Bhai, **Azure Infrastructure Pipeline** (jo mostly **Azure DevOps Pipeline + Terraform/ARM/Bicep** ke sath use hoti hai) me bahut saare **features** hote hain jo infra ko automate aur secure banate hain. Main tujhe **major features + unka use case** simple bhasha me bata deta hoon:

**🔑 Azure Infrastructure Pipeline ke Features**

**1. CI/CD for Infrastructure**

* Code commit hote hi pipeline trigger hoti hai.
* Automatically **plan** aur **apply** kar sakte ho infra changes (Terraform/Bicep/ARM se).
* Manual approval bhi dal sakte ho before production.

**2. Stages & Environments**

* Infra pipeline me alag-alag stages bana sakte ho:
  + Dev → Test → Prod
* Har stage me alag environment aur approval gate use kar sakte ho.
* Example: Dev me auto-deploy, Prod me manual approval.

**3. Terraform/ARM/Bicep Integration**

* Pipeline me direct:
  + terraform init/plan/apply/destroy
  + az deployment group create (ARM/Bicep)
* Infra code ko repeatable aur version-controlled banata hai.

**4. Service Connections (Authentication)**

* Azure resources ke liye **Service Principal** ya **OIDC (Federated Identity)** se login hota hai.
* Securely access karte ho bina secret store kiye.

**5. Azure Key Vault Integration**

* Secrets, passwords, connection strings pipeline me directly use karne ki jagah **Key Vault se fetch** kar sakte ho.
* Example: SQL password, Storage account key, etc.

**6. Approvals & Gates**

* Production me deploy karne se pehle:
  + Manual approval
  + Security/compliance check
  + Quality gate (ex: policy compliance)
* Example: terraform plan output approve karna before apply.

**7. Artifact & State Management**

* Terraform ka state **Azure Storage Account** me securely store karte ho.
* Pipeline me artifacts (like plan files) save aur pass kar sakte ho next stage me.

- publish: tfplan

artifact: planArtifact

- download: current

artifact: planArtifact

**8. Policy & Compliance Checks**

* Azure Policy aur pipeline gates se enforce kar sakte ho:
  + Koi resource specific location me hi create ho.
  + Tags mandatory ho.
* Isse governance enforce hoti hai.

Policy set :- Azure cloud🡪search Policy service🡪Authoring🡪Definitions🡪

**9. Parallel & Sequential Jobs**

* Multiple resources ek sath bana sakte ho (parallel jobs).
* Sequential jobs se dependencies maintain kar sakte ho.
* Example: Pehle VNet, phir VM.

**10. Security Features**

* Role-based access (only few users run prod pipeline).

Left menu → **Pipelines** → **Pipelines** (list)🡪 Top-right me ... (More) pe click → **Security🡪**

🡪Security panel me add karo **AAD group / user** (recommended: AAD group). Fir permissions set karo: **View pipeline**, **Edit**, **Queue builds** (run), **Delete** etc.

* Secrets hidden logs me.
* OIDC authentication (no service principal password rotation headache).

**11. Reusable Templates**

* Common pipeline steps (jaise terraform install, init) ko template bana ke multiple pipelines me reuse kar sakte ho.

**12. Notifications & Reporting**

* Teams/Email notification for success/failure.
* Pipeline run history and logs (audit purpose).

Azure DevOps portal → **Project Settings** → **Notifications**🡪+ New Subscription🡪Condition select करो (jaise When a pipeline run fails OR Pipeline run is successful)--> Recipients (email IDs / groups) select करो

**13. Testing Integration**

* Infra test karne ke liye:
  + **Pester/Inspec/Terraform Compliance tests** run kar sakte ho.
  + Example: Check karo VM sahi size ka hai ya NSG me open ports nahi hain.

**14. Rollback Support**

* Agar apply fail ho jaye to rollback possible hai using:
  + Terraform state
  + Previous artifact plan

stages:

- stage: Rollback

displayName: 'Rollback Previous Plan'

condition: and(succeededOrFailed(), eq(variables['ManualRollback'], 'true'))

jobs:

- job: Rollback

steps:

- download: current

artifact: tfplan

- script: terraform apply tfplan

displayName: 'Apply Previous Terraform Plan'

**15. Multi-Cloud / Hybrid Support**

* Sirf Azure nahi, AWS/GCP infra bhi same pipeline se deploy kar sakte ho (agar Terraform use kar rahe ho).

⚡ **Summary:**  
Azure Infra pipeline ekdum **end-to-end automation + security + governance + testing** deta hai. Tere paas features honge:

* Automation (CI/CD)
* Multi-stage & approvals
* Secret management (Key Vault)
* State/artifact handling
* Policy compliance
* Testing & rollback
* Notifications

👉 Bhai, kya tu chahta hai mai iska **ek real-life pipeline YAML example** bana kar dikhau jisme ye saare features (Dev/Test/Prod stages, KeyVault, approvals, Terraform use) cover ho jaye?