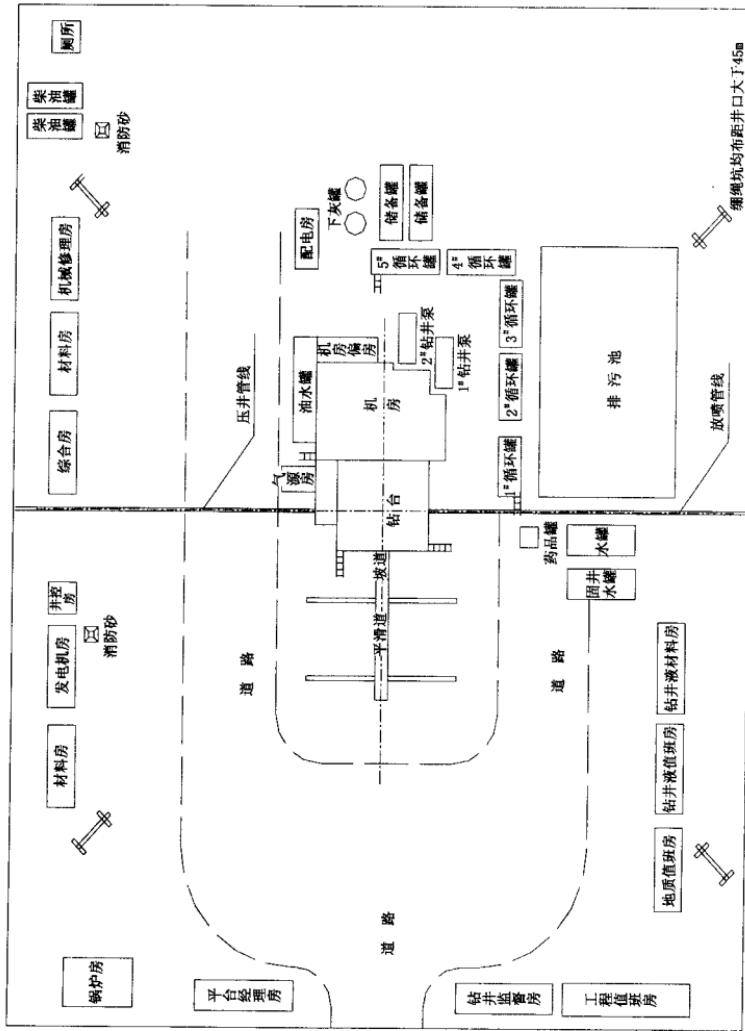


图 A.3 大庆Ⅱ型、ZJ50Ⅰ钻机井场布置示意图

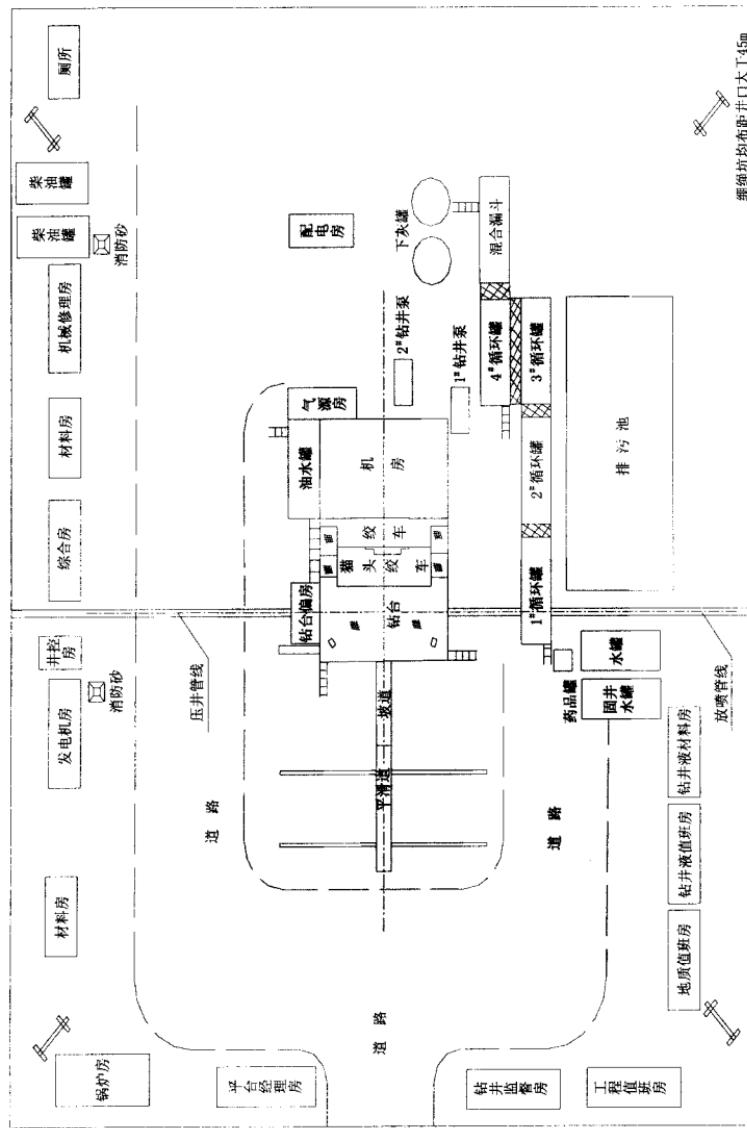


图 A.4 ZJ40J、F320(三机两泵)、ZJ70J 钻机井场布置示意图

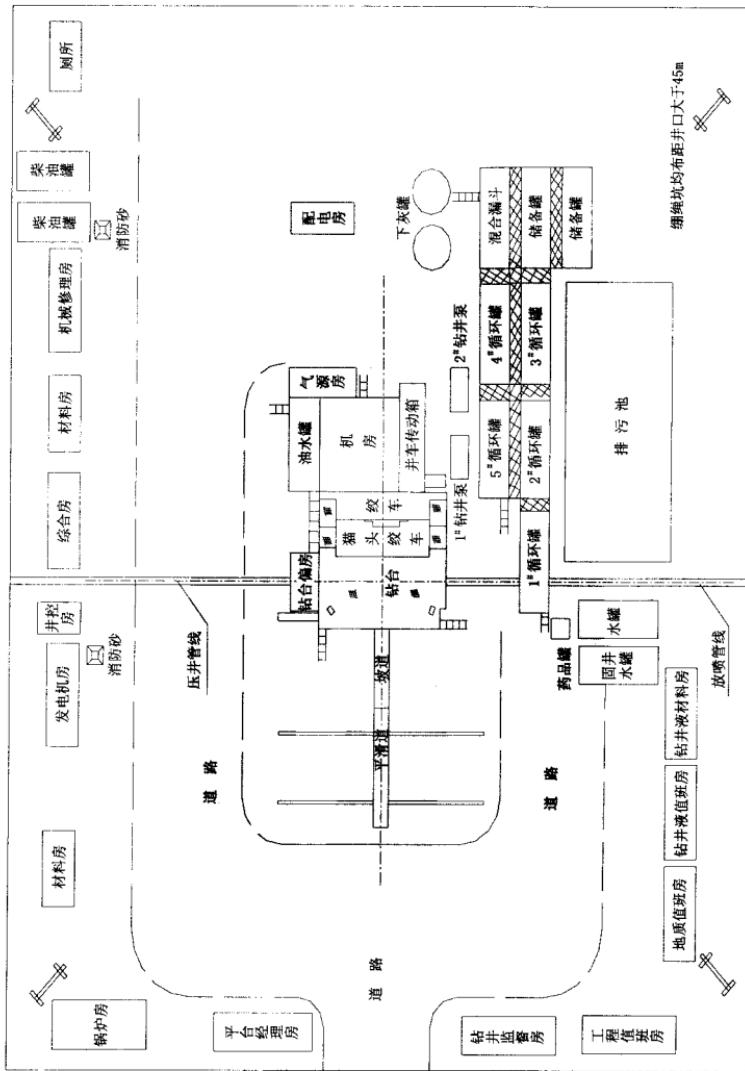


图 A.5 ZJ40L、ZJ50L、ZJ70L、ZJ70LC、ZJ70LD 钻机井场布置示意图

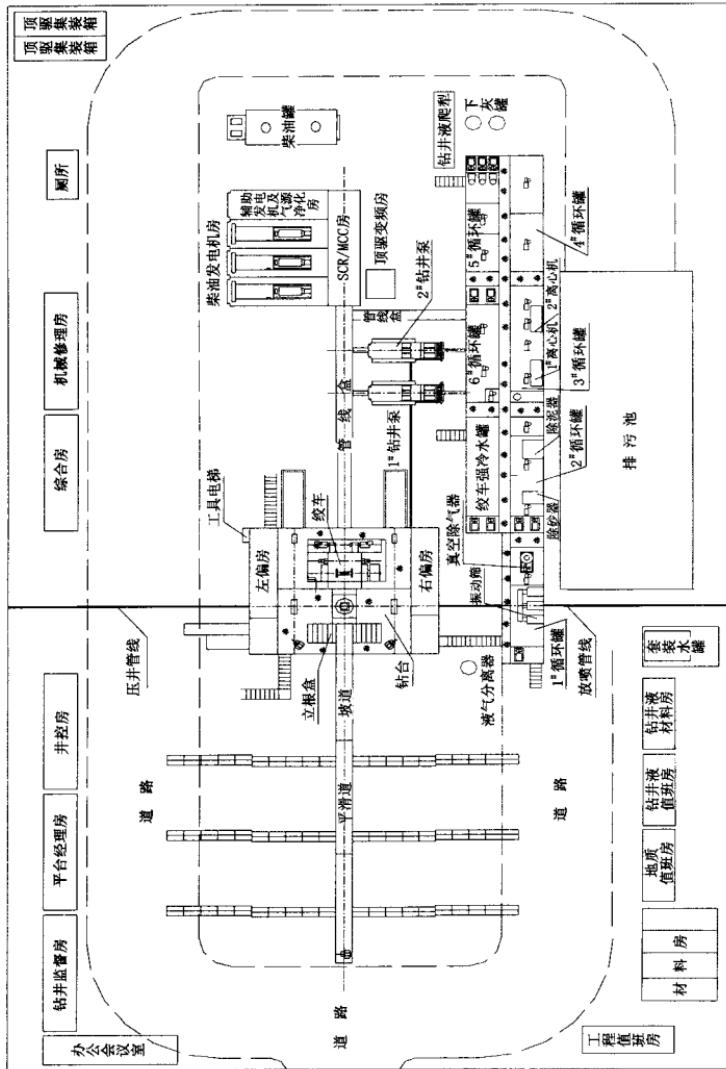


图 A.6 ZJ40D、ZJ40DB、ZJ50D、ZJ50DB 电动钻机井场布置示意图

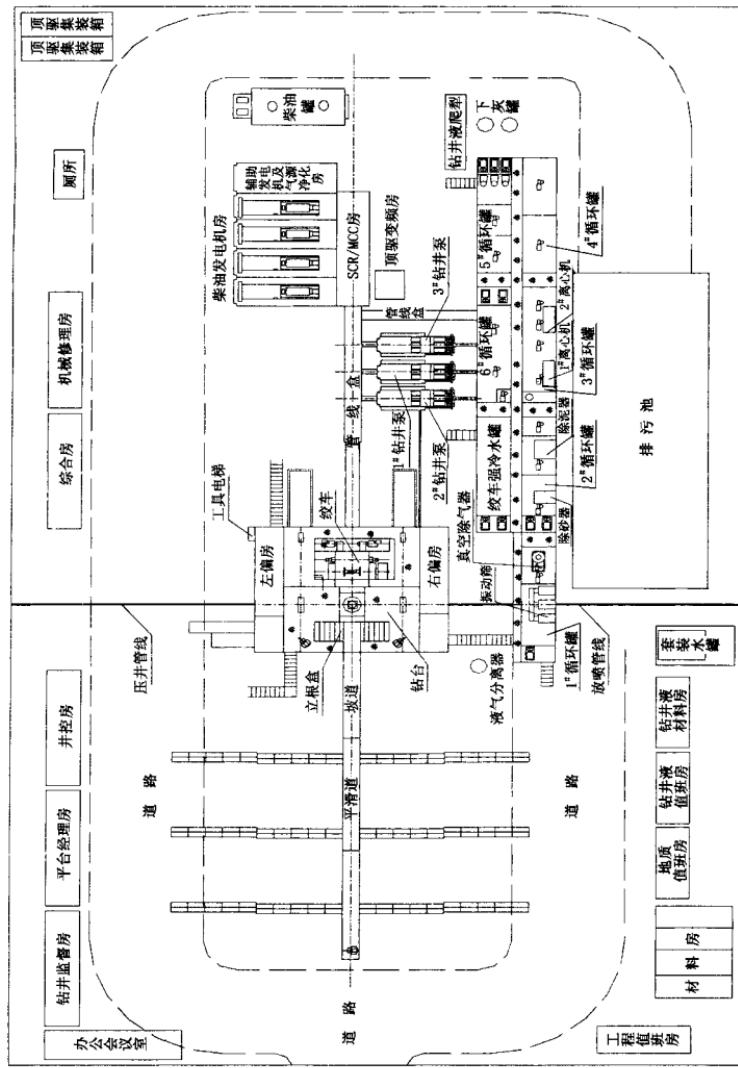


图 A.7 ZJ70D、ZJ70DB 电动钻机井场布置示意图

**The People's Republic of China  
Standard of Petroleum and Natural Gas Industry**

**SY/T 5466—2004**  
Replace SY/T 5466—1997, SY/T 5958—94

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**Well site preparation and layout requirements**

**Issued Date: 07—03—2004**

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## Foreword

SY/T 5958—94 *Principles and technical requirements for well site layout* and SY/T 5466—1997 *Technical requirements for well site preparation* have been revised, the main changes are listed below:

- Instructions for determining sizes of well site in particular cases are added;
- Principles and requirements for foundation models and selection, and technical requirements for foundation layout are added;
- Road surface requirements are added;
- BOP layout requirements are added;
- Warning signs and their layout requirements are added;
- Distance between wellheads and civil dwelling is modified;
- Sizes of well site are modified.

Annex A of this standard is informative.

This standard will replace SY/T 5958—94 and SY/T 5466—1997 from their implementation date of this standard.

This standard was proposed by and is under the jurisdiction of China Petroleum Standardization Committee for Drilling Engineering.

This standard was drafted by The Drilling Engineering Company of Dagang Oilfield Group Ltd. This standard was mainly drafted by Geng Lixin, Tian Gang, Gao Jingyou, Hu Shihong, and Xu Jianxing.

The former standards replaced by this standard are SY/T 5958—94, SY/T 5466—1997.

This part is published in both Chinese and English. In the event of any discrepancy between the texts, the Chinese version shall prevail.

# Well site preparation and layout requirements

## 1 Scope

This standard specifies the technical requirements for well site preparation and layout for main equipment, safety signs and different rig types for oil and gas wells onshore.

The standard is applicable to well site preparation and layout for different rig types for oil and gas wells onshore.

## 2 Normative references

The following normative documents contain provisions which, through reference in this standard, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications (exclude errata) do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

SY/T 5087 *Recommendations for safety drilling of sour oil and gas wells*

SY 5225—1994 *Safety regulations for explosion fire prevention during drilling, development and translation of oil and gas*

SY/T 5323—92 *Choke and kill manifolds*

SY/T 5876—93 *Safety regulations for drilling crew*

SY/T 5957 *Technical requirements for well site electric system installation*

SY/T 5972 *Selection and calculation of rig foundations*

SY/T 6199 *Substructure norms of drilling facilities*

SY/T 6276 *HSE management system of oil and gas industry*

SY 6355 *Special safety signs for oil and gas industry*

JTJ 01 *The technical standard for road engineering*

## 3 Technical requirements for well site preparation

### 3.1 Principles for well site layout

**3.1.1** Based on drilling targets, the placement of drilling equipment shall be determined according to natural environment, rig type and drilling technology.

**3.1.2** Maximize the use of the terrain, minimize the occupied area, and facilitate the drilling operation.

**3.1.3** Meet the safety requirements for prevention of blowout, explosion, fire, poison, and freeze.

**3.1.4** The protection facilities shall be in place when drill site is located in environment sensitive areas.

**3.1.5** In order to prevent pollution, waste should be cleared and treated in time.

**3.1.6** Foundations for derrick and power equipment should be set on excavated ground whenever possible.

### 3.2 Well site partition

**3.2.1** The well site is divided into “front”, “back”, “left”, and “right” by two orthogonal axes with the wellhead as the origin and one of the axes parallel to the derrick substructure.

**3.2.2** The half space containing the V—door is defined as “front”.

**3.2.3** Standing facing the V—door in the front area on the extended axis, the left hand side is defined as “left” and the right hand side is defined as “right”.

### 3.3 Well location

**3.3.1** Drilling contractors, geological depart-

ments and construction contractors shall survey the site and determine the exact location of the wellhead according to the coordinates provided by exploration and/or development departments. The coordinates of the wellhead must be re-measured after the foundation is completed.

**3.3.2** For oil and gas wells, the minimum distance from the wellhead to high voltage power lines and other permanent facilities shall be 75m, to residences shall be 100m, to railroads, expressways shall be 200m, to schools, hospitals, large oil storages and other places with crowded people or with high danger shall be 500m.

**3.3.3** The civil dwelling around sour wells shall not be affected by the emission of hydrogen sulfide.

**3.3.4** The well site of sour wells shall be open and clear, and well ventilated.

**3.3.5** The distance from the well to dams or reservoirs shall comply with the rules and regulations of the government.

**3.3.6** In case it is difficult to fulfill the re-

quirements of operation due to natural environment, any change of well site location shall only be made after approval by related organizations.

### 3.4 Determination of the V-door direction

**3.4.1** Direction of the V-door should comply with the rules and regulation of well control.

**3.4.2** The frequency and direction of wind shall be considered while setting the V-door direction. The V-door direction shall be downwind.

**3.4.3** Generally, the V-door direction should face south or southeast.

**3.4.4** The access road should enter from the front of the well site.

**3.4.5** The V-door direction of sour wells shall face prevailing wind.

### 3.5 Well site dimensions

The well site area is the area used by main drilling equipment, ancillary facilities, reserve pits, waste pits, houses on site, boilers and roads on site.

**3.5.1** Well site dimensions for various rig types are recommended in Table 1.

**Table 1 Well site dimensions for various rig types**

Rig type	Well site area (m <sup>2</sup> )	Length (m)	Width (m)
ZJ10	3600	60	60
ZJ20	3900	60	65
ZJ30	4900	70	70
ZJ40	9000	100	90
ZJ50	10000	100	100
ZJ70	12000	120	100
Above ZJ70	>12000	>120	>100

**3.5.2** In case of underbalanced drilling, one flare or bleed pit at each side of the well site shall be added. Each pit shall be no less than 1000m<sup>2</sup>, with its height no less than 2m, and the distance from its center to the wellhead no less than 75m.

**3.5.3** In environmentally sensitive areas, for example, saline, reservoir, and river, one additional bleed pit shall be built at the right side,

and the capacity of the pit shall be no less than 200m<sup>3</sup>, and the distance from its center to the wellhead no less than 75m.

**3.5.4** For cluster drilling, sufficient area shall be reserved according to the design.

**3.5.5** When drilling in densely populated areas, the minimum safety working area shall be no less than 80% of the corresponding data in Table 1. For special drilling operations the dimensions

of the well site may be expanded on the basis of Table 1.

### **3.6 Foundation selection and layout requirements**

#### **3.6.1 Principles of foundation selection and layout**

In principle, foundation selection and layout shall comply with the rules of SY/T 5972.

#### **3.6.2 Foundation construction and layout requirements**

In addition to corresponding rules of SY/T 6199, foundation construction and layout shall fulfill the following requirements:

**3.6.2.1** The support capacity of the ground for equipment foundations shall be no less than 0.15MPa, or the ground shall be treated to meet the requirement.

**3.6.2.2** In permafrost zones, the base of concrete foundations cast at the site shall be set at least 250mm below the frozen depth.

**3.6.2.3** The top surface of equipment foundations should be 100mm above the ground of the well site.

**3.6.2.4** For drilling fluid reserve tanks not equipped with feeding and discharge facilities, their bases shall be at least 500mm above the surface of circulation tanks. For reserve tanks equipped with feeding and discharge facilities, the bases of all reserve and circulation tanks should be at a same level. Water tanks should be able to support normal operations; the bases of fuel tanks should be at least 200mm above the surface of diesel engine supply box.

**3.6.2.5** To prevent water accumulation around foundations, the ground between foundations should be paved with concrete of about 50mm in thickness, and drainage ditches should be scooped out.

**3.6.2.6** The maintenance of foundations should comply with SY/T 6199.

**3.6.2.7** The corresponding areas for the cellar, the mouse hole and the rat hole shall be reserved.

### **3.7 Well site and roads**

#### **3.7.1 Well site**

**3.7.1.1** Well site should be even and solid, and be able to support heavy vehicles.

**3.7.1.2** Well site should meet the requirements of drilling operation and the layout of the drilling equipment.

**3.7.1.3** The center of the well site should be slightly higher than the fringe so that the water can drain out freely.

**3.7.1.4** Drainage ditches under the drill floor, engine room, around the drilling pump and the well site shall be dug and led to the wastewater pit.

**3.7.1.5** During rainy season, ditches should be dug around the well site.

**3.7.1.6** The well site should be suited to layout sewage treatment systems.

**3.7.1.7** The derrick anchorages or anchor blocks should be positioned according to the instructions of derrick installation for different rigs.

**3.7.1.8** If the well site is located in grasslands, bulrush pools or forestry, its layout shall follow government rules and regulations on prevention of fire, explosion and pollution, etc.

**3.7.1.9** When drilling at riverbeds, foreshores, lakes, salines, reservoirs or aquafarms, the well site shall be equipped with safety facilities to prevent flood, erosion and pollution.

**3.7.1.10** For layout of well site in deserts, more attention should be paid in wind and sand protection.

**3.7.1.11** Well site in farmlands should be isolated by ditches or dykes. Oil, water, drilling fluid and other wastes are not allowed to flow to farms and brooks.

#### **3.7.2 Roads**

**3.7.2.1** If well site access roads pass through hills and mountains, landslide and mudslide prone as well as other bad geological areas must be avoided.

**3.7.2.2** During well construction, road to the well site shall be suitable for various vehicles,

especially emergency vehicles.

**3.7.2.3** The main road in oil fields should meet the grade - 3 road standard stipulated in JTJ 01.

**3.7.2.4** The road to a well site should meet the grade - 4 road standard stipulated in JTJ 01.

**3.7.2.5** The layout of roads should be determined in accordance with the geological structure and well distribution.

**3.7.2.6** When drilling in particular areas (e.g. desert, grassland, beach), roads should be built to meet the basic requirements for transportation.

### **3.7.3 Road surface treatment**

**3.7.3.1** In case of long operation circle or drilling in monsoon season, roads should be maintained for easy travel and pass - by/over - take sections should be reserved. If necessary, gravel, scruff or waste bricks should be paved on the road. The width of pavement should be no less than 4m, the height should be selected according to the roadbed.

**3.7.3.2** For the main road to many well sites, the width of the road pavement should not be less than 8m, the height not less than 0.3m, and the turning corner should be widened 1m ~ 2m, with a slope ratio of 1 : 1.25.

**3.7.3.3** Generally, the gradient of the road arch is 3%~5%.

### **3.7.4 Road culverts**

**3.7.4.1** The types of road culverts should be determined according to the particularity of transporting vehicles and area conditions.

**3.7.4.2** While designing road culverts, the load grade of vehicles should comply with JTJ 01. Load calculation should base "grade - 20 vehicles" or "over grade - 20 vehicles" defined in JTJ 01. For purpose of checking the calculation, "grade - 100 of trailers" or "grade 120 of trailers" should be applied.

**3.7.4.3** Road culverts should be designed rationally depending on terrain so that water can drain fluently. The thickness of the pavement covering the top of culverts should not be less than 0.5m.

### **3.7.5 Well site environmental protection**

**3.7.5.1** Environmental protection during well site design and construction should comply with SY/T 6276.

**3.7.5.2** The well site should have a good sewage treatment system.

**3.7.5.3** The drilling fluid reserve pits (or tanks) should be placed at the back (or the right) of the well site. A wastewater pit should be built next to the solid control system. The wastewater pit should be equipped with wastewater treatment facilities. A cuttings deposit pit should be dug next to the shale shakers.

**3.7.5.4** The volume of the drilling fluid reserve pits (or tanks), the wastewater pit and the cuttings pit should be designed according to the drilling program. In the case of cluster or multi-lateral wells, the volume should be increased correspondingly.

**3.7.5.5** The drilling fluid reservoir pits, the wastewater pit and the cuttings pit should be seepage proof and pollution should be prevented.

**3.7.5.6** Ditches around generator sets and fuel tanks should be in place. Waste oil recover tanks should be equipped.

### **3.7.6 Houses and camps**

**3.7.6.1** The houses on the well site should be properly placed according to specific situations and drilling operations.

**3.7.6.2** The camp must be placed at a windward location and at least 50m away outside of the well site.

**3.7.6.3** It is recommended to shelter the main drilling equipment.

## **4 Equipment layout at well site**

### **4.1 Layout of main equipment**

**4.1.1** Derrick substructures, drawworks, diesel engines, interlocking mechanisms, motors and drilling pumps should be laid - out according to V - door direction and rig type.

**4.1.2** Vent nipples of diesel engines shall not

point to fuel tanks.

**4.1.3** The placement of all equipment for sour wells should comply with SY/T 5087.

#### 4.2 Solid control system

**4.2.1** Drilling fluid tanks should be placed at the right of the well site, with their midlines 11m ~18m to the wellhead. These tanks should be placed in the sequence beginning from the shale shaker.

**4.2.2** The flow line should be properly elevated and sloped to mud logging requirements.

**4.2.3** The degasser, desander, desilter and centrifuge shall be placed on drilling fluid tanks in sequence.

**4.2.4** The capacity of the cuttings pit and the wastewater pit should comply with clause 3. 7. 5. 4.

#### 4.3 Layout of generator sets and fuel tanks

##### 4.3.1 Mechanical rigs

**4.3.1.1** Generator sets should be placed at the left of the well site.

**4.3.1.2** Fuel tanks should be placed at the left - back of the well site.

**4.3.1.3** The distance between generator sets and fuel tanks should comply with clause 3. 2. 20 of SY 5225--1994.

##### 4.3.2 Electrical rigs

**4.3.2.1** Generator sets and SCR/MCC should be placed side by side at the back of the well site.

**4.3.2.2** Fuel tanks should be placed at the back or the left - back of the generator sets.

**4.3.2.3** The distance between generator sets and fuel tanks should comply with clause 3. 2. 20 of SY 5225—1994.

#### 4.4 Blowout prevention equipment

**4.4.1** The remote control unit of BOPs should be installed in an exclusive mobile house facing the left of the V - door, and the distance to the wellhead is no less than 25m. Keep passage around the mobile house at least 2m in width.

**4.4.2** Kill manifold should be placed on the left side of the well site, and its technical re-

quirements should comply with clause 4. 3. 1. 1 of SY/T 5323—92.

**4.4.3** Choke manifold should be placed on the right side of the well site, and its technical requirements should comply with clause 4. 3. 1. 2 of SY/T 5323—92.

**4.4.4** Blooie line (s) should be placed according to clause 3. 3. 12 of SY 5225—1994. For sour wells, blooie line (s) should be placed according to SY/T 5087.

**4.4.5** A separate power cable should be used for the remote control unit of BOPs and spare searchlights.

**4.4.6** Gas - liquid separator should be placed at the right of the well site, and the distance to wellhead is 11m~14m.

#### 4.5 Housing layout at the well site

**4.5.1** The housing for mud logging, geologist, drilling fluid lab, and drilling crew should be placed at the right - front of the well site.

**4.5.2** Warehouse, meeting room, company man's office and other houses should be placed for working convenience.

**4.5.3** Boilers should be set at the downstream of monsoon. The layout should comply with clauses 4. 2. 1 and 3. 2. 20 of SY 5225—1994.

**4.5.4** The layout of the housing for drilling crew, geologist, drilling fluid lab for sour wells should comply with SY/T 5087.

#### 4.6 Fire extinguishing apparatus

**4.6.1** Fire extinguisher room should be placed by the side of the generator. The quantity of fire extinguishers should comply with clause 3. 1. 7. 1 of SY/T 5876—93.

**4.6.2** Fire extinguisher room for sour wells should be placed according to SY/T 5087.

**4.6.3** There should be a heap of sand (4m<sup>3</sup>) at the left - front edge of the well site and a heap of sand (4m<sup>3</sup>) in front of the generator room which is at the left - back of the well site.

#### 4.7 Electric circuits at the well site

Electric circuits at the well site should comply with SY/T 5957.

#### 4.8 Layout of other facilities

**4.8.1** Underbalanced drilling facilities should be placed according to the drilling program.

**4.8.2** Drilling fluid materials and chemicals should be placed near the mixing hopper or the weighting pump.

#### 5 Well site warning signs

**5.1** The sign of “Safety First, Priority on Prevention” should be placed visibly at the well site.

**5.2** Wind direction indicators for sour wells should be placed according to SY/T 5087.

**5.3** The signs, “Authorized Personnel Only”, “No Alcohol”, “No Smoke” and “No Fire”, should be set at the entrance of the well site.

**5.4** The signs, “Hard Hat Required”, “Personal Protective Equipment Must Be Worn”, “Caution – Drop Hazard”, “Caution – Slippery”, “Caution – Fall hazard” and so on should be placed by accesses to the drill floor.

**5.5** The warning sign of “Caution – Machinery Hazard” should be placed on drawworks, diesel engines, generators and so on.

**5.6** The sign of “Safety Belt Required” should be placed at the entrance of derrick ladders and at the boards on the derrick or mast.

**5.7** The signs of “No Smoking” and “No Fire” should be placed at the fuel tank area.

**5.8** The sign of “Danger – Electrical Hazard” should be placed on the switch box of the generator room.

**5.9** The sign of “Don’t Touch the Valves”

should be placed on kill manifold, choke manifold, high – pressure valves and so on.

**5.10** The sign of “Fire Fighting Only” should be placed at the fire extinguisher room.

**5.11** The sign of “No Mixing” should be placed at the gas and electric welding room.

**5.12** The sign of “No Passing During Lifting” should be placed at the catwalk.

**5.13** The sign “Caution – Explosive Gas, Ignition First, and Keep Ventilated” should be placed at the kitchen of the drilling crew.

**5.14** The sign of “Keep Ventilated” should be placed at the mud material room.

**5.15** The sign of “No Overpressure” should be placed at the storage location of the pressure cylinders.

**5.16** The sign of “Danger – Blowout Hazard” should be placed at the drill floor, watch room and other places.

**5.17** The sign of “Wrap in Order” should be placed near the drawworks and the auxiliary winch.

**5.18** The signs, “Muster Point”, “Evacuation Route”, should be placed to a windward location at the well site.

**5.19** All patterns of warning signs should comply with SY 6355.

#### 6 Layout diagrams of well sites for different rig types

The well site layout diagrams are referenced to wellhead. Layout diagrams of well sites for different rig types are shown in Annex A.

**Annex A**  
**(Informative)**  
**Well site layout diagrams for different rig types**

- A.1** Plane layout for Rig ZJ10, ZJ20C, ZJ30C.
- A.2** Plane layout for Rig ZJ20K, ZJ30K.
- A.3** Plane layout for Rig DAQING II, ZJ50J.
- A.4** Plane layout for Rig ZJ40J, F320, ZJ70J.
- A.5** Plane layout for Rig ZJ40L, ZJ50L, ZJ70L, ZJ70LC, ZJ70LD.
- A.6** Plane layout for Electrical Rig ZJ40D, ZJ40DB, ZJ50D, ZJ50DB.
- A.7** Plane layout for Electrical Rig ZJ70D, ZJ70DB.

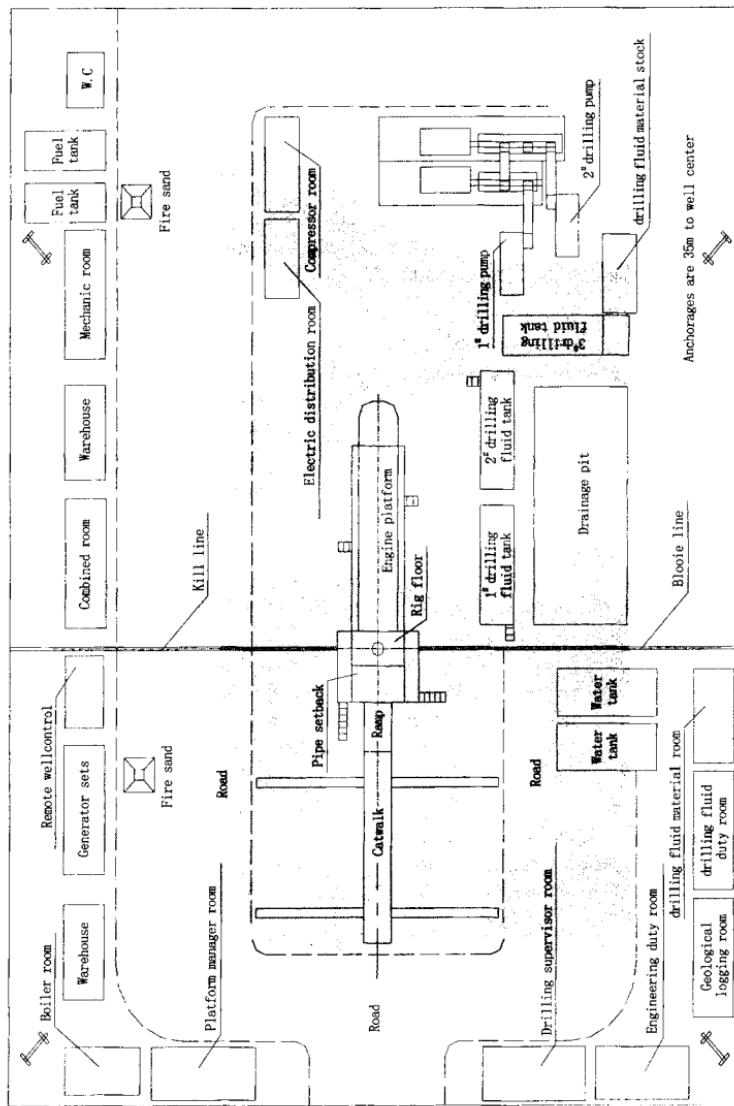


Figure A.1: Plane layout for Rig ZJ10, ZJ20C, ZJ30C

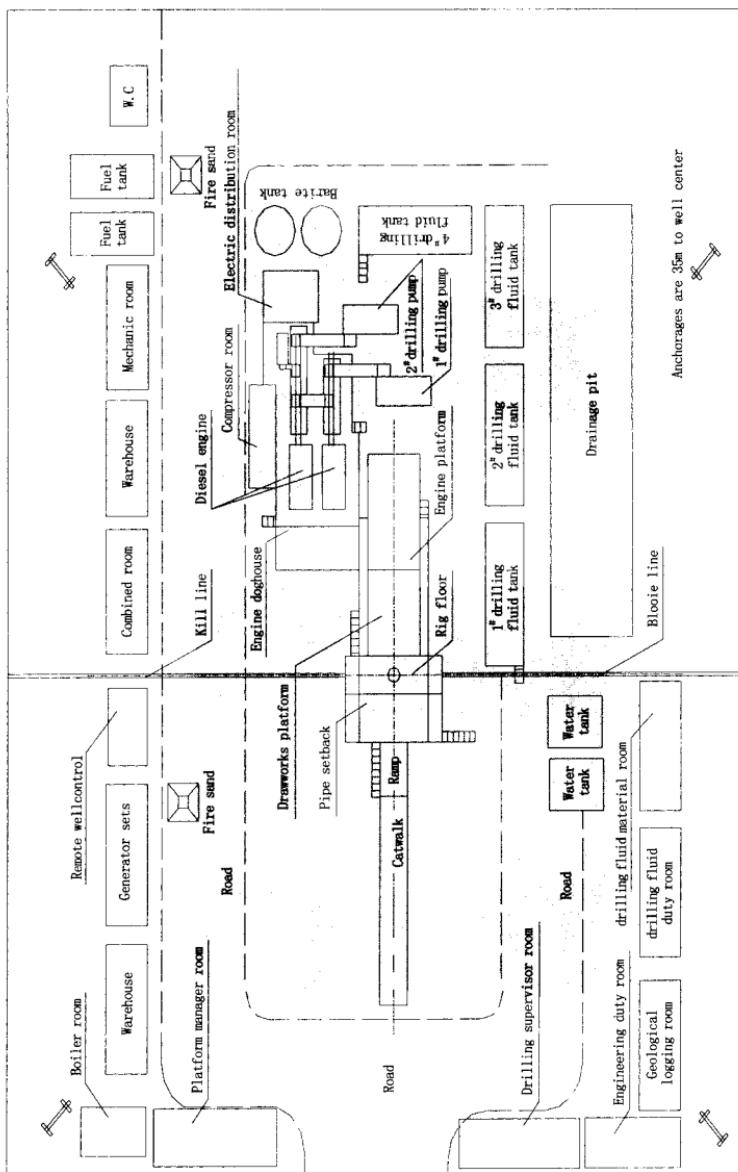


Figure A.2: Plane layout for Rig ZJ20K, ZJ30K

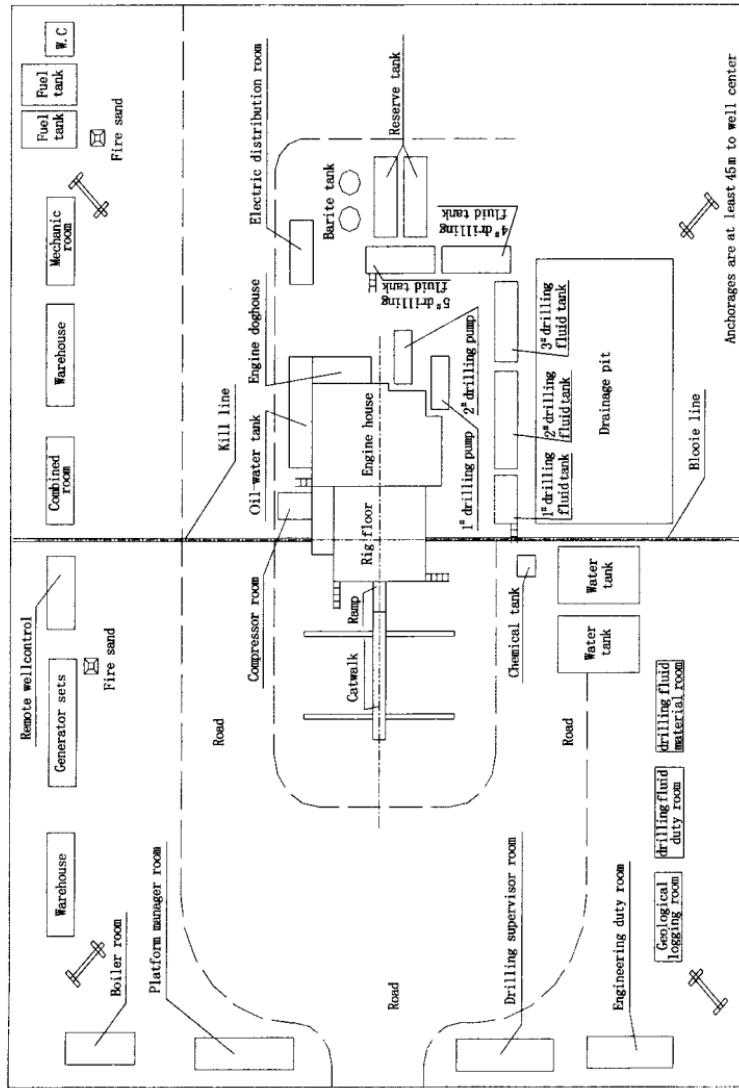


Figure A.3: Plane layout for RIG DAQING II, Z150J

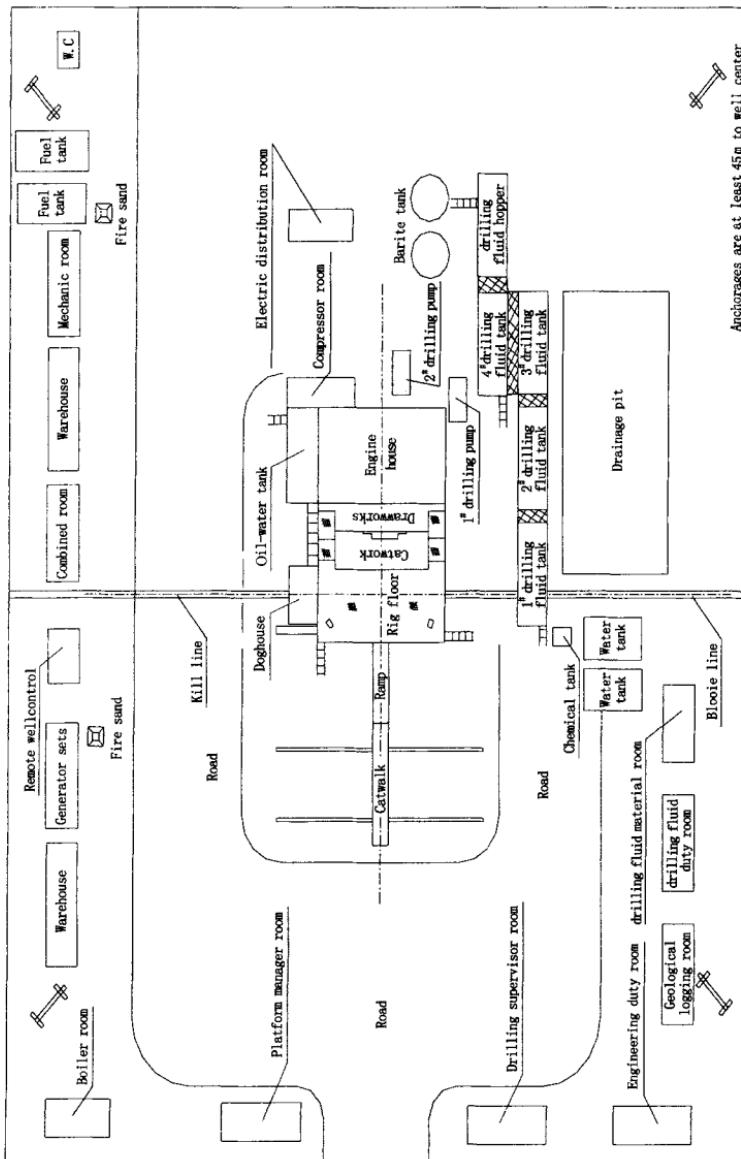


Figure A.4: Plane layout for Rig ZJ40J, F320, ZJ70J

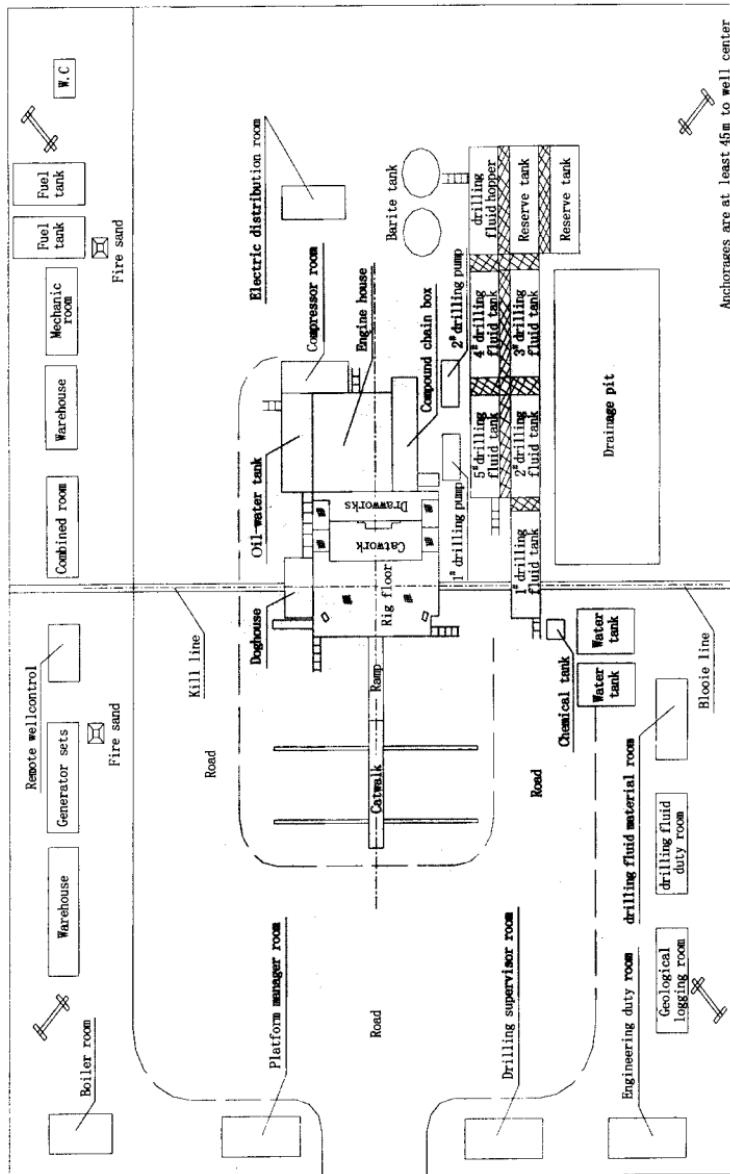


Figure A.5: Plane layout for Rig Z140L, Z150L, Z170L, Z170LC, Z170LD

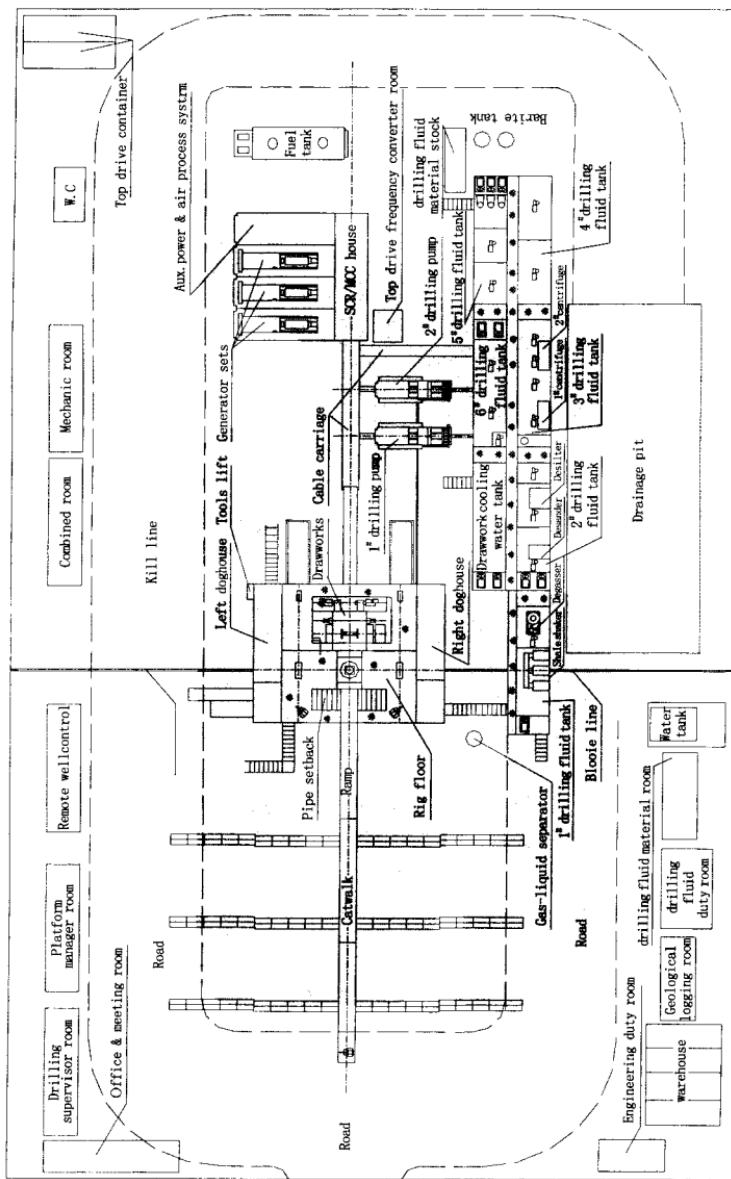


Figure A.6: Plane layout for Electrical Rig Z140D, Z140DB, Z150D, Z150DB

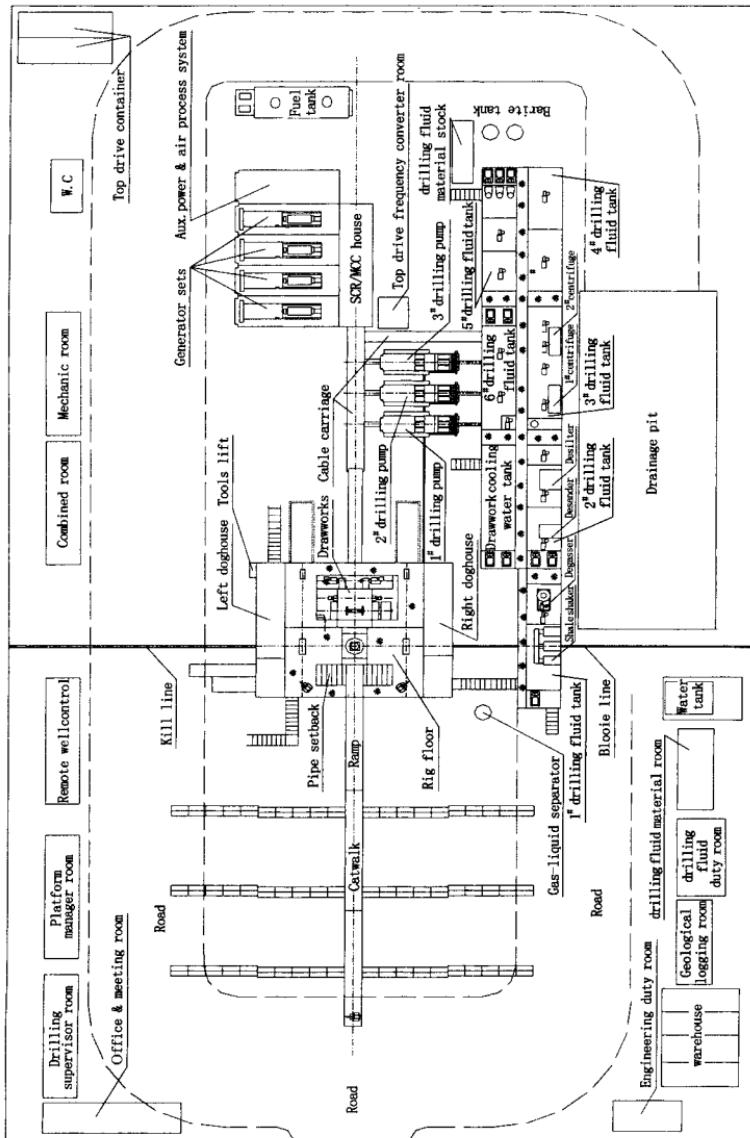


Figure A.7: Plane layout for Electrical Rig ZJ70D, ZJ70DB